May 1, 2011

Mr. Bob Abbey
Director, Bureau of Land Management
Solar Energy PEIS
Argonne National Laboratory
9700 South Cass Avenue
EVS/240
Argonne, IL 60439

Dear Mr. Abbey:

Please accept and fully consider these comments on behalf of The Wilderness Society, Natural Resources Defense Council, Defenders of Wildlife, Sonoran Institute, Wild Utah Project, New Mexico Wilderness Alliance, Tucson Audubon Society, Audubon Wyoming, Friends of Ironwood Forest, Arizona Wilderness Coalition, Southern Utah Wilderness Alliance, California Wilderness Coalition, Nevada Conservation League & Education Fund, Nevada Wilderness Project, Audubon New Mexico, Soda Mountain Wilderness Council, Center for Native Ecosystems, Western Environmental Law Center, Californians for Western Wilderness, Gila Resources Information Project, Gila Conservation Coalition, National Audubon Society, San Luis Valley Ecosystem Council, and the Sierra Club.

We appreciate the opportunity to submit these comments to the Bureau of Land Management on the draft Programmatic Environmental Impact Statement (PEIS) for agency-wide solar energy program and policy. We are submitting these comments today via the Argonne National Lab website.

To achieve the President's and Secretary's visions of sustainable, environmentally responsible renewable energy development, particularly solar energy, our organizations urge BLM to adopt a Modified Solar Energy Zone (SEZ) Program Alternative that would take into account the general approach of the SEZ Alternative while ensuring SEZs are truly prioritized for development and defining the process for continuing to evaluate and add to SEZs. The **Modified SEZ Program Alternative** we propose would incorporate the following key elements:

- Utility-scale development is limited to SEZs identified in the PEIS and designated in the Record of Decision (ROD), which would be modified from the Draft PEIS in accordance with additional comments and recommendations. Some of our

recommendations on the particular Solar Energy Zones are contained in state-specific comments submitted by some of our groups under separate covers. SEZs designated in the final PEIS require additional site-specific NEPA analysis.

- Additional SEZs may be designated based on determinations of need and in accordance with the criteria and more detailed process set out below. A need has already been demonstrated for additional SEZs in California and we urge BLM to continue review of the West Chocolate Mountains site and initiate analysis of a West Mojave SEZ, based on feedback submitted by some of our groups last year, immediately. Similarly, additional SEZs are needed in Arizona and Arizona BLM's on-going Restoration Energy Design Project should be used to identify potential new SEZs. The need for new SEZs should be analyzed at least every five years. Future SEZs would be fully analyzed at the time of designation to ensure they take a hard look at key issues, including wildlife, cultural resources, transmission, and cumulative impacts, and thus could allow project permitting with tiered NEPA analyses.
- Applications filed before June 30, 2009 (the date the BLM made maps of Solar Energy Study Areas available) would be processed subject to current BLM guidance, including meaningful screening of applications according to Instruction Memorandum Number 2011-061 (and others); projects would then be prioritized for processing starting with those having the fewest conflicts.[1] BLM would extinguish all applications located on lands excluded from development under the final PEIS. New applications and those filed on or after June 30, 2009, will be restricted to zones.

Over the last few years, several of our organizations have worked closely with the BLM, industry representatives, utility representatives and others to address the challenges of guiding solar energy development to the right places, taking into account technical, environmental, cultural, transmission, and other needs. We have seen first-hand how difficult it is for BLM to extinguish applications that are submitted for the wrong places, and how speculative applications further complicate the process of moving appropriately-sited projects forward. We know also that permitting projects of the scale and intensity of these solar energy projects is difficult anywhere in the desert. And we have worked hard to improve and support projects, and to help developers and utilities understand the opportunities and limitations for additional development in our wild, fragile deserts.

Based on these experiences, we believe the **Modified SEZ Program Alternative** provides a clear, effective path from the current situation to a world where projects and transmission are sited expeditiously in the areas of high energy resource and least environmental impact. In

[1] IM 2011-061 should be modified to reflect the consensus recommendations of the California Desert Renewable Energy Working Group to the Secretary of the Interior dated December 22, 2010, and attached as Appendix IX.

addition to facilitating BLM's permitting, it can help utilities and other entities plan for needed transmission to meet renewable portfolio standards and other renewable energy goals.

We appreciate your serious consideration of these comments and urge you to adopt the Modified SEZ Program Alternative. We look forward to continuing to work with you to develop a Solar Energy program for BLM lands that moves forward our goals of clean air, reduced greenhouse gas emissions, and protection of our nation's great western desert ecosystems.

Sincerely,

Nada Culver, Senior Counsel & Director, BLM Action Center
The Wilderness Society
1660 Wynkoop Street, Suite 850
Denver, CO 80202

Johanna Wald, Senior Attorney
Natural Resources Defense Council
111 Sutter Street
San Francisco, CA 94104

Jim Lyons, Senior Director for Renewable Energy
Defenders of Wildlife
1130 17th Street N.W.
Washington D.C. 20036-4604

John Shepard, Deputy Senior Adviser
Sonoran Institute
7650 E Broadway Blvd Ste 203
Tucson, Arizona 85710

Jim Catlin, Executive Director
Wild Utah Project
68 South Main Street, Suite 400
Salt Lake City, UT 84101

Judy Calman, Staff Attorney
New Mexico Wilderness Alliance
142 Truman St. NE #B-1
Albuquerque, NM 87108

Dr. Paul Green, Executive Director
Tucson Audubon Society
300 E. University Blvd. #120
Tucson, Arizona 85705

Brian Rutledge, Executive Director
Audubon Wyoming
358 N 5th, Unit A
Laramie, Wyoming 82072

Lahsha Brown, Executive Director
Friends of Ironwood Forest
738 N. Fifth Ave. Suite 114
Tucson, Arizona 85705

Matt Skroch, Executive Director
Arizona Wilderness Coalition
PO Box 40340
Tucson, AZ 85717

Stephen Bloch, Attorney & Director, Energy Program
Southern Utah Wilderness Alliance
425 East 100 South
Salt Lake City, UT 84111

Kristi Davis, Executive Director
California Wilderness Coalition
P.O. Box 11094
Oakland, CA 94605

Scot Rutledge
Executive Director
Nevada Conservation League & Education Fund
817 South Main Street
Las Vegas, NV 89101

Greg Seymour, Nevada Renewable Energy Program Coordinator
Nevada Wilderness Project
P.O. Box 571675
Las Vegas, Nevada, 89157

Karyn Stockdale, Vice President and Executive Director
Audubon New Mexico
P.O. Box 9314
Santa Fe, NM 87504

Dave Willis, Chair
Soda Mountain Wilderness Council
15187 Greensprings Highway
Ashland, OR 97520

Josh Pollock, Conservation Director
Center for Native Ecosystems
1536 Wynkoop St, Ste 303
Denver, CO 80202

Erik Schlenker-Goodrich, Director, Climate & Energy Program
Western Environmental Law Center
208 Paseo del Pueblo Sur, Unit 602
Taos, New Mexico 87571

Michael J. Painter, Coordinator
Californians for Western Wilderness
P.O. Box 210474
San Francisco, CA 94121

Allyson Siwik, Executive Director
Gila Resources Information Project
305A North Cooper St.
Silver City, NM 88061

M.H. Dutch Salmon, Chairman
Gila Conservation Coalition
305A North Cooper St.
Silver City, NM 88061

Mike Daulton, Vice President of Government Relations
National Audubon Society
1150 Connecticut Ave, NW Suite 600
Washington, DC 20036

Christine Canaly, Director
San Luis Valley Ecosystem Council
P.O. Box 223
Alamosa, CO 81101

Barbara Boyle, Senior Representative, Beyond Coal Campaign
Sierra Club, Suite 2700
801 K Street
Sacramento, CA 95814

# Response to the

# Draft Programmatic Environmental Impact Statement for

# Solar Energy Development

**Submitted by:**


**The Wilderness Society**
**Natural Resources Defense Council**
**Defenders of Wildlife**
**Sonoran Institute**
**Wild Utah Project**
**New Mexico Wilderness Alliance**
**Tucson Audubon Society**
**Audubon Wyoming**
**Friends of Ironwood Forest**
**Arizona Wilderness Coalition**
**Southern Utah Wilderness Alliance**
**California Wilderness Coalition**
**Nevada Conservation League & Education Fund**
**Nevada Wilderness Project**
**Audubon New Mexico**
**Soda Mountain Wilderness Council**
**Center for Native Ecosystems**
**Western Environmental Law Center**
**Californians for Western Wilderness**
**Gila Resources Information Project**
**Gila Conservation Coalition**
**National Audubon Society**
**San Luis Valley Ecosystem Council**
**Sierra Club**

# TABLE OF CONTENTS

## INTRODUCTION

Over the last few years, several of our organizations have worked closely with the BLM, industry representatives, utility representatives and others to address the challenges of guiding solar energy development on public lands to the right places, taking into account technical, environmental, cultural, transmission, and other needs. We have seen first-hand how difficult it is for BLM to extinguish applications that are submitted for the wrong places, and how speculative applications further complicate the process of moving appropriately-sited projects forward. We have worked hard to improve and support projects, and to help developers and utilities understand the opportunities and limitations for additional development in our wild, fragile desert ecosystems.

Based on these experiences and our decades of work to improve the protection and management of our public lands, we have outlined in these comments a **Modified SEZ Program Alternative** to provide a clear, effective path from the current situation to a world where projects and transmission are sited expeditiously in the areas of high energy resource and least environmental impact. In addition to facilitating BLM's permitting, it can help utilities and other entities plan for needed transmission to meet renewable portfolio standards and other renewable energy goals.

Through the Solar PEIS, the BLM is undertaking a new program. Our organizations urge BLM to adopt a **Modified SEZ Program Alternative,** instead of the preferred alternative. This modified alternative takes into account the general approach of the SEZ Alternative while ensuring SEZs are truly prioritized for development and defining the process for continuing to evaluate and add to SEZs. The **Modified SEZ Program Alternative** we propose would incorporate the following key elements:

- Utility-scale development is limited to SEZs identified in the PEIS and designated in the Record of Decision (ROD), which would be modified from the Draft PEIS in accordance with additional comments and recommendations. Most of our recommendations on the particular Solar Energy Zones are contained in state-specific comments submitted by some of our groups under separate covers and incorporated here by reference.[2] SEZs designated in the final PEIS require additional site-specific NEPA analysis.
- Additional SEZs may be designated based on determinations of need and in accordance with the criteria and more detailed process set out below. A need has already been demonstrated for additional SEZs in California and we urge BLM to continue review of the West Chocolate Mountains site and initiate analysis of a West Mojave SEZ, based on feedback submitted by some of our groups last year, immediately. Similarly, additional SEZs are needed in Arizona and Arizona BLM's on-going Restoration Energy Design Project should be used to identify potential new

[2] See: Solar DPEIS – Comments – Arizona Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – Colorado Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – New Mexico Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – Nevada Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – Utah Final (TWS and partners 4-18-11)
Solar DPEIS - Comments – California (NRDC and partners)

SEZs. The need for new SEZs should be analyzed at least every five years. Future SEZs would be fully analyzed at the time of designation to ensure they take a hard look at key issues, including wildlife, cultural resources, transmission, and cumulative impacts, and thus could allow project permitting with tiered NEPA analyses.

- Applications filed before June 30, 2009 (the date the BLM made maps of Solar Energy Study Areas available) would be processed subject to current BLM guidance, including meaningful screening of applications according to Instruction Memorandum Number 2011-061 (and others); projects would then be prioritized for processing starting with those having the fewest conflicts.[3] BLM would extinguish all applications located on lands excluded from development under the final PEIS. New applications and those filed on or after June 30, 2009, will be restricted to zones.

## SECTION 1. DOI ACTION

### I. Make it meaningful

Through the Solar PEIS, the BLM is undertaking a new program, which the BLM has described as:

> [R]eplacing certain elements of [BLM's] existing solar energy policies (described above) with a comprehensive Solar Energy Program that would allow the permitting of future solar energy development projects to proceed in a more efficient and standardized manner. While the proposed Solar Energy Program will further the BLM's ability to meet the mandates of E.O. 13212 and the Energy Policy Act of 2005, it also has been designed to meet the requirements of Secretarial Order 3285A1 (Secretary of the Interior, 2010) related to identifying and prioritizing specific locations best-suited for utility-scale solar energy development on public lands.

According to the Draft Solar PEIS, the "BLM is developing this PEIS to evaluate a proposed program to further support utility-scale solar energy development on BLM-administered lands." DPEIS, p. 1-7. In addition:

> The anticipated elements of the BLM's proposed Solar Energy Program include:
>
> 1. Identification of lands excluded from utility-scale solar energy development in the six-state study area;
>
> 2. Identification of priority areas within the lands open to solar energy development that are best suited for utility-scale production of solar energy in accordance with the requirements of Secretarial Order 3285A1 (i.e., proposed SEZs);
>
> 3. Establishment of mitigation requirements for solar energy development on public lands to ensure the most environmentally responsible development and delivery of solar energy; and

[3] IM 2011-061 should be modified to reflect the consensus recommendations of the California Desert Renewable Energy Working Group to the Secretary of the Interior dated December 22, 2010, and attached as Appendix IX.

4. Amendment of BLM land use plans in the six-state study area to adopt those elements of the new Solar Energy Program that pertain to planning.

DPEIS, p. 1-8.
In order to ensure that the Solar PEIS will provide an effective tool for managing development of solar energy on the public lands, the BLM needs to further delineate and expand discussions of the key aspects of this program as discussed below.

A. ***Solar Energy Zones***

1. Solar Energy Zones are a key element of the proposed program.

The Draft PEIS defines a Solar Energy Zone (SEZ) as "an area with few impediments to utility-scale production of solar energy where BLM would prioritize solar energy and associated transmission infrastructure development." DPEIS, p. 2-10. The SEZs were identified based on solar resources, existing transmission and infrastructure, minimum size, lack of slope, screening out units of the National Landscape Conservation System and other classes of lands with high sensitivity and/or conservation values, and taking into account local conditions, institutional knowledge, and other ongoing coordination efforts. DPEIS, p. 2-10.

The general criteria used to identify SEZs will support the goals of the BLM's program by helping to identify lands best-suited for utility-scale development. However, as discussed in detail in specific comments on each SEZ that have been submitted separately,[4] some of the proposed SEZs encompass lands that are not suited for large-scale development and either should not be designated or should be re-drawn to protect sensitive lands and resources. Further, additional analysis of certain resources will be required to define acceptable SEZs. For example, the Draft PEIS acknowledges that identification of areas of Tribal concern was not completed prior to publication (DPEIS, p. 2-10), and notes that additional information regarding the impacts on wildlife remains to be provided.

Nonetheless, the identification of priority areas for industrial-scale energy development is key to guiding development to suitable areas, as well as to keeping such development out of inappropriate areas.

2. BLM should adopt a **Modified SEZ Program Alternative** to make SEZs and the BLM's solar energy development program more meaningful than the Preferred Alternative.

The BLM's preferred Solar Energy Development Program Alternative (Preferred Alternative) will not meet the objectives of the PEIS, including as set forth in the Purpose and Need Statement, or the BLM's program. It would make available 21.5 million acres of land for utility-

[4] See: Solar DPEIS – Comments – Arizona Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – Colorado Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – New Mexico Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – Nevada Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – Utah Final (TWS and partners 4-18-11)
Solar DPEIS - Comments – California (NRDC and partners)

scale energy development, in addition to designated Solar Energy Zones (SEZs). *See*, DPEIS, Table 2.2-1, p. 2-3. The Preferred Alternative would incorporate SEZs only as areas where utility-scale solar development would be prioritized, but would not actually limit development to these areas. While the Draft PEIS discusses general approaches for directing development to SEZs, these measures are not sufficient to ensure that the SEZs will actually be prioritized by developers or the BLM.

The additional lands that would be made available have not been sufficiently analyzed to justify making them available for industrial levels of development. For instance, the BLM acknowledges that, when considering impacts to special status species, the Draft PEIS has only evaluated data in what are termed the "SEZ regions" that are defined as within 50 miles of SEZ centers. Draft PEIS, p. J-2. The Preferred Alternative, if adopted as proposed, would impact more than 400 rare, sensitive, candidate, state-listed and federally-protected plants and animals.

In contrast to the Preferred Alternative's 21.5 million acres, the SEZs have been subjected to more analysis and, as modified in accordance with recommendations set out in separate comments,[5] are better suited to industrial-scale solar energy development.

In order to actually guide utility-scale development to the most appropriate places on public lands, new applications should be limited to the SEZs designated through this PEIS process, and new or expanded SEZs that are designated, as needed, through the process laid out in these comments.

BLM should adopt a **Modified SEZ Program Alternative** that would take into account the general approach of the SEZ Alternative while ensuring SEZs are truly prioritized for development and defining the process for continuing to evaluate those SEZs. The Modified SEZ Alternative would incorporate the following key elements:

a. Utility-scale development is limited to SEZs identified in the PEIS and designated in the Record of Decision (ROD), which would be modified from the Draft PEIS in accordance with additional comments and recommendations.
b. Additional SEZs could be designated based on determinations of need and in accordance with the criteria and more detailed process set out below.
c. Applications filed before June 30, 2009 (the date the BLM made maps of Solar Energy Study Areas available) would be processed subject to current BLM guidance, including , including meaningful screening of applications according to Instruction Memorandum Number 2011-061 (and others).[6] Applications filed on or after June 30, 2009 will be subject to the zone-based solar energy program set out in the PEIS and modified in accordance with these comments.

Our proposed approach to expanding or adding SEZs is set out in more detail in Section 1.I.B.2: Modify the SEZ Alternative to include a process for adding new zones, below.

[5] Ibid.
[6] IM 2011-061 should be modified to reflect the consensus recommendations of the California Desert Renewable Energy Working Group to the Secretary of the Interior dated December 22, 2010, and attached as Appendix IX.

While limiting development to SEZs is evaluated in the SEZ Program Alternative, it is also consistent with a modification to the Preferred Alternative. Both action alternatives contemplate prioritizing development in SEZs as well as adding additional zones. Neither, however, includes a process for doing so beyond noting that "[c]hanges to SEZs would have to go through a land use planning process, which would be subject to the appropriate environmental analysis." DPEIS, pp. 2-11, 2-14. Both alternatives do provide for amendments to affected land use plans: identifying lands in SEZs, identifying lands excluded from development, and for remaining areas available, would also adopt the policies and design features developed in the Solar PEIS. DPEIS, p. C-1. Accordingly, further defining the process by which additional SEZs would be designated or existing SEZs expanded and then incorporated into the affected plans is consistent with the SEZ Alternative's approach.

3. The **Modified SEZ Program Alternative** would provide sufficient production of energy from solar development on the public lands.

As discussed in the Draft PEIS, two methods were used to evaluate a Reasonably Foreseeable Development Scenario (RFDS), estimating the amount of power projected to be generated. The RFDS, as applied for the next 20 years, is the same for both BLM action alternatives – the Preferred Alternative and the SEZ Program Alternative. DPEIS, p. 2-23. The RFDS is sufficient to meet BLM's goals for production of solar energy from the public lands DPEIS, Table 2.4-2, p. 2-22. Further, an independent analysis of the methodology shows that the RFDS is actually aggressive both in terms of amount of renewable energy needed in the study area through 2030 and in terms of the amount of solar energy the public lands will provide to meet that need and, yet, that the alternatives set out in the Draft PEIS will be able to meet those needs and generation goals.

Further, the independent review concluded that the two methods used to arrive at the RFDS were appropriate tools, supporting the conclusion that the RFDS provides a reasonable basis for projecting the *maximum* development that might occur for the purpose of projecting impacts at the programmatic level. We have attached this analysis as Appendix I. We expect that, based on recommendations for modifying SEZs and for adding new SEZs, the **Modified SEZ Program Alternative** would also meet the agency's goals.

***Recommendations:*** SEZ are necessary to provide for targeted development of solar energy on the public lands in a manner that can use high-quality resources while avoiding lands with high conservation values and limiting damage to other natural resources. The PEIS should ensure that utility-scale development is guided to SEZs and set out a process for designating additional lands as SEZs (including associated criteria) when such capacity is needed through adopting a **Modified SEZ Program Alternative**.

B. ***Zone-based Solar Energy Program through adoption of the Modified SEZ Program Alternative.***

Appendix A to the Draft Solar PEIS sets out "Current and Proposed Bureau of Land Management Solar Energy Development Policies and Design Features." These policies will be

incorporated into all of the affected RMPs and, therefore, are a key element of any Solar Energy Program. The Solar Energy Development Policies and Design Features should be improved in the following ways and adopted as part of a **Modified SEZ Program Alternative**:

At the outset, the ROD and land use plan amendments must be absolutely clear that application of the policies and design features is *mandatory*, subject to applicability to specific site conditions.

The actual text of IMs 2010-071, 2010-141, 2011-003, 2011-059, 2011-060, and 2011-061 should be included, to avoid confusion with the status of this guidance as time passes.[7]

The text of the guidance issued by the Council on Environmental Quality on January 14, 2011, addressing the "Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact," should be incorporated.

BLM should adopt a final, effective **Modified SEZ Program Alternative** that incorporates the following modifications of the Draft PEIS SEZ Alternative:

1. Modify the SEZ Alternative set out in the Draft PEIS to provide for three categories of land designation for solar energy development.

The basis for solar energy development on BLM lands is the underlying Resource Management Plan (RMP). The PEIS seeks to amend 89 RMPs to address solar energy development. The final Solar Energy Program adopted by BLM must have the following three categories of land designation for solar energy development.

a. Category 1: Lands made available for solar development. RMPs underlying designated Solar Energy Zones will be amended to be made available for solar development.

Within SEZs, RMP amendments should affirmatively make that acreage available for solar energy development pending adequate environmental analysis.

b. Category 2: Lands not excluded from solar development. RMPs underlying lands outside SEZs designated as "not excluded from solar energy development" (referred to in the Draft PEIS as "available lands") will be available for further study and potential future designation of new or expanded zones.

The lands not excluded from solar energy development, but not designated as zones, in the DPEIS should be designated as such in the **Modified SEZ Program Alternative**. These are the 21.5 million acres identified in the Draft PEIS as "available land." They should be modified to exclude additional sensitive resources as recommended in state specific comments, especially

[7] IM 2011-061 should be modified to reflect the consensus recommendations of the California Desert Renewable Energy Working Group to the Secretary of the Interior dated December 22, 2010, and attached as Appendix IX.

Citizen Wilderness Proposals and lands set aside for mitigation.[8] These lands should not be made available for development in the ROD but, rather, should serve as the universe of lands from which new or expanded zones can be designated under the reassessment process described in Section 1.I.B.2: Modify the SEZ Alternative to include a process for adding new zones, below, and subject to specific criteria laid out in Appendix VII. Although pending applications may be located in these lands in some states, new applications shall not be accepted on these lands unless and until they are designated zones. Pending applications should be defined to include only those filed by June 30, 2009, to avoid potential gaming of the system between now and the date of the ROD.

c. Category 3: Lands excluded from solar energy development. RMPs underlying remaining 180+ million acres will be amended to exclude solar development.

Where lands have been found not suitable and excluded from solar development under both DPEIS action alternatives, RMPs should be amended to exclude solar energy development under the modified SEZ Alternative. Importantly, **pending applications, regardless of filing date, located in whole or in part in lands excluded from solar energy development should be rejected upon issuance of the ROD**.

The exclusions listed in DPEIS Table 2.2-2 (reproduced following) should be reflected in RMP amendments. However, when considering future zones, an exception should be made for Desert Renewable Energy Planning Process (DRECP). In that process, the BLM should continue to examine **all lands** previously identified within the DRECP planning process as lands potentially available for development. While some lands may become "unavailable" for development upon finalization of the PEIS, the BLM could amend the RMPs within the DRECP area to make some of those lands "available" upon finalization of the DRECP. In particular, we believe that there are potentially suitable lands for development with the West Mojave and Imperial Valley that are not currently identified by the BLM in the PEIS as "available lands." Further, if the BLM issues a scoping notice for potential solar zone(s) within the West Mojave prior to the finalization of the PEIS, the BLM should continue with the examination of those areas for possible RMP amendment after the finalization of the PEIS.

**DPEIS TABLE 2.2-2 Areas for Exclusion under the BLM Solar Energy Development Program Alternative**

---

1. Lands with slopes greater than or equal to 5%.
2. Lands with solar insolation levels less than 6.5 kWh/m2/day.

---

[8] See: Solar DPEIS – Comments – Arizona Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – Colorado Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – New Mexico Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – Nevada Final (TWS and partners 4-18-11)
Solar DPEIS – Comments – Utah Final (TWS and partners 4-18-11)
Solar DPEIS - Comments – California (NRDC and partners)

3. All Areas of Critical Environmental Concern (ACECs), including Desert Wildlife Management Areas (DWMAs) in the California Desert District.
4. All critical habitat areas (designated and proposed) for listed species under the Endangered Species Act of 1973 (as amended).
5. All areas where the applicable land use plan designates no surface occupancy (NSO).
6. All areas where there is an applicable land use plan decision to protect lands with wilderness characteristics.
7. All Special Recreation Management Areas (SRMAs), developed recreational facilities, and special-use permit recreation sites (e.g., ski resorts and camps).
8. All areas where solar energy development proposals are not demonstrated to be consistent with the land use management prescriptions for or where the BLM has made a commitment to take certain actions with respect to sensitive species habitat, including but not limited to sage-grouse core areas, nesting habitat, and winter habitat; Mohave ground squirrel habitat; and flat-tailed horned lizard habitat.
9. All ROW exclusion areas designated in applicable plans.
10. All ROW avoidance areas designated in applicable plans.
11. All areas where the land use plan designates seasonal restrictions.
12. All Desert Tortoise translocation sites identified in applicable land use plans.
13. Big Game Migratory Corridors identified in applicable land use plans.
14. Big Game Winter Ranges identified in applicable land use plans.
15. Research Natural Areas.
16. Lands categorized as Visual Resource Management Class I or II (and, in Utah, Class IIIb).
17. National Recreation Trails and National Back Country Byways.
18. National Historic and Scenic Trails, including a corridor of 0.25 mi (0.4 km) from the centerline of the trail, except where a corridor of a different width has been established.
19. National Historic and Natural Landmarks

---

2. Modify the SEZ Alternative to include a process for adding new zones.

To have a meaningful **Modified SEZ Program Alternative**, the BLM must commit not only to a zone-based approach, but also to expanding or adding new zones. The acreage ultimately designated through the PEIS as available for solar development in SEZs is a good starting point, but it is not sufficient, nor optimal, to satisfy changing conditions in the market and natural environment. The BLM's own Reasonably Foreseeable Development scenario makes it clear that the SEZ Alternative has adequate acreage to meet near-term and medium-range needs. Development will not be appropriate for all these lands, however, and changing circumstances will likely require that additional acreage in the form of additional or expanded zones will be needed to provide the agency and industry the flexibility to accommodate changing conditions and to deliver megawatt-hours. To address likely future needs for more acreage as SEZs, we propose the following modifications to the Draft PEIS SEZ Alternative's Solar Energy Program:

a. Modify the Draft PEIS SEZ Alternative to provide for periodic reassessment of the need for new or expanded zones.

BLM should assess the need for additional acreage required to satisfy regional demand for megawatt-hours from large-scale solar development every 5 years on a statewide basis.[9]

Reassessment of the need for additional or expanded SEZs will take place every five years in each of the six states covered by the PEIS. Reassessment can also be triggered at another time by a petition setting out causes, such as changes in policy or reductions in other SEZs. The assessment process should take no longer than six months.

Once a determination of need for additional acreage or megawatts is made, the BLM will commence a public process through an EIS that will be completed within 12-18 months. The BLM will solicit input regarding additional lands to be included from within the approximately 21.5 million acres that the BLM has concluded are potentially suitable for consideration for solar development and which remain eligible after application of exclusion criteria as modified in this PEIS. These future assessments should also take into account adjacent private lands where appropriate. A Draft EIS will analyze potential additions/expansions to address needs, impacts to other resources, and consider a range of alternatives at a level of detail sufficient to permit tiering for NEPA purposes for projects within the new zone(s) as well as consultation with the U.S. Fish and Wildlife Service (FWS) pursuant to the Endangered Species Act. A Final EIS and ROD will then amend the SEZ designations made in the ROD and affected land use plans.

SEZ designation will be subject to specific screening and additional criteria to avoid conflicts and prioritize previously-disturbed lands.

The results of several ongoing processes to identify lands that would be suitable as zones – i.e., the Restoration Energy Design Project in Arizona, the Chocolate Mountains EIS, and the Desert Renewable Energy Conservation Plan in Arizona – should be incorporated as SEZs into the new program in accordance with the criteria set out for new zones below and through the process for adding new zones that we describe herein, without regard to the "triggers" identified for need. In addition, we believe that there are potentially suitable lands for development within the West Mojave and Imperial Valley that BLM should evaluate for new zones.[10] If the BLM issues a scoping notice for potential solar zone(s) within the West Mojave prior to the finalization of the PEIS, the BLM should continue with the examination of those areas for possible RMP amendment after the finalization of the PEIS.

A periodic approach to reevaluation of the need for additional acreage will ensure that SEZs function as they should – as focal areas for appropriate permitting and development, not as ceilings on development. Acreage of public lands is ultimately an input into the commercial production of electricity, and as such an evaluation of additional acreage must be tied to the best available understanding of need, which itself is a function of many factors, including energy use and production patterns across the grid and changes in the availability of specific assets (such as power plants or transmission lines) over time. But acreage of public lands is also a scarce resource managed for multiple uses. The BLM should commit to utility-scale solar development

[9] Appendix 5 includes a fuller discussion of current approaches to determining "need" for additional generation and transmission infrastructure.
[10] See Solar DPEIS - Comments – California (NRDC and partners)

only the lands needed to accomplish the defined purpose, and modify that commitment as conditions change.

The 5-year reassessment should function similarly to the approach taken to ensure the regular reevaluation of transmission congestion mandated by Congress under the Energy Policy Act of 2005 – i.e., through the National Electric Transmission Congestion Study.[11] The commitment to reexamine the circumstances on a rolling basis provides valuable information to decision makers and, importantly, creates an opportunity for the agency to improve its methodology and, as a result, the quality of its output.

The BLM's reasonably foreseeable development scenario provides an important input, but additional information specific to state and regional conditions (including transmission constraints) and changing resource conditions are essential inputs into reassessment. Specifically, the BLM should take into account the criteria provided as Appendix I.

Appendix VII includes criteria for indentifying new zones. These proposed additions should be subject to the list of screening criteria laid out in IM 2011-061, and other screening criteria as appropriate, including those included in Appendix VII to ensure that the additional zones ultimately designated are appropriate for this use. The evaluation process must reflect a priority for identifying lands already degraded by mechanical disturbance as in Arizona's **Restoration Design Energy Project (**RDEP) as well as in the BLM's own screening criteria issued on February 8, 2011. BLM should consider adjacent or intermixed private lands assessing new zones, as is being done in **Arizona's RDEP** and **California's Desert Renewable Energy Conservation Plan (DRECP)**.

b. Modify the Draft PEIS SEZ Alternative to provide for out-of-cycle reassessment triggered by petition.

Acknowledging that significant changes can occur in the interim between required reassessments, the Modified SEZ Program Alternative should also provide for an earlier reassessment triggered by petition. The need for reassessment must be carefully established and linked to significant policy or market changes (e.g., increase in state or national renewable standards or approval of a foundational transmission line), and not, for example, to the desire of an individual developer to construct a particular project on an area of public lands that is not within a zone. An out-of-cycle reassessment should also allow for petition on the basis of seeking changes in already-designated zones, such as elimination or boundary revisions to, for example, take into account identification of special status species or changes in status of species under the Endangered Species Act.

Petitions will be submitted to and decided on by BLM based on national standards for evaluation to be determined in cooperation with the Department of Energy and set out in guidance.

[11] The study, repeated on a three-year cycle, uses key metrics to identify areas experiencing transmission congestion. We have already seen in the repetition of the same findings in the 2006 and 2009 study that three years is likely too close an interval for reassessment. We are not recommending BLM produce a technical study, but rather learn from the experience of conducting a regular reassessment.

c. Modify the Draft PEIS SEZ Alternative to provide for meaningful stakeholder involvement in reassessment.

The BLM's identification of proposed Solar Energy Study Areas laid bare the limitations on in-house data and knowledge at the agency, especially in desert ecoregions. *See, e.g.,* the Scoping Comments of 20 environmental and conservation organizations submitted to the BLM in response to its proposed SESAs on September 14, 2009, and state-specific comments submitted on the Draft PEIS by many of those same organizations. Given the wide range of data needed to ensure a timely and complete decision, the BLM should be responsible for overseeing the reassessment must solicit input regarding need for additional acreage and in identifying and designating additional zones.

BLM should be responsible for making the determination that additional acreage is needed following stakeholder outreach, and notice and comment. Once the decision is made to identify and designate additional acreage for a given state, the BLM in that state will begin the NEPA process. The BLM will solicit input regarding additional lands to be included from within the lands designated as "not excluded from solar development" (currently referred as "available lands") in the PEIS.

Proposed new or expanded zones must be analyzed through an EIS. As noted above, the goal in preparing EISs for new zones should be to produce a document that contains a comprehensive and in-depth look that resources within the proposed zone such that the permitting of projects within the zone can be facilitated by, for example, an environmental assessment . The final EIS and ROD will amend affected RMPs. The reassessment process should also consider changes in conservation status and, as with project-level review proposed under the Draft PEIS Preferred Alternative, remove those lands for which solar energy development is not appropriate from further availability for solar.

For ongoing efforts in California and Arizona, any designation of additional zones should be incorporated, where appropriate, into the **Modified SEZ Program Alternative** outside the reassessment and interim reassessment processes, and RMP amendments processed as part of the ROD developed by those efforts. In the case of California, the DRECP, when completed (and perhaps incrementally prior to completion), will identify lands for conservation and lands for potential solar development. BLM will need to amend the California Desert Conservation Plan as promptly as possible, if not simultaneously, to be consistent with the DRECP's provisions including, for example, its exclusions of all identified conservation lands from solar and other development availability as appropriate, and designating new solar zone(s) based on the potential solar development areas identified in the DRECP.

Again and importantly, SEZ designation should not occur outside the process set out above such as in the regular land use planning process or for individual projects.

Further, additional provisions that should be included in the Modified SEZ Program Alternative are set out and discussed in detail in Section 1.II below.

***Recommendations:*** The Solar PEIS ROD should adopt the Modified SEZ Program Alternative in order to set out a detailed Zone-Based Solar Energy Program, including the text of applicable and revised IMs and other key guidance, as well as additional elements set out above for reassessing zones and criteria for designation, that will be incorporated into all land use plans via RMP amendments as governing solar energy development.

C. ***Pending Applications for Solar Energy Development.***

The Draft PEIS acknowledges that the BLM has continued to receive right-of-way (ROW) applications for solar energy development during the preparation of the PEIS. Further, in the June 30, 2009 Federal Register Notice providing the "Notice of Availability of Solar Energy Study Area maps," the BLM notified applicants that any ROW authorization for a solar energy application filed before issuance of the BLM's ROD for the Solar PEIS would be subject to the requirements adopted in the ROD. The Draft PEIS proposes that ROW applications received after June 30, 2009, but only those within SEZ, would be subject to the ROD. DPEIS, p. 2-5. However, the Draft PEIS does not set out a detailed approach to processing the pending applications, which is also required in order to make the Solar Energy Program effective as soon as possible.

Currently, a great many ROW applications for utility scale solar development have been filed with the BLM. Overall, as of December 23, 2010, approximately 166 ROW applications have been filed.[12] As of April 8, 2011, the BLM had classified 103 of these applications in the six-state study area as "active"[13] and "approved" applications. In all, this "subset" of applications, which included the fast track projects originally identified by BLM as well as lower priority projects, covers 1,038,442 acres and is estimated to have the capacity to produce 60,601 MWs. *See* Table of "Active and Approved Solar Applications on BLM-Administered Lands," prepared by L. Resseguie, December 20, 2010. In California, where there are 30 of these applications, roughly 50 % of them are within proposed zones, including the zones that the State and the environmental community think should be dropped.

It would undoubtedly take significant resources to process all of these applications and it is unlikely that there is enough money to process all of them as well as the transmission that would need to be built to support these projects. (Moreover, many are in inappropriate locations). Although the BLM possesses the legal authority to reject these applications, our groups are not recommending that this be done even after the new solar program is adopted. Rather, as described in more detail below, our groups urge the BLM to adopt a process for dealing with these applications that 1) will ensure that its limited resources are focused on the applications that are most likely to succeed and 2) will not undermine the zone-based approach and its myriad benefits.

Processing pending applications should proceed as follows:

[12] See NRDC, *Bureau of Land Management Utility-Scale Solar Applications – A Geospatial Survey of Active ROW Applications*, April 2011. Data used in production of this report were drawn from BLM.

[13] The meaning of this term is unclear. It may mean that these are "first in line applications." It unquestionably does not mean that the applications have passed the BLM's economic and technical criteria as of that date, let alone the criteria established by Instruction Memorandum 2011-061 on February 8, 2011.

1. Applications filed before June 30, 2009 (the date established by BLM in its Notice of Availability of SESA maps), will be considered, screened, and processed as appropriate with the exception of pending applications within lands excluded from solar energy development.
    a. Pending applications within the acres of public lands excluded from solar energy development under both alternatives presented in the Draft PEIS shall be rejected upon finalization of the ROD.
    b. Applications considered outside of zones will need concurrent RMP amendments as was the case with 'fast track' projects in CDCA.
    c. The prevailing IMs in force as of the finalization of the ROD will be written into the RMPs as the required method for processing all applications submitted prior to June 30, 2009, with the following exceptions:
        i. IM 2011-061 should be amended to reflect the screening criteria agreed to by developers, utilities and other industry representatives, as well as environmental and conservation groups, transmitted to the Secretary on December 22, 2010, and attached as Appendix IX.
        ii. Proximity to National Park Units should remain a high risk factor.
        iii. All pending applications that have not advanced to a Notice of Intent to prepare an EIS shall be subject to the pre-application consultation requirements of IM 2011-061.
    d. BLM shall reserve its right to reject applications at any time and prioritize consideration of pending applications as follows:
        i. Pending applications located within zones, starting with those found to be "low conflict" per the screens established in IM 2011-061, modified as described above, followed by those found to be "medium conflict"
        ii. Pending applications located outside zones found to be "low conflict" per the screens established in IM 2011-061, modified as described above, followed by those found to be "medium conflict"
        iii. Consideration of pending applications is not an assurance that applications will either proceed to environmental review nor be approved
        iv. BLM reserves the right to defer consideration or review of applications on the basis of environmental screening results, as well as on the basis of other appropriate reasons such as agency resource constraints or other agency priorities
    e. Applicants holding pending applications should be assessed an annual "holding fee"
    f. At their discretion, applicants should have the option of withdrawing their applications with a guaranteed refund of application fee.
    g. Applicants should be able to choose to opt into the program established by the PEIS (and set out in the **Modified SEZ Program Alternative**) as follows:
        i. Applicants with pending applications located within designated zones will have the option of electing to be considered under the program established by the PEIS.

ii. Applicants with pending applications located outside of zones that are found to be "low potential for conflict" or "medium potential for conflict" per the screens established in IM 2011-061, modified as described above, will have the option of relocating their project within designated zones on lands not already under application, retaining their filing date seniority, and being considered under the Modified SEZ Program Alternative.

iii. Project proponents with applications pending outside of zones that are found to be "high potential for conflict" per the screens established in IM 2011-061, modified as described above, will not be eligible to opt into the Modified SEZ Program Alternative, and are expected to be screened out under the prevailing agency guidance.

iv. BLM will be expected to enforce requirements from completion of Plans of Development and needed information as has been done in California to work down the list as expeditiously as possible.

v. BLM reserves the right not to process these applications based on available resources and competing priorities.

vi. Zones should be designated as right-of-way corridors pursuant to FLPMA and as such become the immediate priority for consideration.

vii. The 2011-12 priority lists have been established, and will presumptively be worked through not subject to these provisions. However, once designated, zones will be the operational construct for directing agency resources. Accordingly, any pending applications filed prior to June 30, 2009, and not on the 2011-12 priority list would be expected to be considered further only to the extent they are within zones

2. Applications filed after June 30, 2009, will be subject to the Modified SEZ Program Alternative as proposed in this comment letter.
    a. Pending applications within zones will be subject to screening and review pursuant to the PEIS terms.
    b. Pending applications outside of zones will be rejected upon issuance of the ROD.[14]
    c. Future applications will only be accepted within designated zones.
    d. Applications processed under the program established by the PEIS may be subject to competitive offering

Pending Applications must be defined to include only those filed by a certain date in the past. The risk to gaming the system if Pending Applications included applications filed until the ROD, for example, is simply too great. The BLM has already demonstrated it has interest and authority to shield applications in the queue from speculative behavior by mineral developers.[15] And while

[14] At a minimum, pending applications filed post-June 30, 2009, should be deferred until such time as all pre-June 30, 2009, applications are processed and there are no applications pending within zones, provided that the application is subject to a significant holding fee in the meantime.

[15] On April 26, 2011, BLM issued an interim temporary final rule to segregate existing and potential wind and solar lands ROWs, or public lands indentified by the BLM for potential wind and solar generation from competing and potentially conflicting mineral interests. 76 Fed. Reg. 23198. The principle behind the issuance of this rule was sound, in that we agree that such a rule as expressed in the original notice would, "…promote the orderly

a prospective mineral interest can lay harm to the judicious processing of a solar or wind ROW application, the same dynamic is true when multiple and prospective solar ROW applications are accepted, particularly when the boundaries of overlap with preceding applications. Furthermore, the acceptance of multiple ROW applications also threatens to diminish the planning process, given that these multiple ROWs applications compete for the same and limited planning resources of the agency. The same latitude afforded the agency in reducing conflicts through segregation should be applied to establishing a clear boundary date in defining pending applications so that the agency can preclude multiple overlapping applications.

***Recommendations:*** The Solar PEIS needs to address existing applications for rights-of-way in detail and should do so in accordance with the approach set out above and described in further detail below.

D. Conservation of wildlife, habitats and ecosystems concurrent with adoption and implementation of the **Modified SEZ Program Alternative.**

1. The agency should adopt a "no net loss" conservation policy for the **Modified SEZ Program Alternative**

The Preferred Alternative, if adopted without revisions, would undermine at-risk and endangered species, in violation of the Federal Land Policy and Management Act (FLPMA) and applicable BLM policies adopted pursuant to that statute, as well as the Endangered Species Act. The Preferred Alternative would impact more than 400 rare, sensitive, candidate, state-listed and federally-protected plants and animals. For each of these species, BLM identified the acres of potentially suitable habitat in a five million acre area around each zone and then evaluated the potential impact of solar infrastructure on these habitats.

BLM policy pertaining to wildlife, habitats and ecosystems should be consistent with the standards established under BLM's policy on the management of Special Status Species (6840) and Wildlife and Fisheries Management (6500). This standard should require "no net loss" of wildlife as a result of the Solar Energy Program and a "net conservation benefit" to BLM Special Status Species adversely impacted by the program. A net conservation benefit standard would require a project that adversely impacts a listed species to successfully enhance that species' overall population or recovery status. To be classified as a net conservation benefit, the enhancement must benefit the affected species to a greater degree than if the project were not undertaken.

For example, the Special Status Species policy directs the agency to not only minimize threats to sensitive species, but also "improve the condition of the species habitat" and "initiate proactive conservation measures" to minimize the likelihood of ESA listing." BLM Manual 6840.2; 6840.02. Given the breadth and potential of widespread impacts from the new Solar Program, BLM should seize this opportunity to proactively improve conditions for sensitive species across all six states within the PEIS study area. Failing to do so would be inconsistent with BLM

---

administration of the public lands by giving the BLM a tool to minimize potential resource conflicts between ROWs for proposed solar and wind energy generation facilities and other uses of the public lands." 76 Fed. Reg. 23199.

wildlife and special status species policy and would pose a great risk to wildlife on BLM lands as solar energy development expands across the landscape. Yet, for more than 100 species, BLM estimated wildlife populations could face up to a 10% loss of their populations or habitat. In the 11,000 page PEIS, however, BLM offered no detailed proposals to offset those losses with beneficial activities elsewhere.

Further, under section 7(a)(1) of the ESA, BLM is explicitly obligated to affirmatively conserve ESA listed species. Because the BLM already requires developers to implement mitigation measures for impacted species, there is already a framework in place for incorporating the no net loss and net conservation benefit standards. These goals are achievable without slowing the development of a growing solar industry or other energy production or other development on BLM land. In fact, we believe that implementation of the no net loss and net conservation benefit goals would increase certainty for developers by clarifying the standard for mitigating project impacts before a project could go forward.

We believe that the appropriate goals for the BLM, given its public trust responsibility as part of a Department with a mission of protecting natural resources and the affirmative Special Status Species policy and ESA obligations are the following:

- BLM should commit, in the ROD, to a goal of leaving regional populations of sensitive wildlife and plant species as well or better off after solar development than before it – 'no net loss.'
- BLM should establish an agency goal for endangered, threatened and candidate plant and animal species that seeks an outcome from each consultation over a proposed SEZ or solar project that will result in a net conservation benefit for all such affected species through mitigation measures including habitat restoration and land acquisition.

These goals can be met by careful planning that allows projects to avoid impacting the most important places for wildlife. With these broad goals in place for sensitive and listed species, remaining impacts on individual species should be offset through compensatory mitigation that creates benefits for wildlife in other appropriate locations. In addition, success in meeting these goals does not have to be achieved solely through developer-funded mitigation and/or as part of the consultation process. Instead, BLM could describe how its own activities to manage and restore species populations would be used in concert with developer efforts and how all those efforts, together, would achieve the no net loss and net conservation benefit standards proposed.[16]

***Recommendations:*** BLM should commit, through the final PEIS, to a goal of leaving regional populations of sensitive wildlife and plant species as well or better off after solar development than before it – 'no net loss.' With regards to endangered, threatened and candidate species, BLM should establish an agency goal that seeks an outcome from each consultation over a proposed solar project that, through mitigation measures including habitat restoration and land

[16] Such an approach is consistent with BLM-directed mitigation of natural gas development-related impacts on mule deer and pronghorn in the Jonah and Pinedale fields in Wyoming. In that case, developers funded a multimillion dollar mitigation fund and intensive monitoring to document and attempt to fully offset impacts on these species. While the monitoring and follow-up actions have not been carried out as envisioned, the approach could be designed and implemented in a manner that would be successful.

acquisition, will result in a net conservation benefit for affected threatened or endangered plants and animal species.

2. The BLM should use agency wildlife policy to assess and develop the Solar Energy Program through a Modified SEZ Program Alternative.

Substantive BLM wildlife policy is established within the Special Status Species Manual (6840) and the Wildlife and Fisheries Management Manual (6500) on BLM lands.[17] The purpose of these policies is to provide guidance to the agency in the conservation of the species, habitat and ecosystems found on BLM lands. The wildlife policies clearly apply to this PEIS and the program it ultimately implements, which the agency has acknowledged is a land use planning process.

BLM wildlife policy can be translated into meaningful program conservation objectives. For example, agency wildlife policy could be used to analyze and develop a solar program which will:

- Conserve or recover ESA-listed species
- Reduce or eliminate threats to BLM sensitive species and minimize the likelihood of listing these species under the ESA
- Ensure self-sustaining populations and a natural abundance and diversity of wildlife, fish, and plant resources on the public lands

Given the scale and scope of development being contemplated under a solar program and the significant risk posed to wildlife, habitat and ecosystems by that development, it is imperative that BLM fulfill its wildlife policy obligations with the utmost diligence. Agency policy provides the BLM with measurable conservation objectives that should be incorporated into all aspects of solar energy program planning and implementation, for example as a means of evaluating program and project impacts, and as a standard for implementing key program features, such as mitigation and adaptive management plans.

[17] The objectives of the Special Status Species policy are twofold: 1) To conserve and/or recover ESA-listed species and the ecosystems on which they depend so that ESA protections are no longer needed for these species; 2) To initiate proactive conservation measures that reduce or eliminate threats to Bureau sensitive species to minimize the likelihood of and need for listing these species under the ESA. The second objective is of particular use in this case as it provides the agency with the ability to meaningfully characterize the risk posed by solar development to wildlife species.

The Wildlife and Fisheries Management policy provides clear, measurable criteria to the BLM as well: "It is BLM policy to manage habitat with emphasis on ecosystems *to ensure self-sustaining populations and a natural abundance and diversity of wildlife, fish, and plant resources on the public lands*." 6500.06 (emphasis added). In order to accomplish this policy's goal to ensure self-sustaining populations and a natural abundance and diversity of wildlife, section 6500 states that the BLM will, among other things, "ensure *full consideration* of the wildlife, fish, and special status species in land use plans and other BLM activities." 6500.06 (emphasis added)." In addition, it will "ensure that all activity plans (HMPs, AMPs, etc.) include *site specific objectives* for wildlife fish, and special status species and the actions necessary to achieve those objectives."

As with the 6840 policy, the 6500 policy enables BLM to meaningfully assess impacts to fish and wildlife species, and to develop a solar program that is consistent with the agency's policy obligations. In particular, the obligation to ensure self-sustaining populations as well as natural abundance and diversity provide the agency with a meaningful conservation framework. We strongly recommend that the agency apply these wildlife conservation objectives to all aspects of solar program planning and decision-making, for example in the development of meaningful avoidance, minimization and mitigation strategies.

***Recommendations:*** Existing BLM wildlife policy, as set out in the objectives and guidance from BLM's manual for management of Special Status Species (SSS/6840) and Fish and Wildlife (FW/6500) on BLM lands, should be used to identify meaningful conservation objectives as part of the Solar PEIS and the Solar Energy Program. BLM should take this opportunity to set clear goals and commitments to ensure: conservation or recovery of ESA-listed species; reduction or elimination of threats to BLM sensitive species (also minimizing the likelihood of ESA listing for these species under the ESA); and self-sustaining populations and diversity of wildlife, fish, and plant resources on the public lands. In this way, BLM can best comply with its own policies and obligations regarding wildlife management, while also supporting solar energy development.

3. The Solar Energy Program implemented through the Modified SEZ Program Alternative must address groundwater resources.

Water sustainability must be one of the guiding principles for siting solar energy development. Without ensuring water sustainability for power production, the BLM cannot "implement agency-specific programs that would facilitate environmentally responsible utility-scale solar energy development," 73 Fed. Reg. 30908, 30909 (May 29, 2008). The same basins that contain excellent solar resources often have little water to spare for energy development; many are already fully or over-appropriated and many are in a state of overdraft. One research group has found that water availability highly constrains thermoelectric cooling in many of the same areas proposed for solar energy development.[18]

To ensure sustainable water use on BLM lands, the BLM must take all aspects of water resources into account when evaluating solar energy development on our nation's lands. It is critical that BLM ensures that solar energy development limits resource conflict by minimizing water use and reduces energy production's vulnerability to water shortage. We cannot plan for future energy production, energy security and energy reliability without considering how water requirements will be met over time. "[I]t is crucial that the United States develop new policies that integrate energy and water solutions so that one resource does not undermine the use of the other."[19]

For all solar development permitted by BLM, developers must ensure that solar energy water use will not contribute to exceeding the sustainable yield of the surface or groundwater source,[20] to avoid injury to other water rights holders, to federal trust resources, and to special status species. We support the proposed design features required of all solar energy development approved by BLM that prohibit water use that exceeds sustainable yield or affects special status species and sensitive habitats. (A-54, A-57). That said, we recommend BLM include a prohibition on project water use that affects federal trust resources such as national wildlife refuges, national parks, areas of critical environmental concern and similar public lands.

---

[18] *See* EPRI, *A Survey of Water Use and Sustainability in the United States with a Focus on Power Generation* (Nov. 2003) (finding high cooling constraints in Clark County, NV; San Bernardino, Riverside, Imperial and San Diego Counties, CA; Doña Ana County, NM; and Alamosa County, CO).

[19] 111 Cong. Rec. S2830 (daily ed. March 5, 2009) (statement of Sen. Bingaman) (noting that "neither resource is routinely considered in developing management policies for the other").

[20] We also suggest a definition for safe or sustainable yield of surface water sources, as one is currently missing from the glossary. "The level of water extraction from a particular system that, if exceeded, would compromise key environmental assets, or ecosystem functions and the productive base of the resource."

In fully appropriated, over-appropriated or overdrafted surface or groundwater basins, BLM and the project developer must ensure that solar energy projects result in no net depletions of water resources or that any depletions are offset. In overdrafted basins, they should also reduce the amount of overdraft. Any increase in depletions constitutes a new appropriation on the system that will reduce and draw down aquifers, adversely affecting vegetation, wetlands, riparian areas, seeps, springs and other wildlife habitats.

The technology exists to conserve our water resources. In basins with little or no available water, it appears that only dry cooled or non-cooled technologies may be feasible. Cooling systems such as dry cooling and hybrid cooling can conserve water in the cooling cycle, and concentrating PV and dish systems can conserve even more water because no cooling cycle is needed. Should cooling technologies become more water efficient or other technologies that operate without a cooling cycle develop, there may be additional opportunity for solar development in the areas with limited water resources. Should non-freshwater sources, such as municipal wastewater, be available, there may be opportunities to utilize water-dependent technologies for cooling or other needs.

BLM has also acknowledged that wet cooling is not feasible within nearly every proposed SEZ.[21] In light of such limited water availability, we expect that the inclusion of design features finding wet cooling infeasible establishes a presumption against BLM approval of projects utilizing wet cooling. Most proposed wet cooled projects will present both significant resource conflicts in their attempts to obtain adequate water rights and also challenges in avoiding unacceptable impacts to water resources and the ecosystems, habitats and species that depend on them.

***Recommendations***: The ROD should incorporate requirements that limit impacts by basing the selection of solar energy technologies on the available water supply; prohibit unacceptable impacts caused by water use; and mitigate adverse impacts to water and ecological resources.[22] BLM may require a project developer to use non-freshwater sources, such as municipal effluent, or acquire minimization rights that offset adverse and mitigate for impacts to streamflow, aquifer levels, recharge, sensitive fish and wildlife and their habitats, or other impacts, potentially achieving a net gain in water available for ecosystem and habitat needs.

## II. Make it legally sufficient

In order to implement the Modified SEZ Program Alternative and effectuate the Solar Energy Development Program described above, the PEIS and its application must comply with applicable legal requirements. As currently drafted, the Draft PEIS is not legally sufficient. The PEIS must be improved to define the scope of environmental analysis conducted and confirm the additional environmental and cultural analysis that is legally required to approve projects.

### *A. NEPA*

[21] This design feature should also apply to any solar energy project outside a given SEZ.

[22] This could be accomplished, by, for example, denying an application if the water requirements of the proposed technology would result in unacceptable impacts.

The National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 *et seq*., requires, among other things, agencies to conduct environmental analysis of the direct, indirect, and cumulative impacts of proposed actions, as well as mitigation measures, consider a range of reasonable alternatives (including an alternative that minimizes environmental impacts), and solicit and respond to public comments. The Final PEIS should adopt the **Modified SEZ Alternative** described in these comments, which best meets the goals of the PEIS and BLM's Solar Energy Program, and would set out a structure to ensure that BLM's approval of utility-scale solar energy projects comply with NEPA.

1. Scope and adequacy of NEPA analysis for implementing the Modified SEZ Program Alternative.

The Solar PEIS incorporates exclusion of certain lands from utility-scale solar development, assertions about the prioritization of others, and a general preliminary determination of availability for other lands. As discussed above and throughout these comments, and as acknowledged in the Solar PEIS, the environmental analysis contained in the Solar PEIS is not sufficient to approve individual projects, nor is it sufficient to allowing tiering to approve projects using environmental assessments. Additional analysis is required to effectively implement the Solar Energy Program described in these comments, which we have described as the Modified SEZ Program Alternative.

The below analysis discusses both the limitations on the use of the Solar PEIS for approving projects and a path forward for ensuring sufficient and efficient NEPA compliance, by adopting the Modified SEZ Program Alternative. A Solar Energy Program that can be supported and implemented would necessarily incorporate the modifications, clarifications, and additions described in these comments and separate comments addressing the application of the Solar PEIS in each affected state.

(a) The scope of analysis set out in the Solar PEIS generally supports the establishment of the Solar Energy Program incorporated into the Modified SEZ Program Alternative, including designation of Solar Energy Zones.

As noted above, the scope of NEPA analysis in the PEIS must be commensurate with the action that the BLM is undertaking. For the Solar PEIS, the analysis set out can support designation of SEZs and incorporation of program elements such as design features and mitigation measures at the RMP level. However, the environmental analysis set out in the PEIS cannot support substantial tiering such that project-level NEPA could be limited to environmental assessments. Rather, the NEPA analysis conducted in the PEIS sets out a program framework and identifies the next decision points where additional NEPA will be needed – i.e., at a landscape or zone level, and then at a project- or site-specific level. The NEPA analysis in the PEIS must be clearly defined and its limitations recognized in order to support adoption and implementation of the Modified SEZ Program Alternative.

In the context of a programmatic NEPA document, the Supreme Court has held that the environmental consequences of a set of proposed actions must all be considered together in a

single, programmatic EIS when their impacts will have a compounded effect on a region. *See Kleppe v. Sierra Club*, 427 U.S. 390, 410 (1976). With respect to solar energy development, BLM is unquestionably establishing a new program, which the Draft PEIS describes as follows:

> The anticipated elements of the BLM's proposed Solar Energy Program include:
> 1. Identification of lands excluded from utility-scale solar energy development in the six-state study area;
> 2. Identification of priority areas within the lands open to solar energy development that are best suited for utility-scale production of solar energy in accordance with the requirements of Secretarial Order 3285A1 (i.e., proposed SEZs);
> 3. Establishment of mitigation requirements for solar energy development on public lands to ensure the most environmentally responsible development and delivery of solar energy; and
> 4. Amendment of BLM land use plans in the six-state study area to adopt those elements of the new Solar Energy Program that pertain to planning.

DPEIS, p. 1-8.

By completing a programmatic EIS, an agency is able to examine "an entire policy initiative rather than performing a piecemeal analysis." *Northcoast Environmental Center v. Glickman*, 136 F.3d 660, 688 (9th Cir. 1998). However, as set out in the NEPA regulations, the analysis is intended to be **pertinent to the policy at issue** and to **occur at relevant points** in the process – and so is not necessarily going to be comprehensive at the first stage. *See*, 40 C.F.R. § 1502.4 (Major Federal actions requiring the preparation of environmental impact statements) ("Agencies shall prepare statements on broad actions so that they are relevant to policy and are timed to coincide with meaningful points in agency planning and decision making"; and can evaluate these actions in the context of "general location," "relevant similarities" of actions, and "stage of technological development.").

The Draft Solar PEIS provides a broad analysis of environmental consequences that will generally support the elements of a solar development program identified in the PEIS, as well as additional proposed modifications incorporated into the **Modified SEZ Program Alternative**, including:

- excluding some lands in the study area from utility-scale solar energy development;
- identifying lands that might be available for solar applications (which will then be refined based on later analysis);
- imposing a set of mitigation requirements (that will also be refined based on location and proposed technology);
- designating zones where solar energy development will be prioritized (although projects will still require further analysis and may not be approved based on conflicts discovered at that level);
- setting out a process for designating additional zones and incorporating them into the PEIS; and
- setting out policies and other procedures that will apply to evaluating, permitting and monitoring solar projects (such as prioritizing use of previously-disturbed lands).

*See, generally*, DPEIS, Chapter 5.

(b) Additional NEPA analysis is required to effectively implement the Modified SEZ Alternative and to permit tiering for likely environmental consequences and to maximize the efficacy of zones.

The Draft PEIS does not incorporate in-depth analysis of likely environmental consequences to specific resources from utility-scale solar energy development. As noted in Chapter 5, the intent of the analyses presented is "to **describe a broad possible range of impacts** for individual solar facilities, associated transmission facilities, and other off-site infrastructure that might be required to support utility-scale solar energy development." DPEIS, p. 5-1 (emphasis added). Further, the analysis is intended to "**inform the design**" of the BLM's solar energy program. *Ibid*. Neither of these types of analysis would constitute a "hard look" at the direct, indirect, and cumulative impacts to resources and uses of the public lands which could support permitting of projects. As noted above, the scope of NEPA analysis must be commensurate with the action that is proposed; and, as a corollary, the scope of the federal action being analyzed must be accurately characterized to ensure that an EIS of equivalent scope is prepared. *See Aberdeen & Rockfish R. Co. v. SCRAP*, 422 U.S. 289, 322 (1975). The federal action in the Draft PEIS is clearly defined by BLM as a Solar Energy Development Program and the scope of the analysis is of similar breadth and lack of depth, which, consequently circumscribes the use of the analysis to justify activities beyond those that would establish such a program.

The analysis as it pertains to lands outside the proposed SEZs is particularly lacking. The BLM acknowledges in the Solar PEIS that, when considering impacts to special status species, it has only evaluated data in what are termed the "SEZ regions," which are defined as lands within 50 miles of SEZ centers. DPEIS, p. J-2. The agency notes that "an expanded species analysis by alternative was identified too late during the preparation of the Draft PEIS to be accommodated in this version of the document," such that the impacts from the Preferred Alternative to special status species have not been evaluated. *Ibid*. The Draft PEIS further provides that BLM expects "that a discussion of all species with the potential for being impacted under each alternative will be developed between the time of the Draft and Final PEISs." *Ibid*. However, providing the analysis at this later point in the process will not permit the public to review and comment on either the data or the agency's analyses, both of which must be disclosed to the public as part of the Draft PEIS in order to permit the "public scrutiny" that is considered "essential to implementing NEPA." 40 C.F.R. § 1500.1(b). Additionally, the agency has only committed to obtaining additional information regarding special status species and not to other important resources found on the public lands.

Accordingly, use of the Solar PEIS must be limited to supporting a solar energy development program that incorporates the elements described by the BLM and the proposed modifications set out in the Modified SEZ Program Alternative. While the Final PEIS can justify limiting solar energy development to zones, it cannot support project approval without significant additional environmental analysis (as described in further detail below). Similarly, while the PEIS can set out a program governing processing of applications, management of projects, and expanding acreage in zones (also described in further detail elsewhere in these comments), and can incorporate the program into affected RMPs via amendments, the existing analysis cannot

support designation of additional zones in the Final PEIS. To most effectively implement the Modified SEZ Program Alternative and make the most efficient use of designated zones, the PEIS must specifically provide for additional NEPA analysis to be conducted on new zones designated in the future pursuant to the process we recommend in these comments. Such analysis could provide for both the needed landscape- or zone-level analysis and tiering to environmental analysis for individual projects.

i. Tiering

The ability to tier subsequent decisions to the analysis of environmental consequences set out in a programmatic EIS varies based on the definition of the "program" that is analyzed. The NEPA regulations provide:

> Agencies are encouraged to **tier their environmental impact statements to eliminate repetitive discussions of the same issues** and to **focus on the actual issues ripe for decision at each level of environmental review** (Sec.1508.28)…. Tiering may also be appropriate for **different stages of actions**. (Section 1508.28).

40 C.F.R. § 1502.20 (emphasis added).

Thus, while tiering of environmental analysis is encouraged, it is necessarily limited to the issues analyzed at the programmatic level; and each level or stage of analysis should focus on the actual issues that are "ripe" for decision – meaning that there is sufficient information to conduct a meaningful analysis.

The discussion of these issues in CEQ's "NEPA's Forty Most Asked Questions" (http://ceq.hss.doe.gov/nepa/regs/40/20-29.HTM#24) is also instructive:

> 24b. When is an **area-wide or overview EIS** appropriate?
> A. The preparation of an area-wide or overview EIS may be particularly useful when similar actions, viewed with other reasonably foreseeable or proposed agency actions, share common timing or geography. For example, when a variety of energy projects may be located in a single watershed, or when a series of new energy technologies may be developed through federal funding, the overview or area-wide **EIS would serve as a valuable and necessary analysis of the affected environment and the potential cumulative impacts of the reasonably foreseeable actions under that program** or within that geographical area.
>
> 24c. What is the function of **tiering** in such cases?
> A. Tiering is a procedure which allows an agency to avoid duplication of paperwork through the **incorporation by reference of the general discussions and relevant specific discussions** from an environmental impact statement of broader scope into one of lesser scope or vice versa. In the example given in Question 24b, this would mean that an **overview EIS would be prepared for all of the energy activities reasonably foreseeable in a particular geographic area or resulting from a particular development program**. This impact statement would be **followed by site-specific or project-specific EISs. The tiering process would make each EIS of greater use and**

> **meaning** to the public as the plan or program develops, without duplication of the analysis prepared for the previous impact statement.

(emphasis added). Thus, where a programmatic EIS does not contain "specific discussions" of environmental impacts, there is no such environmental analysis to which subsequent NEPA documents can tier, and those discussions will need to be completed at the next level.

Because (and provided that) the Solar PEIS does not seek to approve individual projects or take the place of site-specific analysis, the scope of its NEPA analysis can be focused more on the general types of impacts and the overall effect of this policy initiative, as is most common for a programmatic EIS. *See*, *Northcoast Envt'l Center v. Glickman*, 136 at 688 (Programmatic EIS is used to examine "an entire policy initiative."). However, in order for the BLM to commit to a specific course of action, such as authorizing actual projects, a site-specific and use-specific analysis must be completed. *See*, *State of California v. Block*, 690 F.2d 753, 765 (9th Cir. 1982); *County of Suffolk v. Secretary of Interior*, 562 F.2d 1368, 1378 (2nd Cir. 1977). The NEPA analysis required to effectuate the Solar PEIS is discussed in further detail below.

ii. Subsequent NEPA analysis is required

To follow the path set out by the structure of the Solar PEIS and implement the **Modified SEZ Program Alternative**, BLM should evaluate the impacts of utility-scale solar development at both a regional or landscape level (i.e., SEZs) and at the project level. Landscape level analysis should meaningfully address, among other things, cumulative impacts (currently lacking in the Draft PEIS), to which site-specific, project analysis can be tiered. In this manner, development of utility-scale solar energy projects on the public lands can be informed by knowledge of affected resources and reviews can be conducted efficiently.

1) Analysis of potential impacts at a landscape/zone level.

In the context of the Solar Energy Zones that would be designated in the Solar PEIS, the BLM should next look to the effect on the landscape within the zones. A landscape level analysis of potential utility-scale solar energy development within a watershed, region, zone, portion of zone, or (where zones are smaller) across a number of zones, should take into account the distribution of resources in the landscape, complying with the BLM's legal obligations to assess potential impacts. Large solar developments can disrupt landscape connectivity and impede ecological processes occurring at the landscape-scale such as water flow and availability, wildlife migration, species composition, disturbance, and ecosystem response to climate change.

In considering the potential impacts of permitting development across an entire zone or large area, the BLM must consider how utility-scale solar will change the landscape and interfere with species' ability to migrate and survive. The landscape level analysis must further demonstrate that development is compatible with agency wildlife policy (population level impacts, etc). In the context of this analysis, BLM can then make informed decisions regarding how to manage development in a geographic context that is narrower than the entire PEIS study area but broad enough to permit evaluation of cumulative impacts.

This type of landscape approach is supported by NEPA guidance on cumulative impacts, which requires that the entire area potentially affected be included in a cumulative analysis and holds that a failure to include an analysis of actions within a larger region will render NEPA analysis insufficient. *See, e.g., Kern v. U.S. Bureau of Land Management*, 284 F.3d 1062, 1078 (9th Cir. 2002) (analysis of root fungus on cedar timber sales was necessary for entire area). Thus, in order to accurately evaluate the potential environmental consequences of solar energy development in a zone or comparable area, the cumulative impact analysis would necessarily look at the cumulative impacts on all of the directly and indirectly affected landscapes. The Environmental Protection Agency, in providing direction to its reviewers, emphasizes the importance of ensuring that the cumulative impact analysis is based on "geographic and time boundaries large enough to include all potentially significant effects on the resources of concern. The NEPA document should delineate appropriate geographic areas including natural ecological boundaries, whenever possible, and should evaluate the time period of the project's effects." U.S. Environmental Protection Agency, 1999, *Consideration Of Cumulative Impacts In EPA Review of NEPA Documents*. (emphasis original).

We encourage analysis to be based on watershed boundaries or relevant ecological boundaries, capitalizing on existing regional ecosystem assessments, state fish and wildlife agency analyses, or equivalent analyses by conservation organizations such as The Nature Conservancy. Analysis conducted in this way can be informed by existing databases and should reduce the need for duplicative baseline ecosystem analyses. Analysis at the watershed or ecosystem level should also facilitate required cumulative impacts assessments and the development of mitigation plans for project-specific impacts.

The Council for Environmental Quality's (CEQ) guidelines on cumulative effects analysis provide the following steps for determining the appropriate geographic boundary of cumulative impact analysis:

1. Determine the geographic area that will potentially be directly affected by an action – known as the "project impact zone";
2. Identify resources in the project impact zone that could be affected by the action;
3. Determine the geographic areas occupied by the resources outside the project impact zone.
4. Identify the appropriate area for analysis of cumulative effects based on the largest of the areas determined in step 3.

Council on Environmental Quality, 1997, *Considering Cumulative Effects Under the National Environmental Policy Act*.

When conducting environmental analysis of a zone, the geographic area of impact will include the resources, such as wildlife, within areas of proposed development and their habitat extending outside such areas. The agency can then complete a baseline assessment of affected resources (40 C.F.R. § 1502.15) and effectively take into account the overall impacts of development in a zone on the broader affected areas and resources when considering their potential environmental consequences. *See, e.g.*, *Newmont Mining Corp*., 151 IBLA 190 (1999) (Where the BLM could take into account the overall degradation from existing and connected proposed operations, a cumulative analysis of all impacts was required); *Kern v. United States Bureau of Land*

*Management, supra.* (Cumulative impact analysis of reasonably foreseeable future timber sales on spread of root fungus required before approving single proposed sale).

While the PEIS generally supports creation and implementation of a solar energy development program consistent with the **Modified Solar Energy Zone Program Alternative**, a next step of environmental impact analysis is needed to look at cumulative impacts at a reasonable scale. Analyzing an individual project will not provide the needed context for evaluating development in a designated SEZ. As discussed above, there are numerous resources that will be affected by designation of SEZs and these impacts must be evaluated in a sufficient context. Further, NEPA requires that the BLM "integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts." 40 C.F.R. § 1501.2. Moreover, this analysis will address previous deficiencies present in cumulative impact analyses in project specific-EISs.

In order to effectively use the SEZ designations, BLM must conduct further analysis at the landscape level. NEPA does not permit the BLM to defer such analysis to a specific project. In addition, the environmental analysis generated at this level will not only provide a basis for developing a needed baseline and for additional analysis of direct, indirect and cumulative impacts, but will also provide a usable set of analyses to which evaluation of the environmental consequences of subsequent projects can be meaningfully tiered and for which appropriate, effective mitigation measures can be developed.

As acknowledged in the Draft Solar PEIS, the agency has not thoroughly evaluated resources within the SEZs and has performed an even lesser evaluation on the 22 million acres of lands outside the SEZs identified as available for solar development. Analysis at a landscape level should take into account the distribution of resources across the area and the effects on resources outside the area. Ongoing efforts such as the BLM's Rapid Ecoregional Assessments and the California Desert Renewable Energy Conservation Plan, are compiling vital baseline information that should be incorporated into ongoing analysis under the Solar PEIS.

A more in-depth discussion with a recommended approach for conducting landscape-level analysis to special status species is attached as Appendix V and incorporated herein by reference.

The analysis described in this section is a major federal action and should be completed through an EIS. *See,* 40 C.F.R. § 1501.4. We would also note that in the example from CEQ's recommendations quoted above, a series of EISs is specifically contemplated – which is required in this instance to conduct sufficient analysis of affected resources.

2) Analysis of environmental impacts of specific projects.

BLM's resource management plans and project-level EISs often state that site-specific analysis is not possible until a particular activity, such as a pipeline, is proposed. Preparation of a landscape level EIS on zones, during the designation process, would also be consistent with the NEPA regulation governing tiering environmental analysis for a site-specific action to a broader programmatic EIS or series of EISs. The regulation envisions that agencies can tier to a "broad environmental impact statement" so that the subsequent environmental document "shall

concentrate on the issues specific to the subsequent action." 40 C.F.R. § 1502.20. In the context of the zone or landscape-level EIS, the broader document would analyze the effects of likely utility-scale solar development. While the analysis of a zone can evaluate the impacts on resources present in that area based on a baseline inventory, refined RFD, and expected technologies, further evaluation will be required for each project based on the actual location, technology, and plan of development. These analyses can tier to the PEIS and the subsequent landscape-level EIS, but will still need to address substantial issues and should provide for public comment and engagement throughout the process as well. (A recommended NEPA process for proposed projects is discussed in more detail later in these comments.) The goal of this final stage of environmental analysis should be that it can be completed through an environmental assessment, based on adequate comprehensive analyses conducted previously. By conducting sufficient analyses at the scale of the SEZ, BLM will ensure that adequate baseline data exist to streamline environmental review at the project level, reducing the need for intensive analysis at a level and unlocking the potential of zones and guided development.

In addition, analysis of specific projects could be conducted as part of the landscape-level EIS described in the preceding section. As an example, the Programmatic EIS for Geothermal Leasing and Development evaluated a number of pending lease applications for approval while incorporating by reference the programmatic NEPA analysis conducted to evaluate the broader landscape effects. A similar approach could be taken here, where the site-specific analysis for individual projects could be presented and also take into account the landscape-level analysis conducted for specific zones or areas, so that the EIS would provide both approval for an individual project or set of projects and NEPA analysis to support future projects.

***Recommendations***: The NEPA analysis set out in the Draft Solar PEIS cannot support approval of projects using environmental assessments and does not provide sufficient landscape-level analysis of specific resources and impacts from utility-scale solar energy development. While this may be acceptable in a PEIS, it is only acceptable if the Solar PEIS ROD acknowledges the limitations of the NEPA analysis contained in the PEIS for purposes of tiering and approving projects, and commits to conduct the necessary landscape-level and project-specific analysis, as discussed above. By preparing detailed EISs as part of designating future SEZs, the BLM can provide sufficient environmental analysis to support substantial tiering for analysis of projects proposed within those zones.

2. The PEIS must consider a reasonable range of alternatives, including the Modified SEZ Program Alternative.

The range of alternatives is "the heart of the environmental impact statement." 40 C.F.R. § 1502.14. NEPA requires BLM to "rigorously explore and objectively evaluate" a range of alternatives to proposed federal actions. *See* 40 C.F.R. §§ 1502.14(a), 1508.25(c). "An agency must look at every reasonable alternative, with the range dictated by the nature and scope of the proposed action." *Nw. Envt'l Defense Center v. Bonneville Power Admin.*, 117 F.3d 1520, 1538 (9th Cir. 1997). An agency violates NEPA by failing to "rigorously explore and objectively evaluate all reasonable alternatives" to the proposed action. *City of Tenakee Springs v. Clough*, 915 F.2d 1308, 1310 (9th Cir. 1990) (quoting 40 C.F.R. § 1502.14).

NEPA requires that an actual "range" of alternatives is considered, such that the Act will "preclude agencies from defining the objectives of their actions in terms so unreasonably narrow that they can be accomplished by only one alternative (i.e. the applicant's proposed project)." *Col. Envtl. Coal. v. Dombeck*, 185 F.3d 1162, 1174 (10th Cir. 1999), citing *Simmons v. U.S. Corps of Engineers*, 120 F.3d 664, 669 (7th Cir. 1997). This requirement prevents the environmental impact statement (EIS) from becoming "a foreordained formality." *City of New York v. Dep't of Transp.*, 715 F.2d 732, 743 (2nd Cir. 1983). *See also Davis v. Mineta*, 302 F.3d 1104 (10th Cir. 2002).

The Draft PEIS only evaluates two action alternatives and dismisses all other alternatives without thorough consideration. A reasonable range of alternatives should evaluate specific approaches to limiting development to SEZs, prioritizing development in SEZs, prioritizing use of previously disturbed lands, and expanding or designating new SEZs. Defining the action alternatives as only SEZs comprising less than 700,000 acres *or* a program encompassing close to 22 million acres available for development is not reasonable. Given the range of acreage available for utility-scale solar energy development in the alternatives evaluated in the Draft PEIS, the BLM can feasibly evaluate more detailed alternatives for available acreage and guiding development, including the Modified SEZ Program Alternative set out in these comments.

The PEIS's deficient treatment of alternatives does not appear to stem from the purpose and need statement that it includes. While the BLM has had difficulty articulating a sufficiently broad purpose and need statement in its EISs on specific projects, the purpose and need statement included here – which NEPA requires – seems quite adequate. In this case, however, the PEIS does not support BLM's selection of its Preferred Alternative.

In the Draft PEIS, BLM states that the purpose and need of its program is to guide solar energy developers to areas with the fewest resource conflicts and potential controversy, and to "identify and prioritize development in locations best-suited for such development, called solar energy zones." DPEIS, pp. ES 2- ES 3. The stated purpose of the proposed action is to enable BLM to "prioritize solar energy and associated transmission infrastructure development" in the Solar Energy Zones. The Preferred Alternative, however, merely encourages development in the identified SEZs, and, accordingly, on its face does not achieve these stated purposes and goals as well as the SEZ Alternative, let alone better. Moreover, the PEIS contains no explanation as to why the BLM believes that the Preferred Alternative would achieve these purposes better than the SEZ Alternative.

As we demonstrate throughout these comments, the SEZ Program Alternative, which would require development to be located in the designated zones, would meet the solar development goals in the RFDS, even after dropping some zones and reducing others in size as we have proposed. BLM's primary justification for selecting the Preferred Alternative, that it would likely result in the highest pace of development at the lowest cost, is unsupported by any analysis. Our organizations are certain, based on our cumulative experience with various BLM programs, including BLM's oil and gas program under the Bush Administration which the BLM's Preferred Alternative closely resembles, that the result of selecting the preferred alternative will be controversy, delay and increased costs.

***Recommendations:*** Given the breadth of acreage at issue and the elements of a Solar Energy Program that require further assessment and description, the Solar PEIS should examine additional alternatives in detail, including the Modified SEZ Program Alternative described in these comments. The Modified SEZ Program Alternative best meets the goals of the PEIS and BLM's Solar Energy Program and should be adopted in the Final PEIS and ROD.

3. BLM must consider impacts to environmental resources.

NEPA dictates that BLM take a "hard look" at the environmental consequences of a proposed action. The requisite environmental analysis performed by an agency "must be appropriate to the action in question." *Metcalf v. Daley*, 214 F.3d 1135, 1151 (9th Cir. 2000); *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 348 (1989). In order to take the "hard look" required by NEPA, BLM is required to assess impacts and effects that include: "ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, *whether direct, indirect, or cumulative*." 40 C.F.R. § 1508.8. (emphasis added). The Draft PEIS does not sufficiently evaluate impacts from the alternatives, impacts from the implementation actions it contemplates, or the effects on certain resources, as discussed below.

As a starting point, any analysis of environmental effects must build off of the climate change-affected baseline described in the affected environment. Climate change may influence (e.g., exacerbate or ameliorate) a proposed action's impact on the environment and may pose risks to the proposed action or planning area. As such, among the effects BLM must now consider are effects of the proposed action on the vulnerability of the affected environmental resources to climate change and the ability of these resources to adapt to climate change. *See* 40 C.F.R. § 1508.8 (defining 'effects' to include ecological effects, "such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems"). Without climate change trends and projections built into the affected environment, the environmental effects analysis lacks consideration of climate change.

a. Use of previously-disturbed lands.

Both action alternatives in the Draft PEIS incorporate the design features contained in Appendix A. In order to avoid impacts to ecological resources, the first design feature set forth in Draft PEIS Section A.2.2.11.1 states that "[t]o the extent practicable, projects shall be sited on previously disturbed lands in close proximity to energy load centers to avoid and minimize impacts on remote, undisturbed lands." Additionally, Section 5.10.1.1 of the PEIS recognizes that the "fragmentation of large, undisturbed habitats of high quality by facility or ROW construction would be considered a greater impact than construction through previously disturbed or fragmented habitat." DPEIS, p.5-66. The BLM cites the potential of the Preferred Alternative to locate projects on previously disturbed lands as an important factor justifying its selection. DPEIS, p. 6-35

BLM does not evaluate the availability, quantity, and location of previously disturbed lands to support its conclusion that the Solar Energy Development Program Alternative "potentially would allow a greater degree of development on previously disturbed lands" than the Solar Energy Zone Program Alternative. PEIS at 6-49. BLM's conclusion that the preferred alternative will facilitate development on such lands is purely speculative. *See Sierra Club v.*

*United States Forest Serv.*, 843 F.2d 1190, 1195 (9th Cir. 1988) (observing that "[t]he purpose of an EIS is to obviate the need for . . . speculation by insuring that available data are gathered and analyzed prior to the implementation of the proposed action.") This failure precludes a meaningful comparison between the action alternatives; the agency simply does not know if previously disturbed lands are available for solar development, how many acres are available, or where such lands are located.

The final PEIS should further evaluate the quantity, availability, and location of previously disturbed lands: (1) as a unique reasonable alternative that the agency should consider, and/or (2) as SEZ selection criteria. The evaluation of information on previously-disturbed lands will allow for a more meaningful choice between alternatives and bolster confidence that the primary design feature for the protection of wildlife and ecological resources set forth in Appendix A – that "projects shall be sited on previously disturbed lands . . . to avoid and minimize impacts on remote, undisturbed lands" – will have a significant practical application.

b. Criteria for designation of SEZs.

As part of analyzing consequences to the environment, BLM's "hard look" must be based on adequate data and analysis. NEPA's hard look at environmental consequences must be based on "accurate scientific information" of "high quality." 40 C.F.R. § 1500.1(b). Essentially, NEPA "ensures that the agency, in reaching its decision, will have available and will carefully consider detailed information concerning significant environmental impacts." *Robertson v. Methow Valley Citizens Council*, 490 U.S. at 349.

BLM does not evaluate its SEZ selection criteria in the PEIS. The principal programmatic feature of the PEIS's two action alternative is identical: BLM will identify lands where potential conflicts are minimal and establish SEZs. NEPA implementing regulations require that BLM "insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements." 40 C.F.R. § 1502.24. BLM selected the twenty-four SEZs presented in the PEIS based on (i) proximity to existing or designated transmission corridors, (ii) proximity to existing roads, (iii) slopes of 1-2% or less, (iv) a minimum size of 2500 acres, and (v) "additional filters based on local conditions, institutional knowledge, and coordination efforts." PEIS at ES-7. However, the Draft PEIS does not contain a discussion of whether these selection criteria actually result in the selection of lands most suitable for solar development. BLM did not evaluate additional or alternative selection criteria, nor did it offer more than a vague description of what the selection criteria actually were. For example, the PEIS does not contain information on how close to transmission and roads public lands must be to be included in a SEZ or the scope of the "additional filters."

The state chapters do not provide any additional certainty about the programmatic selection criteria. For example, the Arizona appendix states that for the Brenda SEZ: "The criteria used to identify the SEZ as an appropriate location for solar energy development included proximity to existing transmission or designated corridors, proximity to existing roads, and a slope of generally less than 2%. In addition, the area was identified as being *relatively free* of other types of conflicts, such as FWS-designated critical habitat for threatened and endangered species, Areas of Critical Environmental Concern (ACECs), Special Recreation Management, Area (SRMAs), and National Landscape Conservation System (NLCS) lands (see Section 2.2.2.2 for

the complete list of exclusions). PEIS at 8.1-1 – 8.1-2, BLM does not offer information in the PEIS as to what "relatively free" means in terms that can be applied to new SEZs.

As a result, the PEIS fails to establish a robust, clearly defined programmatic selection program for SEZs, and the methodology for establishing the SEZs, the critical feature under both of the alternatives presented in the Draft PEIS, escapes review. In order to provide a scientific basis for the SEZs, BLM should incorporate spatially explicit wildlife data and previously-disturbed lands data into the PEIS. BLM should also provide an analysis of its zone selection criteria, including an analysis of alternatives to the model presented in the PEIS, that provides the agency and the public a meaningful opportunity to understand the critical feature of BLM's proposed solar development program. To further address this deficiency, expansion, modification or designation of new SEZs should be subject to the criteria set out below.

c. Lands with Wilderness Characteristics.

The scoping notice for the Solar PEIS, highlighted lands with wilderness characteristics, stating:

> The BLM has the authority to develop protective management prescriptions for lands with wilderness characteristics within RMPs. As part of the public involvement process for land use planning, the BLM will consider public input regarding lands to be managed to maintain wilderness characteristics.

73 Fed.Reg. 30911 (May 29, 2008).

The lands encompassed by both the SEZs and the additional lands identified as available for solar energy development contain extensive lands with wilderness characteristics, including those identified in citizen inventories, which were previously submitted to the BLM during the scoping process for this PEIS.

Wilderness character is a resource for which BLM must keep a current inventory. As the U.S. Court of Appeals for the Ninth Circuit held:

> wilderness characteristics are among the 'resource and other values' of the public lands to be inventoried under § 1711. BLM's land use plans, which provide for the management of these resources and values, are, again, to "rely, to the extent it is available, on the inventory of the public lands, their resources, and other values." 43 U.S.C. § 1712(c)(4).

*Oregon Natural Desert Ass'n v. Bureau of Land Management,* 531 F.3d 1114, 1119 (9th Cir. 2008). Accordingly, in preparing the Solar PEIS, BLM must not only identify the wilderness resource, but also evaluate the potential impacts of solar energy development in the various alternatives on wilderness characteristics.

Before permitting any type of surface-disturbing activity on lands with wilderness characteristics, the BLM must evaluate the degree to which wilderness characteristics may be affected by the proposed activity. Specifically, prior to permitting these activities, in the appropriate implementation-level NEPA documents, the BLM should:

- analyze the direct, indirect and cumulative impacts of the proposed activity on potentially affected lands with wilderness characteristics;
- analyze the potential benefits of protecting lands with wilderness characteristics from the proposed surface-disturbing activity; and
- where the BLM has determined not to manage an area to protect its wilderness characteristics, and where BLM has determined that the proposed surface-disturbing activity should move forward, it should evaluate methods that can be incorporated into project approvals to mitigate the projects' impacts to the lands' wilderness characteristics; and adopt appropriate mitigation where warranted.

Secretarial Order 3310, issued by Secretary of the Interior Salazar on December 23, 2010, affirms that protection of wilderness characteristics is a "high priority" for the public lands and that the BLM should protect the "open and natural productive state" of these lands. The Order requires the agency to identify wilderness characteristics and to formally protect those characteristics where they are found. The Order further directs the agency to not only inventory for wilderness characteristics, but also to formally designate lands where those values are identified as "Lands with Wilderness Characteristics." The BLM must identify Lands with Wilderness Characteristics in the Solar PEIS ROD.

Further, in this PEIS, the BLM should also designate Wild Lands. Secretarial Order 3310 directs the BLM to "ensure that any new project-level decision or land use planning effort takes wilderness characteristics into consideration." The BLM is also required to protect its ability to designate Wild Lands by identifying and protecting Lands with Wilderness Characteristics as other projects and interim management decisions arise, which would also encompass the Solar PEIS and individual projects that might seek approval. Accordingly, identifying Lands with Wilderness Characteristics and designating Wild Lands would provide the most comprehensive guidance for further development. The Solar PEIS ROD should provide that solar energy development is excluded on both Lands with Wilderness Characteristics and designated Wild Lands, including in designation of new SEZs.

d. Visual Resources.

The Federal Land Policy and Management Act of 1976 (FLPMA) identifies "scenic values" as one of the resources for which public land should be inventoried and managed, and directs that "the public lands be managed in a manner that will protect the quality of ...scenic...values. 43 U.S.C. §§ 1702(c), 1701(a)(8). Utility-scale solar energy development can impact these resources.

The Draft PEIS acknowledges the potential impact to visual resources by incorporating special management of areas adjacent to certain National Parks. In discussing areas to be excluded from development, the Draft PEIS states: "In Utah, Visual Resource Management (VRM) Class III lands have also been removed due to the high sensitivity and location proximity to Zion, Bryce, Capital Reef, Arches, and Canyonlands National Parks, and to significant cultural resource special management areas (in southeast Utah)." DPEIS, p. ES-9.

Guidance issued by the BLM since the PEIS went to press further underscores the BLM's obligation to take scenic values and potential impacts to those values into account. Instruction

Memorandum (IM) 2011-061, issued on February 8, 2011, affirms the BLM's goal of "direct[ing] development away from lands with high conflict or sensitive resource values," acknowledges the "[h]igh potential for [c]onflict" with development on "*lands near or adjacent to*" such "sensitive viewsheds, resources and values" as units of the National Park System, refuges, national forests and lands in the NLCS as well as lands adjacent to designated and eligible wild, scenic and recreational rivers and lands currently designated as VRM Class I or II by BLM. IM 2011-061, (Solar and Wind Energy Applications – Pre-Application and Screening), pp. 4, 5

In the West-wide Energy Corridor PEIS prepared by BLM, Appendix S identifies and evaluates both direct conflicts with potentially sensitive visual resource areas such as national conservation areas, monuments, scenic/historic trails, and also "proximity events" where a corridor passes within 5 miles of the boundary of a potentially sensitive visual resource area.[23] As shown in Appendix S to the West-wide Energy Corridor PEIS, changes to proposed corridor designations were made based on some of these visual resource impacts.

Similarly, in the Solar PEIS and subsequent analyses of SEZs and individual projects, impacts to visual resources should be evaluated and should be considered in defining locations and boundaries for both SEZs and projects. In addition, as the BLM is continuing to conduct visual resource inventories as part of plan amendments, the updated data on visual resources on the public lands should be incorporated into the PEIS and ongoing analysis for SEZs and projects.

e. Water resources.

A programmatic EIS "must provide sufficient detail to foster informed decision-making." *Citizens for Better Forestry v. U.S. Dep't of Agric.*, 481 F.Supp.2d 1059, 1086 (N.D. Cal. 2007) (internal quotations omitted). Although programmatic and reliant on future site-specific analyses, the EIS must still provide a "reasonably thorough discussion of the significant aspects of the probable environmental consequences." *Northern Alaska Envt'l Ctr. v. Lujan*, 961 F.2d 886, 890 (9th Cir. 1992) (internal quotations omitted).

BLM has not provided a reasonably thorough discussion on the context or intensity of the impacts to water resources. *See generally* 40 C.F.R. § 1508.27 (listing considerations that inform significant effect). For example, the DPEIS cannot assess whether water use or other effects on water resources would comply with state or local laws or policies. DPEIS, p. 5-38 (myriad of applicable laws is complex and requires case-by-case analysis).

Water use requirements – an important consideration for impacts to soils, vegetation, aquatic fish and wildlife and air quality – could be obtained from surface water, groundwater or recycled water, DPEIS 5-37, or water could be trucked in from off-site, DPEIS 5-39. The DPEIS, however, does not quantify the water use requirements for the preferred alternative regardless of the source or, therefore, the resultant direct, indirect or cumulative impacts of water use on such a grand scale. The DPEIS is also unclear as to the likely source of groundwater for construction or operations. *Compare* DPEIS 5-100 ("the use of groundwater for construction activities is

[23] Available at: http://corridoreis.anl.gov/documents/fpeis/vol2/WWEC_FPEIS_App_S.pdf .

unlikely"), DPEIS 5-39 ("In most areas, groundwater would likely be withdrawn from local aquifers to meet the project's water needs.").

The Draft PEIS also declines to estimate the water use demands – and subsequent effects – of the SEZ alternative. Not only does the DPEIS fail to identify these impacts for the SEZ alternative as a whole, but also for individual SEZs. *See, e.g,* DPEIS 11.2-185 ("[i]mpacts of groundwater depletion from solar energy development in the Delamar Valley SEZ cannot be quantified without identification of the cumulative amount of groundwater withdrawals needed to support development on the SEZ"); DPEIS 11.1-194 (same, Amargosa SEZ). In each case, BLM has this information, having estimated low and high water demands for construction and operation within the SEZ and being capable of estimating water demands of nearby projects – BLM simply needed to incorporate this information into a regional groundwater model that could project the impacts of groundwater pumping on species habitats but failed to do so. BLM cannot postpone this analysis to the project-specific level.[24]

The Draft PEIS similarly makes no attempt to quantify the acreage that would be affected by the solar energy development program, and thus the amount or length of streams and washes potentially destroyed and degraded by solar development. It follows that there is no analysis of the extent of water quality impacts from channelization, erosion, sedimentation due to alterations in surface drainage patterns. The DPEIS acknowledges the potential for water quality impacts due to soil erosion, sedimentation, spills, wastewater treatment and storage, pesticide and herbicide application and dust suppressants, but provides no indication as to the severity of the impacts, for example, by discussing potential impacts to public health, to water quality standards, or to special status species. The DPEIS also provides little information regarding the environmental impacts of water and wastewater treatment.

The central considerations regarding groundwater resources to developing a responsible solar energy program are discussed above. We offer the following comments regarding water use assumptions as described in Chapter 3 and Appendix F.

**Fire Protection.** Parabolic trough plants use highly flammable heat transfer fluids in their heat-collecting elements. Use of these fluids in heat-collecting elements and/or for heat storage is a fire hazard. Arnold Leitner, *Fuel from the Sky, Solar Power's Potential for Western Energy Supply* 85 (National Renewable Energy Laboratory, 2002), available at http://www.nrel.gov/csp/pdfs/32160.pdf. Solar energy projects utilizing other technologies for heat collecting that have been reviewed by BLM have included fire protection among their water needs. Examples of these include the Imperial Valley Solar Project, the Amargosa Farm Road Project and the Solar Millenium Blythe Project.[25] Given the above, BLM's review of water use should assess the need for and availability of water for fire suppression as well as the likelihood and effects of fire in an arid, desert ecosystem.

---

[24] Failure to model these impacts renders BLM's conclusion that "[t]he implementation of programmatic design features and complete avoidance or limitations of groundwater withdrawals from the regional groundwater system would reduce impacts on the groundwater-dependent species to small or negligible levels" unsupportable. DPEIS 11.2-185.

[25] These projects also used water for soil compaction needs, another potential water requirement not discussed in these overview sections.

**Water Treatment.** Water used in steam cycles requires treatment to control total dissolved solids (TDS) and prevent scale formation. Water used in the cooling cycle also requires treatment to prevent algae formation and scaling, while water used for mirror washing may also require treatment to reduce TDS concentrations, and water for potable uses may also require treatment. Additional water treatment needs occur at the back end, for treatment of sanitary wastewater and blowdown wastewater (if applicable).

The DPEIS provides little information that details the methods for water treatment, the criteria that dictate the choice of treatment method, the chemicals that may be stored or used on-site, and how any waste stream would be disposed of. Considerations regarding the need for and level of water treatment can inform the tradeoffs between using higher quality water that can increase the cycles of concentration and reduce the quantity of makeup water or utilizing less water treatment.

The DPEIS also provides little information regarding wastewater treatment except to say that three methods – evaporation ponds, septic tanks, off-site treatment – may be employed at any time. The PEIS should disclose this information, including the contaminants in the waste streams, treatment and disposal methods, chemicals that may be stored/used, the water and wildlife impacts of evaporation ponds and the impacts of increased vehicle traffic if treated off-site.

f. State-specific resources.

In the separate comments addressing each of the six states and each SEZ, we have identified additional resources and impacts of concern that should be specifically evaluated and also addressed in the policies, mitigation measures, and design features that will be finalized in the ROD. These include, but are not limited to, water resources, water quality, impacts to groundwater-dependent species and their habitats, soil erosion and associated vegetation impacts; soil diseases and toxins; habitat connectivity, wildlife movement corridors and fencing; playa wetlands; desert tortoise relocation; and transmission, roads and other associated infrastructure.

g. Aquatic Biota

The DPEIS should provide greater context to highlight the scarcity of and stress to water resources in the planning area. Both the main volume and state-specific volumes contain extremely little information about the existing flow systems, their status and the importance. In the six-state area, intermittent and ephemeral streams make up "over 81% [of all streams] in the arid and semi-arid Southwest (Arizona, New Mexico, Nevada, Utah, Colorado and California)." Levick, L. et al., *The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest* iii (EPA 2008) (noting also that desert washes are not consistently mapped). They occupy only a small part of the landscape but support a great deal of biodiversity.

The DPEIS underestimates the importance of aquatic and riparian habitats. "Ephemeral and intermittent streams provide the same ecological and hydrological functions as perennial streams," *id.* at iii, including wildlife habitat, support for riparian vegetation, groundwater recharge, water quality services and nesting and migratory corridors for wildlife. *See generally id.* In the Great Basin, for example, these ecosystems are small, isolated and rare, but support most of the biodiversity in the region. Don Sada, *Great Basin Riparian and Aquatic Ecosystems, in* Collaborative management and research in the Great Basin – examining the issues and developing a framework for action 49, 49 (Jeanne C. Chambers et al. eds., 2008). However, "The Great Basin is the driest region in the United States." *Id.* Riparian and aquatic ecosystems have already been dramatically altered and degraded by unsustainable uses.

There is also a lack of baseline information regarding surface and groundwater features of BLM lands targeted for the proposed SEZs . Many of the areas proposed for solar energy development fall in rural, desert areas not covered by the U.S. Geological Survey (USGS) streamflow gaging network. *Compare* Mark T. Anderson & Lloyd H. Woosley, Jr., *Water Availability for the Western United States – Key scientific challenges* Fig. 10 (U.S. Geological Survey Circular 1261, 2005) (with little to no coverage in NV/CA border region, southwestern California, southern New Mexico). Moreover, there is no national program to monitor groundwater conditions and there is little information on groundwater availability or trends in availability. *Id.* at 17. Groundwater is an important resource in the West; it may be the primary or exclusive water supply for many communities. "In the United States, ground water is the source of drinking water for 50 percent of the population and as much as 90 percent of the population in rural areas, especially in the West." *Id.*

In such arid settings, additional water demand from concentrating solar power systems employing wet-cooling could tax scarce water resources. Put in context, under "normal" conditions, 36 out of 47 state water managers anticipate water shortages in localities, regions or statewide within 10 years; under drought conditions, that number rises to 46 managers. Government Accounting Office, *Freshwater Supply, State's Views of How Federal Agencies Can Help Them Meet the Challenges of Expected Shortages* 64-65(GAO-03-514, 2003).

Many of the potentially affected ephemeral and intermittent streams are not accurately mapped, and desert washes are not consistently mapped. Levick et al., *supra* at 5. While acknowledging this lack of information, BLM improperly defers its acquisition and impacts analysis to the project-specific stage. DPEIS 4-49. Without information regarding water availability or surface water flow systems, it is difficult to choose among alternatives and even more difficult to assess claims of effective mitigation of potential impacts to water availability or to ephemeral and intermittent streams and washes. If the incomplete information is essential to choosing among alternatives and getting the information is not exorbitantly expensive, the agency shall acquire and include the information. *Id.* § 1502.22(a). If it is exorbitantly expensive or not possible to acquire the information, the agency shall inform the reader that the information is incomplete or unavailable, why the information is relevant, what relevant information is available, and what impacts the available information predicts. *Id.* § 1502.22(b).

***Recommendation:*** The BLM should commit to thorough analysis prior to approving projects.

h. Greenhouse gas emissions

BLM must examine the potential greenhouse gas (GHG) emissions of a proposed action and its impact on climate change. *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 508 F.3d 508, 549-50 (9th Cir. 2007); *Border Power Plant Working Group v. Dep't of Energy*, 260 F.Supp.2d 997 (S.D.Cal. 2003); *Mid States Coalition for Progress v. Surface Transp. Bd.*, 345 F.3d 520 (8th Cir. 2003). *See also* 40 C.F.R. § 1502.16(e) (requiring discussion of the "[e]nergy requirements and conservation potential of various alternatives and mitigation measures" in the environmental consequences section); CEQ, *Considering Cumulative Effects Under the National Environmental Policy Act* at 24 (Jan. 1997) (identifying "[r]egional and global atmospheric alterations from cumulative additions of pollutants that contribute to global warming" as prone to cumulative effects), available at http://ceq.hss.doe.gov/nepa/ccenepa/ccenepa.htm/.

While we are pleased that BLM attempted to quantify the beneficial and adverse effects on GHG emissions, including the loss of carbon stored in desert plants and soils, BLM has overlooked several indirect sources of GHGs from each alternative over its life cycle, including vehicle use and construction impacts. BLM should also make clear whether its emission estimates for a hypothetical solar plant include emissions from supplemental power sources (natural gas or electricity) or water usage.

i. Climate change

The environmental effects analysis must build off of the climate change-affected baseline described in the affected environment. Climate change may influence (e.g., exacerbate or ameliorate) a proposed action's impact on the environment and may pose risks to the proposed action or planning area. As such, among the effects BLM must now consider are effects of the proposed action on the vulnerability of the affected environmental resources to climate change and the ability of these resources to adapt to climate change. *See* 40 C.F.R. § 1508.8 (defining 'effects' to include ecological effects, "such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems").

Taking a hard look requires federal agencies to consider climate change in NEPA documents. The latest scientific assessment from the U.S. Global Change Research Program, the body responsible for integrating and coordinating federal research on climate change, reports that "global warming observed over the past 50 years is due primarily to human-induced emissions of heat-trapping gases" and that climate-related changes have been observed and will continue. U.S. Global Change Research Program, *Global Climate Change Impacts in the United States* 9 (Thomas R. Karl et al. eds., 2009) (citing effects on the environment, human health, agriculture and other resources). The EPA has also found that the "climate change associated with elevated atmospheric concentrations of carbon dioxide and the other well-mixed greenhouse gases have the potential to affect essentially every aspect of human health, society and the natural environment." 74 Fed. Reg. 66496, 66523 (Dec. 15, 2009). Climate change is a reasonably foreseeable impact of greenhouse gas ("GHG") emissions. *Id.* at 66518 ("The scientific evidence is compelling that elevated concentrations of heat-trapping greenhouse gases are the root cause of recently observed climate change.").

BLM must consider the effect of the proposed action on climate change as well as the effect of climate change on the proposed alternatives and the effect of climate change on the affected environment. *See* Federal Leadership in Environmental, Energy, and Economic Performance, Exec. Order 13,514, 75 Fed. Reg. 52,117 (Oct. 8, 2009) (directing agencies to "develop approaches through which the policies and practices of the agencies can be made compatible with and reinforce that strategy" for U.S. adaptation to climate change, being developed by the Climate Change Adaptation Task Force); Addressing the Impacts of Climate Change on America's Water, Land, and Other Natural and Cultural Resources, Secretarial Order 3289 (Feb. 22, 2010) (directing DOI agencies to consider and analyze climate change impacts when making major decisions affecting DOI resources), available at http://elips.doi.gov/app_so/act_getfiles.cfm?order_number=3289A1.

Based on those considerations, BLM must then assess the impact of its alternatives – including mitigation measures – on that climate-changed environment. Climate change considerations are relevant throughout the NEPA process, from the scope of the environmental document and the description of the affected environment to the design of the proposed action, its alternatives and their environmental impacts. Integration of climate change concerns into NEPA will help "mainstream" climate change mitigation and adaptation across federal programs and decision-making.

Analysis of the potential impacts of climate change on the environment is necessary to produce accurate predictions of the environmental effects of the alternatives, to assess the ability to carry out the alternatives and the effectiveness of mitigation, and to integrate climate change adaptation into the alternatives. It will also aid BLM in adequately preparing the proposed action and planning area for the inevitability of climate change.

j. Fugitive dust on snow pack

The construction phase of solar development, regardless of the alternative, will generate large quantities of fugitive dust emissions. Many parts of the study area are in non-attainment for particulate matter standards, DPEIS Fig. 4.11-4, likely due to fugitive dust sources such as unpaved roads and wind-blown dust. Site grading and vehicle travel in the arid and desert environments of the planning area will mobilize lots of dust. DPEIS, p. 4-35. BLM should assess the potential for dust-on-snow events in addition to its estimates of potential impacts on air quality. For example, snow cover duration in the San Juan Mountains was shortened by 18-25 days as a result of desert dust from the Colorado Plateau. Thomas H. Painter et al., *Impact of disturbed desert soils on duration of mountain snow cover*, 34 Geophys. Res. Lett. L12502 (2007). Changes in snowmelt timing will have biological effects as well. Heidi Steltzer et al., *Biological consequences of earlier snowmelt from desert dust deposition in alpine landscapes*, 106 Proceedings of the National Academy of Sciences 11629 (July 14, 2009). BLM must supplement its discussion of soil erosion and deposition by wind to examine the effects of land use changes on increased dust deposition onto mountain snow and reduced snow cover duration. *See* DPEIS, pp. 5-22, 5-23.

k. Significance of effects on ecological resources

BLM has not provided a reasonably thorough discussion of effects to ecological resources on the scale of the PEIS, because it does not have enough information about the context or intensity of the impacts to determine their significance. *See generally* 40 C.F.R. § 1508.27 (listing considerations that inform significant effect). For example, there is no analysis of the significance of the impacts of the likely solar development in the context of the six-state study area, seeking instead to defer to the project-specific review. *See, e.g.,* DPEIS, p. 5-63 (plant communities affected and the nature and magnitude of impacts would depend on the site-specific locations of the projects, as well as on the specific project design and the mitigation measures).

**Wildlife Impacts Outside the SEZs**

A meaningful comparison of the impacts of the PEIS's two action alternatives is not possible because BLM does not analyze the wildlife impacts of solar development outside of the SEZs. The principal difference between the two action alternatives is the flexibility of the Solar Energy Development Program Alternative to permit solar development on approximately 22 million acres of public lands while under the Solar Energy Zone Program Alternative development is restricted to the SEZs. In the Draft PEIS, BLM only analyzes wildlife impacts for a subset of the 22 million acres, the 677,400 acres within the proposed SEZs, and acknowledges in Appendix J that it did not attempt to compare the wildlife impacts of the Draft PEIS's two action alternatives:

> Only those species that are known to occur in the SEZ regions (i.e., within 50 mi [80km] of the SEZ centers) are discussed here in Appendix J because an expanded species analysis by alternative was identified too late during the preparation of the Draft PEIS to be accommodated in this version of the document. It is anticipated that a discussion of all species with the potential for being impacted under each alternative will be developed between the time of the Draft and Final PEISs.

DPEIS, p. J-2. However, without an analysis of wildlife impacts outside of the SEZs, the Draft PEIS does not allow agency or the public to understand the impacts of, and meaningfully distinguish between, the two action alternatives. BLM appears to recognize this critical gap in its analysis in Chapter 6 where it states:

> However, this same flexibility [of the preferred alternative] also would increase the uncertainty regarding the siting of such projects, and limit the assurance that a reduction in negative impacts would, in fact, occur. That is, this flexibility might actually increase the possibility for fragmentation of habitat, or result in greater impacts to other resource values and uses.

DPEIS, p. 6-35. We are cognizant of the practical challenge that analyzing wildlife impacts for 22 million acres of public lands presents, but, even though an agency may defer full-evaluation of site specific impacts at the programmatic EIS stage, a "programmatic EIS must provide sufficient detail to foster informed decision-making." *'Ilio'Ulaokalani Coalition v. Rumsfeld*,

464 F.3d 1083, 1095 (9th Cir. 2006) (internal quotations and citations omitted). Additionally, BLM has an obligation under 40 C.F.R. 1502.22(b) to use theoretical approaches or research methods generally accepted in the scientific community when faced with incomplete or unavailable information. Without at least a theoretical analysis of the impacts to wildlife and other ecological resources outside of the SEZs, neither BLM nor the public can meaningfully distinguish between the impacts of the action alternatives.

**Special Status Species**

The BLM acknowledges in the Solar PEIS that, when considering impacts to special status species, it has only evaluated data in what are termed the "SEZ regions" that are defined as within 50 miles of SEZ centers. Draft PEIS, p. J-2. The agency notes that "an expanded species analysis by alternative was identified too late during the preparation of the Draft PEIS to be accommodated in this version of the document," such that the impacts from the Preferred Alternative to special status species have not been evaluated. *Ibid*. The Draft PEIS further provides that BLM expects "that a discussion of all species with the potential for being impacted under each alternative will be developed between the time of the Draft and Final PEISs." *Ibid*. However, providing the analysis at this later point in the process will not permit the public to review and comment on either the data or the agency's analyses, both of which must be disclosed to the public as part of the Draft PEIS in order to permit the "public scrutiny" that is considered "essential to implementing NEPA." 40 C.F.R. § 1500.1(b).

**Vegetation**

The destruction of native vegetation communities is a significant impact, yet BLM makes no attempt to inform the reader as to the context or intensity of this impact by characterizing the "rare communities, remnant vegetation associations, endemic species, riparian areas, …." to be impacted. DPEIS, p. 5-65. This is important because these communities in arid environments are extremely sensitive, and can take decades to recover, if at all, because re-establishment may be unsuccessful in some areas.

**Aquatic Habitats and Wildlife**

The Draft PEIS also fails to characterize the water depletion impacts on aquatic habitats and wildlife, stating simply that impacts depend on the water source, the amount of water withdrawn and the organisms present. DPEIS 5-102. The Draft PEIS also inappropriately minimizes the impacts to aquatic habitats from groundwater withdrawal claiming that the use of groundwater during construction activities is unlikely, DPEIS 5-100, yet this claim contradicts its water resources analysis. DPEIS 5-39 ("In most areas, groundwater would likely be withdrawn from local aquifers to meet the project's water needs."). Further, it has become clear through projects that have already gone through the NEPA process that many plan to use groundwater during construction.

Upon further reading, SEZ-specific analysis does not support either claim, where, for example, the assumed perennial yield of Delamar Valley (NV) will not support the peak construction year water needs for any technology except for parabolic trough. Even here, the DPEIS does not acknowledge the shortfall. *See* DPEIS 11.2-63 ("The availability of groundwater and the potential impacts of groundwater withdrawal would need to be assessed during the site characterization phase.") Given this failure, the DPEIS does not take a hard look at whether

there is enough water to support construction or construction combined with operations or at the ecosystem impacts of that water use. Evaluation of impacts from water depletion must be conducted prior to project approval and at a sufficient regional scale to be meaningful.

**Fish and Wildlife Adaptation**

The PEIS fails to include any discussion of the impacts of the solar development program on the adaptation of wildlife and other ecological resources to climate change. Chapter 9 of the Draft PEIS recognizes that desert ecosystems in the American West are expected to experience rising mean temperatures and prolonged droughts during the PEIS's 20 year planning horizon. DPEIS, p. 9.1-280-81. Additionally, the proposed authorization policies in Section A.2.1.2.2 of the PEIS require that the BLM evaluate the extent to which proposed projects will impact areas that are important for adaptation to climate change. Climate change adaption is a critical mechanism for the protection of sensitive wildlife species. Despite broad reach of the PEIS to 677,400 acres of SEZs and, in BLM's Preferred Alternative, 22 million acres of BLM lands, BLM has not included a discussion and analysis of the program's impact on the climate change adaptation capability of wildlife, including, endangered or threatened species or other special status species.

l. Environmental Benefits.

The effects to be evaluated under NEPA include both costs (or damages) and benefits. 40 C.F.R. § 1508.8. In addition, when evaluating a range of alternatives, the BLM is required to consider more environmentally protective alternatives and mitigation measures. *See, e.g., Kootenai Tribe of Idaho v. Veneman*, 313 F.3d 1094, 1122–23 (9th Cir. 2002) (and cases cited therein). The consideration of more environmentally protective alternatives is also consistent with FLPMA's requirement that BLM "minimize adverse impacts on the natural, environmental, scientific, cultural, and other resources and values (including fish and wildlife habitat) of the public lands involved." 43 U.S.C. §1732(d)(2)(a).

Therefore, when evaluating the impacts of various alternatives in the Solar PEIS, the BLM should explicitly discuss the benefits of protecting land (such as scenic values, clean air and water), as part of limiting development to designated SEZs.

***Recommendations:*** The resources identified above require additional analysis of environmental consequences from utility-scale solar energy development. The Solar PEIS should highlight these resources and provide further analysis, as well as setting out clear requirements for evaluation of environmental consequences in NEPA analysis that will occur prior to project approval, including necessary updates of baseline conditions needed to conduct a meaningful analysis.

4. Cumulative impacts analysis in the Draft PEIS is not sufficient.

NEPA regulations define "cumulative impact" as:

> the impact on the environment which results from the *incremental impact of the action when added to other past, present, and reasonably foreseeable future*

> *actions* regardless of what agency (Federal or non-Federal) or person undertakes such other actions. *Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time*.

40 C.F.R. § 1508.7 (emphasis added).

Further, in determining the significance of a proposed action, BLM must consider "[w]hether the action is related to other actions with individually insignificant but cumulatively significant impacts." *Id.* § 1508.27(b)(7).

To satisfy NEPA's hard look requirement, the cumulative impacts assessment must do two things. First, BLM must catalogue the past, present, and reasonably foreseeable projects in the area that might impact the environment. *Muckleshoot Indian Tribe v. U.S. Forest Service*, 177 F.3d 800, 809–10 (9th Cir. 1999). Second, BLM must analyze these impacts in light of the proposed action. *Id.* If BLM determines that certain actions are not relevant to the cumulative impacts analysis, it must "demonstrat[e] the scientific basis for this assertion." *Sierra Club v. Bosworth*, 199 F.Supp.2d 971, 983 (N.D. Ca. 2002). A failure to include a cumulative impact analysis of actions within a larger region will render NEPA analysis insufficient. *See, e.g., Kern v. U.S. Bureau of Land Management*, 284 F.3d 1062, 1078 (9th Cir. 2002) (analysis of root fungus on cedar timber sales was necessary for an entire area).

The PEIS does not provide a sufficient cumulative impact analysis for either the study area as a whole or for sub-regions within it.

The cumulative impact discussion in the Draft PEIS is conclusory and prevents a meaningful examination of the impacts of: (1) of solar energy development at the landscape and regional level and (2) solar energy development in light of the other uses of the public lands. The BLM specifically recognized that one of the benefits of a comprehensive solar energy development program is that it "would allow the BLM to better assess potential cumulative impacts of solar energy development across the six-state study area" (DPEIS, p. 6-35), yet the agency fails to undertake this analysis in a meaningful manner.

The BLM perfunctorily dismisses cumulative impacts without an attempt to distinguish the impacts of the proposed broad, six-state program from the site-specific impacts which the Draft PEIS pledges to analyze in more detail later.[26] Additionally, the Draft PEIS merely catalogues other uses of the public lands – oil and gas, coal production, nuclear energy, renewable energy development for solar, wind, geothermal, hydroelectric, and biomass, transmission and distribution systems – without analyzing how development of solar energy might increase or exacerbate existing environmental impacts for those uses.

[26] "The PEIS does not assess site-specific issues associated with any future individual solar energy development projects. A variety of location-specific factors (e.g., soil type, watershed, groundwater availability and presence of threatened and endangered species, and the presence of cultural resources) would vary considerably from site to site, especially over a six-state region. In addition, the variations in technology and project size and design would greatly determine the magnitude of the impacts from given projects (i.e. mitigation requirements) applicable to utility-scale solar energy development in general. BLM's proposed Solar Energy Program would require that site-specific and species-specific issues be addressed during individual project reviews, where resolution of these issues is more readily achievable." DPEIS, p. ES-5.

For example, Section 6.5.2.9.2 describes the significant potential for solar development to adversely affect wildlife:

> Potentially affected wildlife in solar development areas includes numerous species of amphibians and reptiles, birds, mammals, and aquatic biota. Species would be affected by loss of habitat, disturbance, loss of food and prey species, loss of breeding areas, effects on movement and migration, introduction of new species, noise, and habitat fragmentation.

Section 6.5.2.9.2 then concludes that:

> Cumulative impacts on wildlife and aquatic biota from foreseeable development in the six-state region would be small provided mitigation measure to preserve important habitat and migration corridors are implemented (or sufficient alternative lands are set aside as compensation).

Absent from this discussion is any attempt to identify and then examine (1) the landscape and regional wildlife impacts of solar energy development or (2) the impacts of solar development that could increase or exacerbate wildlife impacts from other uses of the public lands. Section 6.5.2.9.3 concerning special status species offers a more troubling conclusion for special status species:

> Cumulative impacts from foreseeable development in the six-state region could be small to moderate for some species, with solar development being a major contributor to cumulative impacts.

Again, this section is devoid of analysis and offers nothing more than perfunctory statements. Neither Section 6.5.2.9.2 nor Section 6.5.2.9.3 allow for meaningful consideration of the cumulative impacts of the proposed solar development program by the BLM or the public. As a result, the Draft PEIS lacks meaningful information on whether or not establishing 677,400 acres of SEZs and opening 22 million acres of public lands to utility-scale solar energy development under the preferred alternative will have adverse cumulative impacts to wildlife apart from the project-scale impacts that the Draft PEIS promises to assess later.

Water resources also exemplify the need for a meaningful cumulative impacts analysis beyond that set out in the Draft PEIS. Regarding cumulative impacts on water resources, a key example for development in this arid region, the DPEIS states that "impacts on water supplies from dry-cooled solar thermal facilities and dish engine facilities would likely be minor, since such facilities would not be permitted unless studies had shown that there would be no significant impacts on the hydrologic system." DPEIS 6-93. Nevertheless, these studies will not occur until the project-specific phase. "More detailed analyses of cumulative impacts would be performed in the environmental reviews for specific projects in relation to all other existing and proposed projects in the relevant geographic area." PEIS 6-89. As such, cumulative impact analysis

deferred until such time will be unable to capture the cumulative impacts to water resources that should be within the scope of the Draft PEIS.

There are several other water resources for which there is no cumulative impacts analysis: impacts to surface water flow systems; impacts to water quality; effects of increased competition for water supplies; and effects of changing the current place of use, purpose of use, or point of diversion. In addition to the development of thousands of megawatts of solar energy, there are many other projects that will adversely affect on ephemeral and intermittent streams, increase competition for water and stress water availability, and move water from current uses in current locations to elsewhere. These projects include energy development, water development and housing development throughout the study area. The cumulative impacts to water resources in southern Nevada alone could result in declines to the groundwater table, spring discharge, wetlands and streamflow, adversely affecting twenty federally listed species and 137 other water-dependent endemic species. *See generally* James E. Deacon et al., *Fueling Population Growth in Las Vegas: How Large-scale Groundwater Withdrawal Could Burn Regional Biodiversity*, 57 BioScience 688 (2007). BLM must evaluate the effects of climate change on the potential loss of wash networks, the loss of wildlife habitat, surface water hydrology and streamflow and flood modeling.

The utility-scale solar energy development contemplated by the PEIS would have substantial effects on the other resources of the public land, as well, such as wildlife and ecosystem functionality and resilience. The size of these projects and the technologies they employ will eliminate permanently all or nearly all habitat value and other parts of functioning ecosystems - recovery time for desert ecosystems is hundreds if not thousands of years. These effects will be wide-ranging whether multiple projects are concentrated in a given area (particularly if there are sensitive resources or species) or if they are "scattered across the landscape" as proposed in the Preferred Alternative (which will degrade habitat and habitat connectivity through edge effects). The approach taken in the Ivanpah Valley highlights the risks from cumulative impacts: In a narrow movement corridor for desert tortoise, three huge projects adjacent or nearly adjacent to one another threaten to completely block a movement corridor in an area with very good tortoise habitat, and thus harmfully impact the genetic diversity of the Northeastern Mojave recovery unit.

The PEIS also fails to include an appropriate cumulative analysis for proposed zones – an approach that, had it been taken, would have allowed the agency to significantly facilitate the permitting of projects in those zones once designated and an approach that, as these comments make clear, we sincerely hope the BLM will adopt in the future. Equally importantly, however, because the PEIS did not include such an analysis, it does not reveal whether the level of development that has been projected for the proposed zones – i.e., 80% – can be sustained. While such an analysis may not be as critical in some areas – e.g., in zones in which there are currently no applications pending it is certainly critical in others. The best example of such a needed analysis is the Riverside East zone proposed for the California Desert Conservation Area. As of March 7, 2011, there are a total of 25 ROW applications pending for that proposed zone, 11 of which are "first in line." Two projects were approved in this zone last year and the permitting process is close to completion for at least two more projects. BLM and others are questioning whether this zone has already reached its capacity. Without a more in-depth analysis of

cumulative impacts and the effects on projected development in the SEZs, which this PEIS does not even purport to provide, vital questions cannot be answered.

***Recommendations:*** In order to evaluate and approve utility-scale solar energy development, BLM must conduct a meaningful analysis of the cumulative impacts of this development at a landscape scale. The Final PEIS should include additional cumulative impacts analysis, especially for water resources, and should also set out specific parameters for cumulative impact analysis to be conducted for other resources.

5. The Draft PEIS presents limited baseline information, which restricts the analysis of potential impacts.

NEPA requires agencies to "describe the environment of the areas to be affected or created by the alternatives under consideration"; so agencies must establish baseline conditions. 40 C.F.R. § 1502.15. In *Half Moon Bay Fisherman's Marketing Ass'n v. Carlucci*, 857 F.2d 505, 510 (9th Cir. 1988), the Ninth Circuit states that "without establishing . . . baseline conditions . . . there is simply no way to determine what effect [an action] will have on the environment, and consequently, no way to comply with NEPA." The court further held that "[t]he concept of a baseline against which to compare predictions of the effects of the proposed action and reasonable alternatives is critical to the NEPA process."

As noted above, the Solar PEIS concedes that collection of baseline data has been deferred, such as the data for special status species outside the SEZs. Until an adequate baseline is established, the BLM cannot evaluate impacts, determine the mitigation measures needed to address those impacts, or conclude that specific actions will not have a significant impact and approve them. This is the major reason why – as stated above – BLM cannot choose its Preferred Alternative (the Solar Development Alternative) on the basis of the draft PEIS as written.

a. Water availability

The Draft PEIS does not take into account the various legal structures that determine water availability. These need to be taken into account. For example, New Mexico law allows the State Engineer to provide legal protection to flows for fish, wildlife or other ecological uses. *See* Opinion of Tom Udall, Attorney General, Opinion No. 98-01 (March 27, 1998); *compare* DPEIS 4-60 ("New Mexico has no state laws governing flows, and they are not recognized as a beneficial use in the state."). BLM also needs to update its discussion of New Mexico water management and other analyses as a result of successful legal challenges to the state's Active Water Resource Management program. DPEIS 4-63, 4-75, 12.1-73-74, 12.1-80, 12.2-61-62, 12.2-68, 12.3-54-65.

BLM's discussion of water resources and their management in Nevada suffers many of the same flaws. In the volume on Nevada's proposed energy zones, the DPEIS portrayal of the available water supply in two zones is greatly overstated due to failure to understand the full meaning of recent court decisions. BLM should revise its discussions and assumptions regarding water use and water rights management in Delamar and Dry Lake Valley North, *see, e.g.*, DPEIS at 11.2-

60—61, 11.2-65, 11.2-67, 11.2-336, 11.4-63, 11.4-67, to clarify that State Engineer Ruling 5875 has been vacated and that the perennial yield newly established in Ruling 5875 and water rights granted to SNWA have also been vacated. As a result, the DPEIS baseline analysis should reflect that the basins are fully appropriated. *Carter-Griffin v. Taylor*, CV 0830908 (Oct. 15, 2009), slip op. at 5 (citing Ruling 5875) ("all water rights previously available in [Delamar and Dry Lake Valley basins] had already been fully appropriated"). Note also that the Colorado River Compact does not entitle Nevada to 300,000 acre-feet/year, DPEIS 4-73; Nevada's Colorado River apportionment derives from the Boulder Canyon Project Act and the Consolidated Decree in *Arizona v. California*. The same holds true for California's Colorado River apportionment. *See* DPEIS 4-68 (stating California's apportionment comes from the Colorado River Compact).

Although there are a number of state laws and policies for managing water resources, the DPEIS fails to mention several directly applicable to water use for energy generation. BLM should discuss these requirements, because an action that may violate federal or state law or other requirements for environmental protection, *see id.* § 1508.27(b)(10), may have a significant impact. *See also id.* § 1502.16(c) (environmental effects section shall include discussions of possible conflicts between the proposed action and federal, state, local or tribal plans, policies or controls for the area); *id.* § 1506.2(d) (requiring discussion of any inconsistency with state or local plans or laws and of the extent to which the proposed action will be reconciled with the plan or laws).

For example, the Nevada State Engineer has expressed a clear preference for air-cooled power plants in its water permitting decisions. In Nevada, water rights applications for water to support utility-scale power plants were granted because the plants were to use "water efficient, air-cooled technology" – "realistic power generation projects" – and water use in this context was reasonable. State Engineer Ruling No. 5008, dated March 20, 2001, at p.24-25, 40, available at http://images.water.nv.gov/images/rulings/5008r.pdf?CFID=170013&CFTOKEN=49614454. A year later, as the Nevada State Engineer considered water rights applications for which a potential use was a water-cooled power plant, he recognized that "Technology is available, which can produce significant amounts of electricity using air-cooled systems. This technology uses significantly less quantities of water. … The State Engineer … does not believe it is prudent to use substantial quantities of newly appropriated ground water for water-cooled power plants in one of the driest places in the nation, particularly with the uncertainty as to what quantity of water is available from the resource, if any." State Engineer Ruling No. 5115, dated April 18, 2002, at p.25, available at http://images.water.nv.gov/images/rulings/5115r.pdf.

The California Energy Commission and California State Water Resources Control Board also discourage fresh water use for power plant cooling. *See* California Energy Comm'n, *2003 Integrated Energy Policy Report* 39-41 (2003), available at http://www.energy.ca.gov/reports/100-03-019F.PDF; State Water Resources Control Board Resolution 75-58, *Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling*, June 19, 1975, p. 1. http://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/1975/rs75_058.pdf. As a result, all solar thermal projects permitted on public lands in California in 2010 were dry-cooled.

b. Aquatic Biota

The final PEIS should provide greater context to highlight the scarcity of and stress to water resources in the planning area. Both the main volume and state-specific volumes contain extremely little information about the existing flow systems, their status and the importance. In the six-state area, intermittent and ephemeral streams make up "over 81% [of all streams] in the arid and semi-arid Southwest (Arizona, New Mexico, Nevada, Utah, Colorado and California)." Levick, L. et al., *The Ecological and Hydrological Significance of Ephemeral and Intermittent Streams in the Arid and Semi-arid American Southwest* iii (EPA 2008) (noting also that desert washes are not consistently mapped). They occupy only a small part of the landscape but support a great deal of biodiversity.

The DPEIS underestimates the importance of aquatic and riparian habitats. "Ephemeral and intermittent streams provide the same ecological and hydrological functions as perennial streams," *id.* at iii, including wildlife habitat, support for riparian vegetation, groundwater recharge, water quality services and nesting and migratory corridors for wildlife. *See generally id.* In the Great Basin, for example, these ecosystems are small, isolated and rare, but support most of the biodiversity in the region. Don Sada, *Great Basin Riparian and Aquatic Ecosystems, in* Collaborative management and research in the Great Basin – examining the issues and developing a framework for action 49, 49 (Jeanne C. Chambers et al. eds., 2008). However, "The Great Basin is the driest region in the United States." *Id.* Riparian and aquatic ecosystems have already been dramatically altered and degraded by unsustainable uses.

There is also a lack of baseline information regarding surface and groundwater features of BLM lands targeted for SEZs. Many of the areas proposed for solar energy development fall in rural, desert areas not covered by the USGS streamflow gauging network. *Compare* Mark T. Anderson & Lloyd H. Woosley, Jr., *Water Availability for the Western United States – Key scientific challenges* Fig. 10 (U.S. Geological Survey Circular 1261, 2005) (with little to no coverage in NV/CA border region, southwestern California, southern New Mexico). Moreover, there is no national program to monitor groundwater conditions and there is little information on groundwater availability or trends in availability. *Id.* at 17. Groundwater is an important resource in the West; it may be the primary or exclusive water supply for many communities. "In the United States, ground water is the source of drinking water for 50 percent of the population and as much as 90 percent of the population in rural areas, especially in the West." *Id.*

In such arid settings, additional water demand from concentrating solar power systems employing wet-cooling could tax scarce water resources. Put in context, under "normal" conditions, 36 out of 47 state water managers anticipate water shortages in localities, regions or statewide within 10 years; under drought conditions, that number rises to 46 of 47 managers. Government Accounting Office, *Freshwater Supply, State's Views of How Federal Agencies Can Help Them Meet the Challenges of Expected Shortages* 64-65(GAO-03-514, 2003).

Many of the potentially affected ephemeral and intermittent streams are not accurately mapped, and desert washes are not consistently mapped. Levick et al., *supra* at 5. While acknowledging

this lack of information, BLM improperly defers its acquisition and impacts analysis to the project-specific stage. DPEIS 4-49. Without information regarding water availability or surface water flow systems, it is difficult to choose among alternatives and even more difficult to assess claims of effective mitigation of potential impacts to water availability or to ephemeral and intermittent streams and washes. If the incomplete information is essential to choosing among alternatives and getting the information is not exorbitantly expensive, the agency shall acquire and include the information. 40 C.F.R. § 1502.22(a). If it is exorbitantly expensive or not possible to acquire the information, the agency shall inform the reader that the information is incomplete or unavailable, why the information is relevant, what relevant information is available, and what impacts the available information predicts. *Id.* § 1502.22(b).

c. Climate change

BLM has failed to include climate change projections in its description of the affected environment so that it may adequately identify direct, indirect and cumulative effects. The long-term duration of the program and individual projects – 20 years – speak to the need to consider how the effects of climate change may intensify over time. Moreover, review at a programmatic level lends itself to climate change projections that can be made at a regional scale. Although the DPEIS acknowledges that such an analysis may be necessary in this section, *see* DPEIS at 4-1 (noting that "[f]actors such as climate change that may have an influence on the current conditions and potential trends of individual resources and resource uses have been incorporated as appropriate …"), it devotes a mere four sentences to climate change impacts on resources throughout the chapter. *See* DPEIS at 4-59 (observing that there may be variations in water supply and use); DPEIS at 4-132 (summarizing adverse effects on the range of resources). BLM repeats much of this information in the cumulative impacts assessment. DPEIS 6-87. The summary provided offers no information on <u>impacts</u> or <u>trends</u>; information on trends and how they manifest on water resources and ecosystems are below. "The past century is no longer a reasonable guide to the future for water management." U.S. Global Change Research Program, *Global Climate Change Impacts in the United States* 49 (Thomas R. Karl et al. eds., 2009)[hereinafter USGCRP].

The PEIS should include observed <u>and</u> projected impacts of climate change in the region – considering whether climate change has affected, is affecting, or will in the future affect each resource and incorporating that information into the discussion of each resource. Federal and state agencies have published reports, studies and plans that identify the observed and projected impacts of climate change on specific geographic areas or environmental resources and that are readily available to BLM. BLM must consider the following impacts of climate change on the affected environment.

(i) Soils

BLM must supplement its discussion of soil erosion due to water and surface runoff (*see, e.g.*, DPEIS 5-23) to consider increased runoff from more extreme storms in a climate-changed environment. Climate change will lead to an intensified hydrologic cycle, including more extreme rainfall events. *See* Zbigniew W. Kundzewicz et al., *Freshwater resources and their*

*management*, in Climate Change 2007: Impacts, Adaptation and Vulnerability, Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change 173, 175 (M.L. Parry et al., eds. 2007). Increasing trends in extreme precipitation events have already been observed in the Southwest and climate change may be the cause. *See* Kenneth E. Kunkel et al., *Long-term trends in Extreme Precipitation Events over the Conterminous United States and Canada*, 12 J. of Climate 2515 (1999); Kenneth E. Kunkel, *North American Trends in Extreme Precipitation*, 29 Natural Hazards 291 (2004). Increased intensity of rainfall events will lead to increased erosion from increased rainfall and in combination with other climate-related factors such as changes in soil moisture, plant cover and shifts from snow to rain. One study indicated that a 1% change in total precipitation (due to climate change alone, and not considering land use or other changes) could affect a 1.7% change in soil erosion. F.F. Pruski & M.A. Nearing, *Runoff and soil loss responses to changes in precipitation: a computer simulation study*, 57 J. of Soil and Water Conservation 7 (2002).

BLM must assess the impacts of proposed land use changes – construction on thousands of acres of desert soils – on the hydrology of the affected environment in an environmental setting that contemplates the impacts of climate change. The potential removal of desert wash networks over thousands of acres would eliminate their hydrological and biological functions and impede wildlife movement through the washes. An increase in the frequency or duration of extreme rainfall events may change upstream and downstream surface water features, soil moisture and the frequency and characteristics of flow and flood events.

The Bureau must also assess impacts of the proposed construction on desert crusts, especially on cryptobiotic soils essential to desert ecosystem functions, as discussed in further detail in the state-specific comment submitted separately.

(ii) Water resources

Numerous federal publications expand on the DPEIS's observation that climate change may modify water supply and use by actually explaining how the surface and groundwater resources in the planning area may be affected over the next decades by changes in precipitation patterns. For example, the IPCC has projected likely reductions in snowpack, seasonal shifts in runoff patterns, declines in groundwater recharge, and an increased frequency of intense precipitation events, such as flash floods, in the western and southwestern U.S. IPCC, 2007, *supra.* *See also* USGCRP, *supra* at 42 ("the arid Southwest is projected to experience longer and more severe droughts from the combination of increased evaporation and reductions in precipitation"); *id.* at 44 (16% increase in average number of days with very heavy precipitation); *id.* at 44 (extended dry periods have become more frequent in the Southwest and "[l]onger periods between rainfalls, combined with higher air temperatures, dry out soils and vegetation …"); *id.* at 45 (projecting substantial declines in the interior West, especially the Southwest, in runoff); *id.* at 46 (projecting advances in spring runoff by up to 60 days; earlier spring runoff leads to reduced summer flows); *id.* at 47 (changes in water cycle will affect groundwater recharge).

These same publications discuss the potential changes in water quality as a result of climate change. The IPCC predicts that increased water temperatures will put additional stress on aquatic species. IPCC, 2007, *supra.* *See also* USGCRP, *supra* at 46 (higher water

temperatures); *id.* at 46 (increases in storm intensity and reductions in summer streamflow contribute to higher concentrations of pollutants); *id.* at 46 (heavier storms increase runoff, sedimentation and flushing of pollutants into waters).

Additional federal sources explain how the transformations driven by climate change will redistribute stream flow and wetlands in the Great Basin, one of the basins within the planning area:

> Ongoing climate change will have significant effects on the timing and amount of available water in this arid to semi-arid region (Wagner 2003, CIRMOUNT Committee 2006). Under warming trends, a larger fraction of precipitation will come as rain, and the region's snow packs will melt earlier, yielding higher winter and spring runoff rates and less summer runoff. Spring snowmelt is already occurring weeks earlier than in past decades and more precipitation falls as rain in much of the region. Continuation of these trends will result in increased winter floods in some basins, smaller warm-season reserves and rates of runoff, and warmer water temperatures in many of the region's rivers and lakes. In summer, lower flows coupled with higher variability may negatively affect various water uses including hydropower, irrigation, fish, and recreation. … Areas with increasing dryness will exhibit a decrease in groundwater recharge, decreasing the longevity of groundwater resources.

Jeanne C. Chambers, *Water resources in the Great Basin, in* Collaborative management and research in the Great Basin – examining the issues and developing a framework for action 20, 20 (Jeanne C. Chambers et al. eds., 2008).

> A reasonable scenario for western stream flows is change in the current seasonal proportionality of flows: increased winter flow, reduced and earlier spring peaks, and reduced summer and fall flows. The change in absolute flows will depend on the actual increase in precipitation relative to the degree of warming and its effects on evapotranspiration. Most watersheds in the Great Basin exhibit high natural variability in unregulated streamflow (Hurd and others 1999) and this variability may increase. In summer, lower flows coupled with higher variability may negatively affect various water uses (hydropower, irrigation, fish, recreation, and so forth).

Jeanne C. Chambers, *Climate Change and the Great Basin, in* Collaborative management and research in the Great Basin – examining the issues and developing a framework for action 29, 30 (Jeanne C. Chambers et al. eds., 2008).

(iii) Ecosystems

The IPCC has stated broadly that, "Responses of terrestrial species to warming across the Northern Hemisphere are well documented by changes in the timing of growth stages (i.e., phenological changes), especially the earlier onset of spring events, migration, and lengthening of the growing season." IPCC, 2007: Climate Change 2007: Impacts, Adaptation, and

Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Parry, Martin L., Canziani, Osvaldo F., Palutikof, Jean P., van der Linden, Paul J., and Hanson, Clair E. (eds.)]. Cambridge University Press, Cambridge, United Kingdom, 1000 pp.

Arid environments like those studied here are likely to become even hotter and drier; in fact, this is already being observed. USGCRP, *supra* at 83. The ranges of many species in the United States have shifted northward and upward in elevation. *Id.* at 80. Communities of species will shift as a whole, breaking up existing ecosystems, and some migratory corridors may be blocked. *Id.* at 81.

(iv) Vegetation

Earlier average bloom dates for plants have already been observed. Jeanne C. Chambers, *Climate Change and the Great Basin, in* Collaborative management and research in the Great Basin – examining the issues and developing a framework for action 29, 29 (Jeanne C. Chambers et al. eds., 2008).

(v) Invasive species

Rising air temperatures can increase pest outbreaks. USGCRP, *supra* at 82. Many invasive plant species can tolerate higher temperatures of climate change and may grow faster than natives. *Id.* at 83. In the Great Basin, researchers predict that higher levels of CO2 may increase the invasibility of cheatgrass and other annual grasses. Other invaders, including perennial forbs and woody species, may be similarly advantaged. Jeanne C. Chambers, *Climate Change and the Great Basin, in* Collaborative management and research in the Great Basin – examining the issues and developing a framework for action 29, 30 (Jeanne C. Chambers et al. eds., 2008).

d. Water Quality

BLM should provide more information in the Final PEIS that includes a robust inventory of surface and groundwater quality in the planning area. There is nothing but a brief, general statement about water quality in each of the nine aquifers, *see, e.g.*, DPEIS Table 4.9-4 (groundwater generally good in the Pacific Northwest, not known in the Texas-Gulf), with similarly terse statements regarding surface water quality. *See* DPEIS Table 4.9-1. Additional information will inform a comparison of alternatives, to discern the water treatment needs for solar energy facilities (e.g., for potable supply, for mirror washing), the resultant wastewater treatment needs, the environmental impacts of any water treatment, or the effectiveness of proposed mitigation.

***Recommendations:*** BLM has conceded that the Solar PEIS does not set out a sufficient baseline of conditions on the public lands that are made available for solar energy development. In order to comply with NEPA's requirement to evaluate impacts starting from an accurate description of the affected environment, the PEIS must set out specific requirements for describing an accurate

baseline of resources and conditions so that impacts can be evaluated at a landscape level prior to project approval.

5. Mitigation measures must be described with specificity and must include commitments for action.

NEPA requires that BLM discuss mitigation measures in an EIS. 40 C.F.R. §§ 1502.14, 1502.16. Simply identifying mitigation measures, without analyzing the effectiveness of the measures, violates NEPA. Agencies must "analyze the mitigation measures in detail [and] explain how effective the measures would be . . . A mere listing of mitigation measures is insufficient to qualify as the reasoned discussion required by NEPA." *Nw. Indian Cemetery Protective Ass'n v. Peterson*, 764 F.2d 581, 588 (9th Cir. 1985), *rev'd on other grounds*, 485 U.S. 439 (1988). NEPA also directs that the "possibility of mitigation" should not be relied upon as a means to avoid further environmental analysis. Council on Environmental Quality, *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, *available at* http://ceq.hss.doe.gov/nepa/regs/40/40p3.htm; *Davis v. Mineta*, 302 F.3d at 1125.

Further, general statements that BLM will conduct monitoring are also not an appropriate form of mitigation. Simply monitoring for expected damage does not actually reduce or alleviate any impacts. Only the taking of appropriate actions based on monitoring results can reduce impacts. The Draft PEIS fails to set out mitigation goals or requirements for special status species, for example, simply stating that an Ecological Resources Mitigation and Monitoring Plan should include: "Measures to mitigate and monitor impacts on special status species developed in coordination with the appropriate federal and state agencies (e.g., BLM, USFWS, and state resource management agencies)." DPEIS, p. 5-134.

As discussed in recent guidance issued by the Council on Environmental Quality (CEQ) addressing the "Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact,"[27] specific commitments are needed for meaningful use of mitigation measures.

As CEQ describes it:

> Specifically, the guidance affirms that agencies should:
> - commit to mitigation in decision documents when they have based environmental analysis upon such mitigation (by including appropriate conditions on grants, permits, or other agency approvals, and making funding or approvals for implementing the proposed action contingent on implementation of the mitigation commitments);
> - monitor the implementation and effectiveness of mitigation commitments;
> - make information on mitigation monitoring available to the public, preferably through agency web sites; and
> - remedy ineffective mitigation when the Federal action is not yet complete.

Thus, in the context of the Solar PEIS, the guidance requires commitment to actual mitigation measures that the BLM has reason to believe will be effective, monitoring of actual

[27] Available at: http://www.whitehouse.gov/administration/eop/ceq/initiatives/nepa

effectiveness, publication of monitoring data, and action to address ineffective mitigation. If monitoring shows that mitigation measures are not effectively avoiding or reducing or compensating for environmental impacts, then new actions must be taken to mitigate harms or the damaging activities associated with solar energy development must be stopped until new measures can be evaluated and developed.

Further, the guidance states:

> CEQ encourages agencies to commit to mitigation to achieve environmentally preferred outcomes, particularly when addressing unavoidable adverse environmental impacts. Agencies should not commit to mitigation, however, unless they have sufficient legal authorities and expect there will be necessary resources available to perform or ensure the performance of the mitigation.

Guidance, p. 5. Consequently, the BLM must also take into account the likelihood that it will have the funding and resources necessary to implement mitigation measures, as one aspect of ensuring that these measures are likely to be successful. In California, the BLM is trying to establish a comprehensive monitoring program that includes "before" monitoring at project and reference sites; and careful consideration should be given to expanding their efforts across all public lands that will be affected by solar development.

To support the BLM's assertion that its "comprehensive set of mitigation requirements would ensure that impacts from solar energy development on BLM-administered lands would be mitigated to the fullest extent possible," DPEIS, p. 6-104, the final PEIS must provide data and analysis that demonstrate why the proposed mitigation measures/design features will "constitute an adequate buffer against the negative impacts that may result from the [proposed alternatives]." *Nat'l Parks & Conservation Ass'n v. Babbitt*, 241 F.3d 722, 734 (9th Cir. 2001). Critical to the assessment of environmental effects is an analysis of the effectiveness of proposed mitigation measures – this assessment is lacking in this DPEIS. This gap would be partly addressed by setting goals and adding further discussion of potential compensatory mitigation as described below, but we also add the following comments:

a. Analysis is required to support effectiveness of mitigation.

Frequently, the Draft PEIS states that mitigation will minimize impacts, but offers no supporting analysis. *See, e.g.,* DPEIS, p. ES-18 (Impacts to groundwater and surface water flow systems, water contamination, water quality degradation by runoff or excessive withdrawals "can be effectively mitigated"; DPEIS, pp. 5-24, 5-25, 5-26 (mitigation measures would reduce the level of impacts to soils from site characterization, construction, operations and decommissioning); DPEIS 5-41 (mitigation measures relating to site design, stormwater, and avoidance of critical landscapes would reduce impacts relating to altered hydrology); DPEIS, pp. 11.1-61, 11.2-62, 11.4-64 (land disturbance impacts to water resources "will be minimized"); DPEIS, Tables 5.10-1, 5.10-2, 5.10-3, 5.10-4 (claiming an ability to mitigate impacts to ecological resources). Each section of design features is "at best a 'mere listing' of mitigation measures, without supporting analytical data." *League of Wilderness Defenders v. Forsgren*, 309 F.3d 1181, 1192 (9th Cir. 2002) (quoting *Okanogan Highlands Alliance v. Williams*, 236 F.3d 468, 473 (9th Cir. 2000)).

In fact, a closer reading of the DPEIS reveals that BLM cannot be sure which mitigation measures will be implemented or that they will be effective; and if ineffective, that other mitigation measures will be put in place. The final PEIS must contain analyses that estimate how or to what extent mitigation will reduce impacts – BLM must "show its work" as well as acknowledge the need for site-specific analysis showing that a specific BMP will in fact produce the intended result if a proposed project is approved.

In the final EIS, to show whether and how mitigation will work, BLM must provide a more accurate assessment of environmental effects and must temper its conclusions that impacts will be mitigated when it does not have supporting data. Before selecting and implementing an action alternative, BLM must have a better understanding of its ability to mitigate significant impacts. NEPA "requires the Federal agencies to assess the environmental consequences of their actions *before* those actions are undertaken." *Klamath-Siskiyou Wildlands Ctr. v. BLM*, 387 F.3d 989, 993 (9th Cir. 2004) (emphasis added).

In many cases, the type of mitigation and the actual ability to mitigate significant impacts to environmental resources will not be known until BLM reviews specific projects. "Actual ability to mitigate impacts will depend on site-specific conditions and the communities present in the project area." DPEIS, Table 5.10-1 (vegetation); DPEIS, Table 5.10-2 (wildlife); DPEIS, Table 5.10-3 (aquatic resources). *See also* DPEIS, p. 5-2 ("Their [mitigation measures] applicability and effectiveness cannot be fully assessed except at the project-specific level when the project location and design are known."); DPEIS, p. 6-104 ("Any potential adverse impacts that could not be addressed at the programmatic level would be addressed at the project level, where resolution of site-specific and species-specific concerns is more readily achievable."). In other cases, assertions that impacts can or will be effectively mitigated are contradicted by statements elsewhere in the DPEIS. *See, e.g.,* DPEIS Tables 5.10-1, 5.10-2, 5.10-3, 5.10-4 (noting that overall it is relatively difficult to mitigate impacts to ecological resources).

Built off of BLM's Special Status Species Policy and BLM's ESA Section 4(a)(1) affirmative obligations to conserve and recover listed species, the final PEIS should be used to promulgate goals that will provide clarity to project developers and the public on how mitigation requirements will be developed and analyzed. In particular, mitigation measures should be specific to the wildlife species and other resource impacts that will occur. BLM offices need a clear standard for review of mitigation projects that require a clear description and quantification of wildlife impacts and offsets.

b. Monitoring is critical to mitigation effectiveness.

DOI agencies have too often failed to establish clear and measurable biological goals in their own work and in requirements of third parties seeking agency approval. The absence of goals feeds into problems with inadequate monitoring. The result is that too many projects fail to adequately compensate for impacts, and DOI agencies have a poor record of being able to track such performance.

The Draft PEIS lacks assurances that mitigation measures will be implemented and monitored. CEQ recommends that any agency NEPA analyses and/or decision documents should:

- describe the expertise applied in determining appropriate mitigation commitments;
- consider when and how mitigation commitments will be implemented;
- specify measurable performance standards or expected results of mitigation commitments as well as the timeframe for the agency action and mitigation commitments;
- disclose if it is reasonably foreseeable that funding for mitigation measures may not be available and, if so, the resultant environmental effects;
- identify alternative mitigation measures if the initial commitments are not implemented or effective; and
- describe monitoring plans and programs, the agency and/or applicant responsible for developing and implementing the monitoring program and the monitoring area and appropriate monitoring system.

*See* Final Guidance for Federal Departments and Agencies on the Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact, 76 Fed. Reg. 3843 (Jan. 21, 2011). BLM should apply these recommendations to the DPEIS.

BLM must use the final PEIS to define the types of outcomes (population size, viability, reproductive performance, age class distribution, etc.) that it will require. Additional final PEIS analysis should describe the expected results of mitigation and how it will serve to guide any monitoring program that BLM and applicants implement. "Monitoring is fundamental for ensuring the implementation and effectiveness of mitigation commitments, meeting legal and permitting requirements, and identifying trends and possible means for improvement." 76 Fed. Reg. at 3849. BLM must establish clear requirements for monitoring and reporting – to the public and the agency – on the success in achieving those goals. Public reporting should document whether the monitoring program should track whether mitigation commitments are being performed as described in NEPA analyses and whether the mitigation is producing the expected outcomes and environmental effects. The monitoring program should also provide for public involvement. 76 Fed. Reg. at 3851.

Moreover, many of the design features rely on monitoring alone as mitigation plans. *See, e.g.,* DPEIS, pp. A-48—A-50 (requiring a variety of hydrologic studies and monitoring plans). However, none of these monitoring plans call for changes in water use should the monitoring reveal adverse effects to water resources, sensitive habitats or special status species; the agency and the public must be able to determine, *in advance*, the appropriateness and effectiveness of mitigation commitments. "Monitoring may serve to confirm the appropriateness of a mitigation measure, but that does not make it an adequate mitigation measure in itself." *Nat'l Parks & Conservation Ass'n,* 241 F.3d at 734. To truly ensure that these impacts are avoided, the mitigation plans must include conservation measures informed by the monitoring results.

c. Mitigation measures must be sufficiently robust to address the extensive impacts of utility-scale solar energy development.

It is critical to note that the kinds of impacts these massive projects will cause in desert environments are essentially permanent and will persist far beyond the site's use for energy

production, despite "remediation" commitments. Thus, mitigation measures must be planned and funded to last in perpetuity, not subject to change via land use plan amendments, budget cuts and other impacts.

d. Adaptive management, as part of mitigation, must be conducted using a detailed framework.

The Draft PEIS also states that the BLM will rely on adaptive management so that new data and lessons learned can be addressed on an ongoing basis. DPEIS, pp. 2-5 and 2-6. In order for BLM to rely on actions to be taken through adaptive management to mitigate impacts from solar energy development, there must be a concrete and detailed adaptive management plan. The key elements of a meaningful adaptive management plan, as well as appropriate monitoring, are discussed in further detail below in Section 1.III.D of these comments.

In addition to the specific changes to the mitigation measures recommended in Section 1.I above, the PEIS must also evaluate the likelihood of effectiveness based on the criteria set out above and must incorporate a detailed adaptive management plan framework.

e. Monitoring results and actions must be made public.

Lastly, the ROD must include an unambiguous commitment to making monitoring data available to the public at the same time it is received by the agency. Information about the ongoing impacts of these projects on publicly-owned resources is not confidential or propriety and making it public is key to the BLM's goal of having an environmentally responsible solar program.

***Recommendations***: BLM cannot rely on mitigation measures without a reasoned evaluation and conclusion that they will be successful. Monitoring and adaptive management cannot substitute for mitigation, but must be part of BLM's detailed, science-based commitments to action. The Solar PEIS, the ROD and Solar Energy Program should require evaluation of mitigation measures and commitments to monitoring and adaptive management to ensure that they are successful or, if they are not, that new measures are implemented or development activities are changed. In addition, BLM should commit to making all monitoring information, as well as adaptive management actions taken in response to monitoring results, public.

### *B. BLM Wildlife Policy*

1. The Draft PEIS analysis of impacts on special status species is not adequate to reveal whether implementation of the proposed program will be consistent with agency policy to conserve those species

BLM's Special Status Species policy states that the agency "shall manage Bureau sensitive species and their habitats to minimize or eliminate threats affecting the status of the species or to improve the conditions of the species habitat…."Manual 6840.2C. The policy then enumerates the specific means to achieve these objectives, including through "evaluating the significance of BLM-administered lands and actions undertaken by the BLM in conserving those species"(

6840.2C1) and ensuring that "BLM activities affecting Bureau sensitive species are carried out in a way that is consistent with its objectives for managing those species and their habitats at the appropriate spatial scale." 6840.2C2. The policy even goes beyond species that currently have special status species protection and instructs the BLM to "[c]onsider ecosystem management and the conservation of native biodiversity to reduce the likelihood that any native species will require Bureau sensitive species status." 6840.2C7.

While the Draft PEIS acknowledges the severe risk posed to special status species by large scale solar development, especially under the Preferred Alternative, the analysis it contains is inadequate to reveal whether implementation of the program will be consistent with Special Status Species policy. [28]

First, as stated above, the analysis of impacts to special status species outside of zones is insufficient. The BLM acknowledges in the Solar PEIS that, when considering impacts to special status species, it has only evaluated data in limited "SEZ regions" and hopes to have additional data and analyses prepared before the final PEIS is released. [29] DPEIS, p. J-2. As noted above, providing the analysis at this later point in the process will not permit the public to review and comment on either the data or the agency's analyses, both of which must be disclosed to the public as part of the Draft PEIS in order to permit the "public scrutiny" that is considered "essential to implementing NEPA." 40 C.F.R. § 1500.1(b).

Second, the analysis that was conducted for impacts to special status species within the zones is not conducted at the appropriate biological scale. BLM special status species policy focuses conservation actions at the population scale of analysis, and notes other key parameters such as species distribution and abundance for covered species that should be considered and employed when assessing the impacts of the solar program. For example, BLM is required to inventory the public lands to determine the "condition of the *populations* and their habitats, and how discretionary BLM actions affect those species and their habitats" 6849.04D.3. The policy also calls for population monitoring of special status species to "determine whether management objectives are being met" 6840,04E.7. Furthermore, the policy states that the agency will "manage Bureau sensitive species and their habitats to minimize or eliminate threats affecting the status of the species by…determining, to the extent practicable, the distribution, abundance, population condition, current threats, and habitat needs for sensitive species, and evaluating the significance of BLM-administered lands and actions by the BLM in conserving those species" 6840.2C.1.

The Draft PEIS's analysis does not reveal population level impacts; it acknowledges that these impacts will occur. For example, it states that "because of their small population sizes and often specialized habitat needs or dependence on rare habitats, special status species may be more vulnerable to impacts than common and widespread species. *Small population size* makes them more vulnerable to the effects of habitat fragmentation, habitat alteration, habitat degradation, human disturbance and harassment, mortality of individuals, and the loss of genetic diversity.

[28] Federally listed as threatened or endangered under the Endangered Species Act (ESA); candidate or proposed for listing under the ESA; BLM-designated sensitive; state-listed as either endangered, threatened, or a species of special concern; or a rare species as defined by a state rank of S1 or S2.
[29] As noted above, these "regions" are comprised of the lands within 50 miles of the centers of the proposed SEZs.

DPEIS, p. 5-114 (emphasis added). Despite this overarching statement and clear acknowledgement of risk to wildlife populations, however, the draft PEIS fails to conduct a meaningful vulnerability analysis of the effects of habitat fragmentation, alteration and degradation on populations of special status species. Furthermore, the proposed program does not clearly define how these risks will be defined, avoided, minimized and mitigated during program implementation. More specifically, it does not clarify whether population level effects will be meaningfully assessed at the project scale.

Instead, and despite the fact that the population condition of wildlife species is a key attribute of agency policy, the draft PEIS provides an extremely broad analysis of potential impacts to ecological resources and wildlife. The draft PEIS acknowledges that construction and operation is likely to result in habitat disturbance "that could result in major impacts to wildlife", including the loss and fragmentation of habitat, resulting in "loss of genetic interchange among populations" and impacts to "local wildlife composition and abundance" as well as loss of "local wildlife composition and abundance" DPEIS, p. 5-74. Although the PEIS concludes that impacts will be "large," assuming no mitigation, assessment of actual impact magnitudes on wildlife is deferred until the project scale of analysis.[30] DPEIS, Table 5.10-4. It is unclear, however, whether or how the population level impacts will be assessed at a project scale.

Rather than providing mere agency assurances that actual impacts will be effectively evaluated at a later planning stage, the analysis in the draft PEIS could have been conducted in a more meaningful manner. While the analysis of relative impact magnitudes relies on numerous assumptions, two are of particular concern. First, in determining whether impacts are categorized as none, small, moderate, or large, the draft PEIS uses a "landscape-level analysis" based on the percentage of a sensitive species' *population* **or** *suitable habitat* that would be lost in an SEZ region. If this analysis were to be based on population-level impacts, or otherwise constructed so as to allow meaningful inference to risks posed to individual species persistence, we believe that reasonable conclusions could be drawn about the risks the program presents to a species' chances of being listed under the ESA, in accordance with BLM wildlife policy. For many sensitive species, however, the draft PEIS relies on broad habitat-level impacts. The PEIS fails to demonstrate a connection between the estimated habitat-level impacts and actual risks to a species conservation status, and is therefore not adequate to demonstrate compliance with BLM wildlife policy. In other words, for many sensitive species, the Draft PEIS provides no useful information about how much closer the solar program places these species toward an ESA listing.

The second notable flaw with the special status species analysis is the use of a 50-mile radius to determine the relative impact magnitude for all special status species. Depending on the type of species, a 50-mile radius could represent a small portion of the species' range, the species' entire range, or anything in between. For example, rare endemic plants have far more restricted ranges

[30] A "large" impact is defined as "effects are clearly noticeable and are sufficient to destabilize important attributes of the resource (e.g. > 10% of the population or its habitat would be lost in the region.)" (5-96). Despite the reference to population level effects, we found no evidence that the draft PEIS actually attempted to estimate them. Furthermore, the reference to "population" in this criterion is misplaced; there is no evidence that population level effects were assessed.

than birds; impacts to the former would be of greater concern than impacts to the latter. The draft PEIS, however, does not specifically distinguish among these species and thus may both underestimate and overestimate the significance of impacts at the species level. A more reasonable and meaningful approach, and one more likely to be consistent with agency wildlife policy, would have been to estimate habitat loss for individual species based on the species' known range and distribution.

In order to conduct proper and sufficient analysis of the impacts to wildlife, to remedy the deficiencies of the draft PEIS, and to provide for improved conditions for sensitive species, additional future analyses must consider:

- Program and project level impacts to "the occurrence, distribution, population, and habitat condition of all ESA-listed species" on lands potentially impacted by solar development as well as assess the significance of lands potentially impacted by solar development in the conservation of ESA-listed species.840.1E4.
- Whether solar development actions (including mitigation actions) will improve the status of special status species so that their Bureau sensitive recognition is no longer warranted.
- Whether solar development actions will contribute to "a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range." Following this standard would ensure that the program does not increase the risk of adding a species to the sensitive species list.
- The potential for harm to "species (which depend) on ecological refugia or specialized or unique habitats on BLM-administered lands" and whether potential solar development could lead to "alteration such that the continued viability of the species in that area would be at risk." 6840.2A1. Following this standard would ensure that the program does not increase the risk of adding a species to the sensitive species list.
- Potential impacts to "the distribution, abundance, population condition…and habitat needs for sensitive species" and sufficiently evaluate the potential impacts of solar development actions on lands in conserving those species. 6840.2C1.
  Whether species management objectives are being met as part of mitigation and adaptive management plans the "monitoring (of) populations and habitats of Bureau sensitive species." 6840.2C3.

***Recommendations:*** BLM should conduct a meaningful vulnerability analysis of the effects of habitat fragmentation, alteration and degradation on populations of special status species that includes all potentially affected species, is based on meaningful biological and spatial scales, and focuses at the population level. Such analysis is required in order for BLM to be in compliance with its own policy.

2. The Solar Energy Program must define and employ measurable wildlife standards that are consistent with agency wildlife policy.

The PEIS relies on mitigation measures to alleviate harm to wildlife and special status species, however, it does not adequately describe how the Solar Energy Program will "minimize or eliminate threats" to sensitive species, nor how it will evaluate "the significance of …actions undertaken by the BLM in conserving those species" to an extent that satisfies the SSS policy.

The underlying problem is that the PEIS fails to establish an explicit standard that can be used to determine what level of impacts to sensitive species is deemed acceptable and how much mitigation is required. Without this standard, the analysis in the PEIS of avoidance, minimization, and mitigation occurs in a vacuum.

One manifestation of this problem occurs in Appendix M, page 34, which states that if a project cannot be sited to avoid occupied habitats, then translocation and compensatory mitigation will be "recommended for consideration," with the final mitigation plan being determined at the project level. This language provides no information on exactly when translocation and compensatory mitigation should be implemented, largely because it is unclear when these measures are actually needed. If the PEIS were to establish a quantitative, risk-based standard that defines the maximum extent that a sensitive species could be endangered as a result of the Solar Program, then it would be clearer when mitigation is and is not required. This would not only provide the environmental community with greater certainty, but also enable solar developers to more effectively site and plan development projects.

In addition, it is not clear whether the proposed mitigation measures introduced under 5.10.5 will achieve wildlife policy objectives. For example, "projects shall be sited and designed to avoid direct and indirect impacts on important, sensitive, or unique habitats in the project vicinity, including, but not limited to….habitats supporting special status species *populations*…For cases in which impacts cannot be avoided they shall be minimized and mitigated appropriately." DPEIS, p. 5-127. The language fails to define habitats which support special status species populations, nor to articulate what standard shall apply to appropriate minimization and mitigation using a population level effect. The section goes on to say that projects "should not be sited in…other specially designated areas that are considered necessary for special status species and habitat conservation." Again, determinations of what is "necessary" for species conservation are not clearly articulated in biologically meaningful terms.

The PEIS repeats this failure to properly account for populations of special status species in the program design features, including:

- The final PEIS fails to clearly define the relationship between the protection of "potentially sensitive resources" including "unique biological communities" and "crucial wildlife habitats" and actual populations of wildlife and special status species as directed by agency policy.
- The Draft PEIS states: "Buffer zones shall be established around sensitive habitats, and project facilities and activities shall be excluded or modified within those areas." The final PEIS must describe how buffer zones will be established around "sensitive habitats" (and explain why "unique" and "important" habitats are excluded from this requirement) and describe how determinations will be made whether to exclude or modify activities. It is unclear in the Draft PEIS whether the buffer zones themselves will be "substantiated by best available information or science" or whether this applies to the modifications.
- The final PEIS or subsequent analyses must clarify the degree to which "habitat loss, habitat fragmentation, and resulting edge habitat due to project development shall be minimized." Similarly, the Final PEIS must clarify and define how projects will be

designed "to minimize the disruption of animal movement patterns and connectivity of habitats."

***Recommendation***: The BLM must establish an explicit standard that can be used to determine what level of impacts to sensitive species is deemed acceptable and how much mitigation is required to achieve species conservation.

D. ***National Historic Preservation Act***

Several 2010 fast track projects in California are currently in litigation in alleged violation of cultural and historic resources law over issues such as failure to avoid culturally important locations, failure to adequately consult with tribes, and inadequate analysis of cultural and historic resources. Anecdotally, critics have charged that the BLM's cultural resource evaluations appear to be an afterthought rather than fully integrated into project design and evaluation.

Ideally, cultural and historic evaluation, and government-to-government outreach to tribes, would be started well in advance of specific project design in order to avoid important resources. The following comments are offered in recognition that cultural and historic resources must be addressed as carefully as environmental resources, engaging all key stakeholders, and ensuring that laws governing them are fully followed. If they are not, these mistakes can doom an otherwise well-sited renewable energy project.

Section 106 of the National Historic Preservation Act (NHPA) includes a process for early identification of cultural resources and Traditional Cultural Properties or sacred areas in and adjacent to the SEZs as defined in the Draft PEIS.[31] Currently, a lack of inventory, site information, and quality consultation of interested Native American Tribes prevents a reliable idea of quality, number and location of significant cultural resources and sacred areas that may significantly hamper completion of proposed renewable energy projects.

The PEIS should clearly state that the ROD on the Final PEIS does not preclude or substitute for the continuing process of consultation with parties in order to comply with Section 106 of the National Historic Preservation Act during subsequent project specific EIS determinations, and that requirements to meet applicable parts of Section 106 have not yet been fulfilled.

These Section 106 requirements include but are not limited to cultural resources that meet the eligibility criteria for listing on the National Register of Historic Places (NRHP), are considered "significant" resources, and must be taken into consideration during the planning of federal projects. Federal agencies are also required to consider the effects of their actions on sites, areas, and other resources (e.g., plants) that are of religious significance to Native Americans as

[31] Information for this section was drawn primarily from PATRICIA L. PARKER *and* THOMAS F. KING (1990; Revised), Guidelines for Evaluating and Documenting Traditional Cultural Properties, *Cultural Anthropologist and Archeologist, American Indian Liaison Office, National Park Service Senior Archeologist and Director of the Office of Program Review, Advisory Council on Historic Preservation (formerly)Consultant, Archeology and Historic Preservation (currently).* U.S. Department Of The Interior, National Park Service, National Register, History And Education, National Register Of Historic Places

established under the American Indian Religious Freedom Act (P.L. 95-341). Native American graves and burial grounds are protected by the Native American Graves Protection and Repatriation Act (P.L. 101-601). Many of these resources are found in the six-state area covered by the PEIS.

1. Legal framework for managing cultural resources

The NHPA is the overarching law concerning the management of cultural resources. Numerous other regulatory requirements, however, pertain to cultural properties and are presented below. These laws are applicable to any project undertaken on federal land or requiring federal permitting or funding.

The NHPA created the framework within which cultural resources are managed in the United States. Section 106 of the NHPA defines the process for the identification of a cultural resource and the process for determining if a project will adversely affect the resource. The NHPA establishes the processes for consultation among interested parties, the agency conducting the undertaking, and the relevant State Historic Preservation Office (SHPO) or Tribal Historic Preservation Office (THPO); and for government-to-government consultation between U.S. government agencies and Native American Tribal governments. The NHPA, in Section 106, also addresses the appropriate process for mitigating adverse effects. The NHPA applies to federal undertakings and undertakings that are federally permitted or funded. The Solar PEIS is an undertaking subject to the NHPA.

Cultural resources on BLM-administered land are managed primarily through the application of the above identified laws. Guidance on the application of the laws is provided through Programmatic Agreements (PAs) developed among the BLM, the National Council of SHPOs, and the Advisory Council on Historic Preservation; and through state-specific PAs concerning cultural resources. Further guidance is provided through the 8100 Series manuals and handbooks for BLM employees, which outline cultural resource management on BLM-administered land.

"Significant Cultural Resources" which are protected by NHPA are generally 50 years of age or older and meet National Register of Historic Places (NRHP) criteria for evaluation (36 Code of Federal Regulations 60.4) which state, in part:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, materials, workmanship, feeling, and association, and
>
> Criterion A. that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> Criterion B. that are associated with the lives of persons significant in our past; or
>
> Criterion C. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high

> artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> Criterion D. that have yielded, or may be likely to yield, information important in prehistory or history.

While historic period sites may be determined NRHP eligible under virtually any of these criteria, prehistoric archaeological sites are almost always evaluated with respect to Criterion D. In other words, to be considered NRHP eligible, a prehistoric site must have yielded, or have the potential to yield

> important information about some aspect of prehistory or history, including events, processes, institutions, design, construction, settlement, migration, ideals, beliefs, lifeways, and other facets of the development or maintenance of cultural systems. . . . Any consideration of a property's eligibility under Criterion D must address (1) whether the property has information to contribute to our understanding of history or prehistory and (2) whether that information is important.

An eligible property must also be at least 50 years old (with a few special exceptions) and retain a certain amount of physical integrity.

2. Recommendations for managing cultural resources

Cultural resources information on public lands in and near the proposed Solar Energy Zones is incomplete. Coupled with the lack of inventories in and surrounding most of the SEZs, this means that early identification of areas appropriate for development cannot be completed with any assurance of reliability. In fact, Table 1 below illustrates the percentage of inventory within each SEZ. Sixteen of the SEZs have less than 5 percent surveyed and seven of these have less than 1 percent completed. No totals were given for seven of the SEZ. However, descriptions suggest that five have low percentages inventoried. In only one SEZ, Dry Lake near Las Vegas, NV, have surveys been completed to any appreciable amount.

We are recommending a two-phased approach to increase the quality and amount of data in a relatively cost effective and timely manner. The first is to develop a predictive model using existing data from surrounding areas within the same physiographic and cultural areas. The model should allow the agency to better extrapolate what kinds, location, and quality of sites will likely occur in the SEZs in areas that are to be inventoried. The second part includes completing a sample survey to bring the percentage of the inventory up. This will help the agency with selection and boundary adjustments before the PEIS is completed. As part of this sample survey, the agency should conduct viewshed analyses for proposed SEZs to identify which historic properties located outside SEZs—such as national scenic and historic trails and TCPs—whose significances are at least partly tied to their settings, could be adversely affected by development within the SEZs. Using these approaches, the agency will be more likely to predict issues that may arise during the required Section 106 compliance. This will also assist developers to avoid areas that are likely to contain significant cultural resources and the subsequent costs of data recovery or project adjustment.

**Table 1. Acreage and percentage of inventory by SEZ.**

| SEZ | State | SEZ Acreage | Approx. % Surveyed | Comments |
|---|---|---|---|---|
| Brenda | AZ | 3,878 | 0 | |
| Bullard Wash | AZ | 7,239 | 0 | |
| Gillespie | AZ | 2,618 | ? | 4 linear, 1 block |
| Imperial East | CA | 5,722 | ? | 1 block partially in NW |
| Iron Mountain | CA | 106,522 | ? | at least 3 linear surveys |
| Pisgah | CA | 23,950 | ? | at least 19 surveys |
| Riverside East | CA | 202,896 | ? | at least 109 surveys |
| De Tilla Gulch | CO | 1,522 | 3.8 | |
| Fourmile East | CO | 3,882 | 0 | |
| Los Mogotes East | CO | 5,918 | 0.2 | |
| Antonito SE | CO | 9,729 | 0 | |
| Afton | NM | 77,623 | 8 | |
| Mason Draw | NM | 12,909 | 2 | |
| Red Sands | NM | 22,520 | 7 | |
| Amargosa Valley | NV | 31,625 | 3 | |
| Delamar Valley | NV | 16,552 | 3.4 | |
| Dry Lake | NV | 15,649 | 60.2 | |
| Dry Lake Valley North | NV | 76,874 | 2.8 | |
| East Mormon Mountain | NV | 8,968 | 0.9 | |
| Gold Point | NV | 4,810 | 0 | |
| Millers | NV | 16,787 | 4 | |
| Escalante Valley | UT | 6,614 | ? | 8 linear; 2 block partially in S & W |
| Milford Flats South | UT | 6,480 | ? | 9 mostly linear |
| Wah Wah Valley | UT | 6,097 | 0.04 | |

a. Native American Consultation

One kind of cultural significance a property may possess, and that may make it eligible for inclusion in the Register, is *traditional cultural significance*. National Register Bulletin 2009. "Traditional" in this context refers to those beliefs, customs, and practices of a living community of people that have been passed down through the generations, usually orally or through practice. The traditional cultural significance of a historic property, then, is significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices. Examples of properties possessing such significance include:

- a location associated with the traditional beliefs of a Native American group about its origins, its cultural history, or the nature of the world;

- a rural community whose organization, buildings and structures, or patterns of land use reflect the cultural traditions valued by its long-term residents;

- an urban neighborhood that is the traditional home of a particular cultural group, and that reflects its beliefs and practices;

- a location where Native American religious practitioners have historically gone, and are known or thought to go today, to perform ceremonial activities in accordance with traditional cultural rules of practice; and

- a location where a community has traditionally carried out economic, artistic, or other cultural practices important in maintaining its historic identity. A traditional cultural property, then, can be defined generally as one that is eligible for inclusion in the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community.

b. Recommendations to Address Native American Concerns

Native American consultation under Section 106 of the National Historic Preservation Act must be conducted on all federal undertakings that may have an effect on sites or areas that may be of concern. Not only is there a legal mandate to complete consultation, but it is the right thing to do and is part of good management planning. This consultation should be:

- Meaningful -- the agency must make a reasonable and good faith effort to identify consulting parties;
- The consultation must fully address tribes' concerns;
- Government to government consultation must be conducted in person and should be ongoing until parties resolve adverse affects;
- Government to government is in addition to the regular public process dictated by NEPA;
- Consultation should consider cumulative effect of this project and others on traditional properties, cultural resources and tribal concerns; and
- Consultation should consider not only direct effects, but indirect effects on traditional properties.

To be most successful, consultation should be undertaken in the earliest stages of project development—meaning before scoping for NEPA—to avoid costly expenditures on locations that are inappropriate for development because of cultural or historic resources.

***Recommendations:*** As written, the Draft PEIS does not fulfill BLM's obligations under the NHPA. In order to comply with both the requirements and intent of the NHPA and other obligations for consultation, the Modified SEZ Program Alternative must set out more specific requirements and commitments for inventory and consultation, as described above.

### *E. Federal Land Policy and Management Act*

1. Multiple use management requires consideration of other resources when defining a solar energy program.

The Federal Land Policy and Management Act, ("FLPMA"), 43 U.S.C. § 1701 et seq., provides the BLM with both the obligations and the discretion to design a solar energy development program that also achieves meaningful conservation objectives, pursuant to its mandate of managing the public lands for "multiple use" and "sustained yield."[32] *See Theodore Roosevelt Conservation P'ship v. Salazar*, 616 F.3d 497, 518 (D.C. Cir. 2010) (observing that FLPMA affords the agency broad "discretion to decide how to achieve the multiple use and sustained yield objectives."). "Multiple use management' is a deceptively simple term that describes the enormously complicated task of striking a balance among the many competing uses to which land can be put, "including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and [uses serving] natural scenic, scientific and historical values." *Norton v. S. Utah Wilderness Alliance*, 542 U.S. 55, 58 (2004)(citing 43 U.S.C. § 1702(c)).

The definition of multiple use specifically provides for the agency to manage some areas for certain uses and certain resources:

> **The term "multiple use"** means the management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people; **making the most judicious use of the land for some or all of these resources or related services** over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; **the use of some land for less than all of the resources**; a combination of balanced and diverse resource uses that takes into account the long-term needs of future generations for renewable and non-renewable resources, including, but not limited to, recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values; and harmonious and coordinated management of the various resources without permanent impairment of the productivity of the land and the quality of the environment with consideration being given to the relative values of the resources and not necessarily to the combination of uses that will give the greatest economic return or the greatest unit output.

42 U.S. C. § 1702(c) (emphasis added).

FLPMA provides equal standing to the many uses and values of the public lands, such as fish and wildlife and wilderness characteristics. One of the Act's enumerated purposes is that:

[32] "Multiple use" is defined as managing the lands so that the various resources, "recreation, range, timber, minerals, watershed, wildlife and fish, and natural scenic, scientific and historical values," are utilized in the combination that will best meet the present and future needs," of the public. 43 U.S.C. § 1702(c). "Sustained yield" is defined as managing to maintain regular renewable resource outputs in perpetuity. 43 U.S.C. § 1702(h).

> the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values; that, where appropriate, will preserve and protect certain public lands in their natural condition; that will provide food and habitat for fish and wildlife and domestic animals; and that will provide for outdoor recreation and human occupancy and use. . .

43 U.S.C. § 1701(a)(8). BLM's discretionary multiple use mandate provides the agency with the flexibility to design a solar development program that both achieves solar energy production goals and conserves ecological resources.

2. BLM must ensure that management decisions are based on a current inventory of the resources of the public lands.

FLPMA imposes a duty on BLM to identify and protect the many natural resources found on public lands. FLPMA requires BLM to inventory its lands and their resources and values, "including outdoor recreation and scenic values." 43 U.S.C. § 1711(a). FLPMA also obligates BLM to take this inventory into account when preparing land use plans, using and observing the principles of multiple use and sustained yield. *See* 43 U.S.C. § 1712(c)(4), (1). Through management plans, BLM can and should protect wildlife, scenic values, recreation opportunities, and wilderness character in the public lands through various management decisions, including by excluding or limiting certain uses of the public lands. *See* 43 U.S.C. § 1712(e). However, these decisions must be based on current knowledge of resources. FLPMA's inventory requirements buttress NEPA's requirements for an accurate depiction of the affected environment, directing the BLM to make management decisions, such as designating lands for utility-scale solar energy development, based on a sufficient knowledge of the other resources likely to be affected.

3. FLPMA requires the BLM to avoid environmental damage and degradation.

In issuing rights-of-way, FLPMA requires BLM to impose terms that will "minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment" 43 U.S.C. § 1765(a)(ii). "[U]nderscoring the BLM's duty to protect the environment is the statutory requirement that 'in managing the public lands the Secretary shall, by regulation or otherwise, take any action necessary to prevent unnecessary or undue degradation of the lands." *Utah Shared Access Alliance v. Carpenter*, 463 F.3d 1125, 1129 (10th Cir. 2006). The D.C. district court in *Mineral Policy Center v. Norton* held that this standard, "by its plain terms, vests the Secretary of the Interior with the authority – and indeed the obligation – to disapprove of an otherwise permissible mining operation because the operation, though necessary for mining, would unduly harm or degrade the public land." *Mineral Policy Center v. Norton*, 292 F. Supp. 2d 30, 35 (D.D.C. 2003). Under *Mineral Policy Center*, BLM has the obligation to prevent degradation that is "undue or excessive." *Id.* at 38. Further, BLM's duty to prevent unnecessary or undue degradation under FLPMA is mandatory, and BLM must, at a minimum, demonstrate compliance with this standard. *See Sierra Club v. Hodel*, 848 F.2d 1068, 1075 (10th Cir. 1988) (the "unnecessary or undue degradation" standard provides the "law to apply" and "imposes a definite standard on the BLM").

Through the Solar PEIS, BLM is going to make lands available for development on a colossal scale: the establishment of SEZs on 677,400 acres assumed to experience an 80% build-out with another 21 million acres of public lands available for solar development.[33] Solar development will have serious consequences for wildlife and other resources. For example, the Draft PEIS observes that "[n]umerous wildlife species would be adversely impacted by loss of habitat, disturbance, loss of food and prey species, loss of breeding areas, effects on movement and migration, introduction of new species, habitat fragmentation, and changes in water availability." DPEIS, p. 6-9. The scale of proposed utility-scale solar development and its impacts may, without further commitments of analysis and mitigation prior to authorizing projects (and in light of the deficiencies noted in this comment letter), result in undue degradation to the public lands, including special status species and their habitat. FLPMA's direction also supports NEPA's requirement to consider more environmentally protective management alternatives.

***Recommendations:*** FLPMA requires the BLM to ensure that due consideration is given to management actions that will protect the many resources of our public lands (including fish and wildlife habitat and wilderness characteristics), and provides additional obligations and authority to determine the conditions of these resources. By designing a solar energy development program that aspires to and achieves both development and conservation objectives, the BLM will truly fulfill its multiple use mandate under FLPMA for these public lands.

### *F. Endangered Species Act*

#### 1. BLM Should Take Advantage of Several Opportunities to Streamline Section 7 Consultations Within the Solar Energy Zones

To encourage solar energy development within SEZs, BLM should take advantage of several opportunities to streamline section 7 consultations within the zones. The first opportunity is gathering enough data to begin formal consultations as early as possible within the zones. The Service's Section 7 Handbook clarifies that "formal consultation, if required, should be initiated prior to or at the time of release of the [Draft EIS]" and that "at the time the Final EIS is issued, section 7 consultation should be completed."[34] To date, BLM has not begun formal consultation on its new Solar Energy Program.

The second is for BLM and USFWS to consider conducting an appended programmatic consultation for each SEZ. This would allow USFWS to issue a programmatic biological opinion and incidental take statement for one or more zones, based on design features and other requirements of the Solar Energy Program. When BLM reviews projects under the program, it can append the project-specific documents to the programmatic biological opinion, thus completing the consultation process for projects with sufficiently low impacts to listed species.

---

[33]We want to emphasize that, while assuming an 80% buildout may be reasonable for purposes of assessing the maximum environmental impacts of the proposed program, it is just that – an assumption. Whether an individual SEZ and its resources can accommodate that level of development must depend on analyses of the sort that BLM has yet to prepare, either in this PEIS or the individual project-specific EISs it has prepared to date. In fact, BLM staff as well as others are already concerned about the level of development that has been permitted in California's Riverside East proposed SEZ, which is far less than 80% of that zone's total acreage.

[34] U.S. Fish & Wildlife Service and National Marine Fisheries Service, *Endangered Species Consultation Handbook*, March 1998, pg. 4-11.

This appended approach would streamline consultations even more than a tiered programmatic consultation would, as the latter requires a biological opinion for each project.[35]

Third is to prioritize development in zones that have the lowest potential for conflicts with the conservation of threatened and endangered species. The Draft PEIS has already identified which listed species occur within each zone, and we have tallied this information in the table below. Incentivizing solar development in zones with low potential conflict would result in greater net conservation benefits and greater regulatory certainty for developers.

**Table 2. Number of Sensitive Species by Proposed Solar Energy Zone**

| | ESA Endangered | ESA Threatened | ESA Under Review | ESA Candidate | ESA Proposed Threatened |
|---|---|---|---|---|---|
| **Arizona** | | | | | |
| Brenda (Lake Havasu/La Paz) | 0 | 1 | 1 | 0 | 0 |
| Bullard Wash (Hassayampa/Yavapai) | 4 | 1 | 1 | 0 | 0 |
| Gillespie (Lower Sonoran/Maricopa) | 2 | 1 | 1 | 2 | 0 |
| **California** | | | | | |
| Imperial East (El Centro/Imperial) | 1 | 0 | 0 | 0 | 1 |
| Iron Mountain (Needles/San Bernardino) | 0 | 1 | 0 | 0 | 0 |
| Pisgah (Barstow/ San Bernardino) | 1 | 1 | 0 | 0 | 0 |
| Riverside East (Palm Springs–South Coast/Riverside) | 0 | 1 | 0 | 0 | 0 |
| **Colorado** | | | | | |
| Antonito Southeast (La Jara/Conejos) | 1 | 0 | 1 | 1 | 0 |
| De Tilla Gulch (Saguache/Saguache) | 1 | 0 | 1 | 1 | 0 |
| Fourmile East (La Jara/Alamosa) | 1 | 0 | 0 | 1 | 0 |
| Los Mogotes East (La Jara/Conejos) | 1 | 0 | 1 | 1 | 0 |
| **Nevada** | | | | | |
| Amargosa Valley (Southern Nevada/Nye) | 5 | 7 | 16 | 0 | 0 |
| Delamar Valley (Ely/Lincoln) | 4 | 1 | 5 | 1 | 0 |
| Dry Lake (Southern Nevada/Clark) | 3 | 1 | 6 | 1 | 0 |

[35] Appended consultations have been used in other situations involving programmatic agency actions.

| | | | | | |
|---|---|---|---|---|---|
| Dry Lake Valley North (Ely/Lincoln) | 0 | 1 | 0 | 0 | 0 |
| East Mormon Mountain (Ely/Lincoln) | 0 | 1 | 0 | 1 | 0 |
| Gold Point (Battle Mountain/Esmeralda) | 0 | 0 | 0 | 1 | 0 |
| Millers (Battle Mountain/Esmeralda) | 0 | 0 | 2 | 1 | 0 |
| **New Mexico** | | | | | |
| Afton (Las Cruces/Dona Ana) | 2 | 0 | 0 | 1 | 0 |
| Mason Draw (Las Cruces/Dona Ana) | 2 | 0 | 0 | 0 | 0 |
| Red Sands (Las Cruces/Otero) | 4 | 0 | 0 | 0 | 0 |
| **Utah** | | | | | |
| Escalante Valley (Cedar City/Iron) | 0 | 1 | 0 | 1 | 0 |
| Milford Flats South (Cedar City/Beaver) | 0 | 1 | 0 | 1 | 0 |
| Wah Wah Valley (Cedar City/Beaver) | 0 | 1 | 3 | 1 | 0 |

***Recommendation:*** The BLM should: 1)gather enough data to begin formal consultations as early as possible within the zones; 2) consider jointly with USFWS whether to conduct an appended programmatic consultation for each SEZ; and 3) prioritize development in zones that have the lowest potential for conflicts with the conservation of threatened and endangered species.

2. BLM Should Implement its Section 7(a)(1) Obligations by Setting a "Net Conservation Benefit" Standard for ESA Listed Species

Under the ESA, BLM is required not only to consult under section 7(a)(2) on the impacts to listed species, but also affirmatively conserve these species under section 7(a)(1).[36] BLM can implement its section 7(a)(1) obligations by establishing a "net conservation benefit" standard for ESA listed species through the Solar Energy Program. As discussed in other parts of our comments, this standard would require a project that adversely impacts a listed species to successfully enhance that species' overall population or recovery status. To be classified as a net conservation benefit, the enhancement must benefit the affected species to a greater degree than if the project were not undertaken. Because BLM policy already requires developers to implement mitigation measures for impacted species, the framework for achieving a net benefit standard already exists.

[36] Federal agencies shall "seek to conserve [listed] species and shall utilize their authorities in furtherance of the purposes of [the] Act." 16 U.S.C. § 1536(a)(1).

Section 7(a)(1) is designed to ensure that federal agencies "conserve" listed species, which means to recover a species to the point where it no longer requires the ESA's protection – in other words, result in a "net benefit." If the Solar Energy Program explicitly implements the section 7(a)(1) net benefit standard, then BLM and solar developers could showcase the program as an example of "green" development that is both climate friendly and wildlife friendly, and the BLM would be in compliance with its ESA obligation to conserve listed species Adopting a net benefit standard would also directly benefit developers by minimizing the risk of negative publicity and legal challenges over projects that may otherwise have questionable impacts to listed species. This would result in additional economic and regulatory certainty to the hundreds of projects expected to be approved under the Solar Energy Program.

***Recommendation:*** The BLM should work with the USFWS to implement the Bureaus Section 7(a)(1) obligations by setting a net conservation benefit standard for all ESA listed species adversely impacted by the Solar Energy Program.

### E. Bald and Golden Eagle Protection Act

Based on U.S. Fish and Wildlife Service's analysis of golden eagle populations across the nation, there is no safely allowable take level for golden eagles.[37] In other words, the status of the golden eagle is so dire that the U.S. Fish and Wildlife Service completely prohibits the taking of a golden eagle. The Bald and Golden Eagle Protection Act, 16 U.S.C. §§ 668 *et seq*., is intended to be the "primary vehicle" for the conservation and protection of golden eagles, *see* 71 Fed. Reg. 8265, 8266 (Feb. 16, 2006), and as such, makes it unlawful to "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or in any manner, any bald eagle [] alive or dead, or any part, nest, or egg thereof . . .." 16 U.S.C. § 668(a). Principal among the Act's protections, the prohibition against "take," by definition, makes it illegal to: "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or *disturb*" an eagle. 50 C.F.R. § 22.3 (2010) (emphasis added). Further, "disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." *Id*.

In California, for example, golden eagles are known to nest within a few miles of the Pisgah Valley. Development in the proposed Pisgah SEZ would constitute a "take" of golden eagles because it would disturb, and indeed destroy, the foraging habitat of nearby golden eagles. In addition, solar development within the Pisgah Valley would create the potential for golden eagles colliding with mirrors or PV panels while foraging.

***Recommendation***: In order to comply with the FWS regulations, BLM must ensure additional analysis is conducted within the Modified SEZ Program Alternative.

## III. Make it smart

[37] Pagel, Joel, et. al, *Interim Golden Eagle Technical Guidance*, U.S. Fish and Wildlife Service, February, 2010.

The DPEIS proposes important elements of a comprehensive, enduring solar energy program that can responsibly protect sensitive wild lands and wildlife habitat. However, both of the "action alternatives" which are intended to "establish a comprehensive program to facilitate utility-scale solar energy development on BLM lands" (PEIS, 2-1) omit key elements necessary to meet the goals of the program. Section 1.I of this letter lays out our recommendations for a **Modified SEZ Program Alternative**. This section provides additional detail for how a Modified SEZ Program Alternative should be structured and function in practice.

**A.** ***BLM should expand and adopt Best Management Practices for solar energy development on public land.***

The draft solar PEIS devoted significant attention to best management practices. In addition to those BMPs already identified in the PEIS, we urge BLM to expand the BMPs as described below. Compliance with all applicable BMPs should be required for solar energy development on all public lands.

While the first, and best, strategy for conserving natural resources is to avoid sensitive areas, there will be significant surface disturbance and other adverse impacts wherever solar energy development occurs. Minimizing these impacts where possible is a critical element of a responsible development approach.

Experience with solar energy development is in its infancy in the U.S. As such, the literature on best management practices is quite sparse with regard to most utility-scale solar energy development technologies. However, there are many common features with other forms of commercial energy development. Best management practices identified from other forms of energy develop should be integrated into the **Modified SEZ Program Alternative** so that a Zone-Based Solar Energy Program can learn from past experience with, for example, road construction and decommissioning.

A compilation of best management practices for renewable energy siting and development drawn from scientific, peer-reviewed research, was recently prepared by Utah Clean Energy and several other conservation groups in the West, attached as Appendix VIII. We urge the BLM to carefully examine this document, and to take from it any and all practices not already included in the administrative polices and guidance. Moreover, we urge the BLM to commit to producing and updating a compendium of such practices.

*B.* ***Approach to mitigation.***

As is true with any project that could affect sensitive resources, agencies should seek first to find ways to avoid impacts entirely and then to minimize them through changes to the project design and configuration. In addition to avoidance and minimization efforts, compensatory mitigation must be required when there are impacts that cannot be avoided or sufficiently minimized –these impacts include the direct, indirect and cumulative effects described for wildlife, water and other resources in the draft PEIS.

In its treatment of compensatory mitigation measures, as discussed throughout our comments, the Draft PEIS fails 1) to provide necessary description of possible mitigation measures; 2) to establish mitigation goals; and 3) to analyze the sufficiency of mitigation requirements it does propose.

The draft PEIS fails to include a focused discussion about how compensatory mitigation will be carried out in such a way as to offset impacts on endangered, threatened, candidate and sensitive species. For example, while Chapter 5 (Impacts of Solar Energy Development and Potential Mitigation Measures) provides extensive discussion of avoidance and minimization measures, it neglects to mention compensatory mitigation. Each subsection of the chapter describes impacts which cannot be avoided, but proposes no compensatory mitigation measures. This is unacceptable when there are 400 rare, sensitive species, state- or federally-listed and/or candidate species identified as potentially facing effects in SEZs and 562 species potentially affected by BLM's preferred alternative.

BLM should describe its approach to compensatory mitigation in far more detail to give greater certainty to developers and to potential providers of mitigation services. We offer the following comments:

1. *Loss of federal lands and resources that provide habitat for threatened and endangered species and sensitive species should be successfully mitigated by the acquisition and permanent protection of currently non-federal lands and resources that provide better than equivalent benefits to wildlife.* BLM should place the highest priority on acquisition, restoration, and long-term management of private lands to mitigate remaining wildlife impacts that cannot be minimized. If newly protected lands are to be held in non-federal ownership, conservation values must be given similar permanent protection through deed restrictions and easements, and funding must be secured for long-term management of these lands. We believe the final PEIS should establish *a preference* for acquisition, restoration and management of private lands versus allocation of mitigation dollars to federal lands, while recognizing that in many cases it will be necessary to pursue mitigation measures on federal lands as well. In some locations such as Nevada, there is inadequate private land available for acquisition so the only possible mitigation is restoration, enhancement and permanent protective management of public lands.

2. *On federal mitigation lands, permanently protect conservation values.* If lands acquired for mitigation purposes are to be transferred to federal ownership, they must be protected from future development. One option by which to do so is to withdraw these lands from use under federal mining and other land use laws and cover them by a plan amendment that ensures long-term protection of their conservation values. This option, however, cannot guarantee protection in perpetuity, upon which the mitigation is based, since new plan amendments can alter the land management. Our preferred option is to require that third parties secure easements or enforcement rights through deed restrictions before property is transferred to federal ownership. In either case, this additional protection is necessary because federal lands face extraordinary energy development and other pressures, and mitigation efforts will fail if an acre protected

today, in compensation for a loss elsewhere, is developed and made unsuitable to wildlife through some future project or authorized activity. Future mining, energy development, grazing and other non-compatible uses need to be prohibited using legally effective means (e.g. deed restrictions with enforcement rights held by third parties).

To the extent that mitigation occurs on public lands, BLM must take measures to ensure it is not offering mitigation at below-market costs compared to mitigation options on private lands and that it is not simply using private funding to pay for activities which it (or other agencies) already has an obligation and duty to carry out. In particular for endangered species, federal agencies have special duties under the Endangered Species Act to affirmatively use their authorities to promote endangered species conservation (see http://www.edf.org/documents/1667_michael%20bean%20testimony.pdf ). To prevent the public from essentially subsidizing the costs of mitigation, BLM needs to ensure that private funding does not simply substitute for public funding for land management activities on a parcel now being used to mitigate solar impacts.

3. *On federal and non-federal mitigation lands, require endowments to ensure the perpetual management of mitigation lands.* The protection of land hosting affected wildlife populations or the restoration of such lands to better support wildlife will mitigate impacts only for as long as the wildlife populations endure. The final PEIS should be used to establish guidance on the establishment and transparent operation of regional or other large-scale endowments to maintain mitigation values over time. An established mitigation lands endowment program between the California Department of Fish and Game and the National Fish and Wildlife Foundation is a good model for what is needed under this PEIS. These funds should be set up to serve one or multiple solar development zones. This premise of establishing a perpetual management endowment is well established in federal conservation banking policy and in some state law and policies. It would be inappropriate for BLM to hold private land projects needing Section 10 permits to a higher mitigation standard than for those projects occurring on public lands. We do not believe that such mitigation funds, whether maintained for the management of public or non-public lands, should be held by a federal entity.

4. *Land acquisition is inadequate to meet a 'no net loss' or 'net conservation benefit' goal and must be supplemented with species restoration and management activities and funding.* Land acquisition, by itself may not satisfy a net conservation benefit standard for particular species because it may simply result in the protection of a wildlife resource that is already present or may fail to address current critical stressors affecting the wildlife resource. We believe most mitigation projects should include a significant commitment to restoration and long-term management, allocating mitigation dollars to actions that significantly enhance sensitive, threatened and endangered wildlife and plant populations. Such projects create a positive change in populations that can help offset direct and incidental losses of individuals and local populations on solar development sites. Establishing a priority on management and

restorationthrough this PEIS will also creates a clear signal which would incentivize the creation of private banks to secure and begin implementing such restoration in advance of actual mitigation plans being established for future projects. Permanent retirement of grazing permits should be included among activities that could result in restoration of habitat for affected wildlife.

5. *Improve certainty for developers and improve wildlife benefits by creating expansive service areas for mitigation, pooling mitigation funds and using a transparent and competitive process to allocate resources to affected species conservation efforts*
Project-by-project development of mitigation formulas and identification of mitigation projects is a wasteful system whose flaws have already been documented in case studies of wetland mitigation and endangered species banking. This process also creates higher costs and lower certainty for companies. The final PEIS should include explicit discussion of how mitigation efforts will be coordinated within a large 'service areas' for all designated Solar Energy Zones and should discuss available and preferred options for mitigation within these service areas. Large zones will create more opportunity for mitigation efforts to be directed to the highest value lands and habitats where activities will most benefit affected species. California and the U.S. Fish and Wildlife Service's habitat conservation plan policy, regional conservation strategies developed by state fish and wildlife departments, and the best habitat banking practices all serve as models to establish effective service areas for mitigation that will maximize benefit for affected species. Ideally, the final PEIS would include maps that identify potential priority areas that have the wildlife resources to serve as mitigation lands.

   A coordinated and transparent approach that prioritizes the allocation of funds to species and types of projects and then seeks the highest benefit/least cost solution to secure benefits will provide greater recovery benefits to sensitive, endangered and threatened species. The final PEIS should also identify species priorities for land and water acquisition for wildlife and plants that BLM already knows are likely to be affected by planned solar projects. Such an approach will create the certainty to allow more parties to develop mitigation options in advance before mitigation is needed. For reasons described above, we support a transparent and competitive process for selecting mitigation projects to ensure that private land restoration and protection is prioritized over work on federal lands, which agencies already have an ESA obligation to proactively manage. Investments should be in priority conservation areas as determined by state wildlife action plans, regional conservation strategies, recovery plans, Nature Conservancy ecoregional assessments, or other credible analysis or plans that identify the areas of greatest ecological significance, and at a meaningful scale.

***Recommendations:*** BLM should enhance its approach to mitigation as well as its treatment of this key issue in the PEIS. First, the agency should describe its approach to compensatory mitigation in far more detail. Additionally, within its mitigation regime for solar energy development, BLM should establish a preference for land acquisition and restoration so as to better manage federal and private resources. Lands reserved for mitigation purposes, whether

private or federal, must be perpetually managed for conservation, and BLM should establish guidance as to how this can occur. Certainty for developers can be enhanced by establishing large "service areas" for mitigation.

*C.* ***Approach to monitoring.***

DOI agencies have too often failed to establish clear and measurable biological goals in their own work and in requirements of third parties seeking agency approval. The absence of goals feeds into problems with inadequate monitoring. The result is that too many projects fail to adequately compensate for impacts and DOI agencies have a poor record of being able to track such performance.

The DPEIS lacks assurances that implementation and effectiveness of mitigation measures will be monitored. CEQ recommends that all agency NEPA analyses and/or decision documents should:

- describe the expertise applied in determining appropriate mitigation commitments;
- consider when and how mitigation commitments will be implemented;
- specify measurable performance standards or expected results of mitigation commitments as well as the timeframe for the agency action and mitigation commitments;
- disclose if it is reasonably foreseeable that funding for mitigation measures may not be available and, if so, the resultant environmental effects;
- identify alternative mitigation measures if the initial commitments are not implemented or effective; and
- describe monitoring plans and programs, the agency and/or applicant responsible for developing and implementing the monitoring program and the monitoring area and appropriate monitoring system.

*See* Final Guidance for Federal Departments and Agencies on the Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact, 76 Fed. Reg. 3843 (Jan. 21, 2011). BLM should use these recommendations as the basis for monitoring requirements established as part of the Modified SEZ Program Alternative established by the ROD.

To do this, BLM must use the final PEIS to define the types of outcomes (population size, viability, reproductive performance, age class distribution, etc.) that it will require. Additional final PEIS analysis should describe the expected results of mitigation and how it will serve to guide any monitoring program that BLM and applicants implement. "Monitoring is fundamental for ensuring the implementation and effectiveness of mitigation commitments, meeting legal and permitting requirements, and identifying trends and possible means for improvement." 76 Fed. Reg. at 3849. BLM must establish clear requirements for monitoring and reporting – to the public and the agency – on the success in achieving those goals. The monitoring program should also provide for public involvement. 76 Fed. Reg. at 3851.

Additionally, to evaluate the cumulative impacts on species and other resources, and to compare impacts of different solar projects, locations and technologies, the BLM should require

standardized monitoring protocols for all projects, including transmission and related substations. All monitoring data should be made publicly available in data sets with a common format (recommended by leading scientists who want to conduct studies) that may be easily downloaded and manipulated by researchers and the public at large. This transparency will enable timely and robust evaluation of program impacts, efficacy of mitigation measures, and full engagement of the scientific community.

***Recommendations:*** BLM should establish clear requirements for monitoring and reporting to both the agency and the public at-large. Such requirements must enable third-party tracking of the effectiveness of mitigation measures and, as such, should involve the public in development.

***D. Adaptive management.***

The solar draft PEIS contains a number of references to using adaptive management. As an overall implementation strategy, the draft states that:

> *The BLM, recognizing that data regarding the actual impacts of solar energy development on various resources are still limited, will require the development and implementation of an adaptive management plan to ensure that new data and lessons learned about the impacts of solar energy projects will be reviewed and, as appropriate, incorporated into the Solar Energy Program.*

DPEIS, p. A-25. The DPEIS specifies at page C-12 that this requirement would apply to all lands available for solar development under either alternative. The Preferred Alternative specifically relies on adaptive management at the programmatic level:

> *As an element of the proposed program, the BLM would implement an adaptive management plan for solar energy development, developed in coordination with potentially affected natural resource management agencies, to ensure that new data and lessons learned about the impacts of solar energy projects would be reviewed and, as appropriate, incorporated into the program through revised policies and design features.*

DPEIS, p. ES-11. Additional detail is provided in Chapter 6 regarding the BLM's understanding of how an adaptive management plan would function:

> *As described in Section 2.2.2.1, as an element of the proposed program, the BLM would implement an adaptive management plan for solar energy development developed in coordination with potentially affected natural resource management agencies, to ensure that new data and lessons learned about the impacts of solar energy projects would be reviewed and, as appropriate, incorporated into the program through revised policies and design features. Changes to the BLM's Solar Energy Program will be subject to appropriate environmental analysis and land use planning.*

DPEIS, p. 6-31. The Preferred Alternative rests on incorporation of future data and knowledge into an adaptive management framework:

> *Proposed adaptive management strategies would ensure that new data and lessons learned about the impacts of solar energy development are incorporated into future programmatic and project-specific requirements.*

DPEIS, p. 6-35. In addition, the DPEIS states that:

> Monitoring program requirements, including adaptive strategies, shall be established at the project level *to ensure that potential adverse impacts are mitigated*. Monitoring programs shall consider the monitoring requirements for each ecological resource present at the project site, *establish metrics* against which monitoring observations can be measured, identify potential mitigation measures, and establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures.

DPEIS, p. 5-136. For all the reliance on an adaptive management approach to administering a solar energy development program, however, **there is no specific discussion of how an adaptive management approach would be implemented at the project or program level**.

We support the overall approach to adaptive management and, in general, the overall approach to adaptive management as described in the Draft PEIS. However, a fuller description of how adaptive management of the program would be carried out, such as specific indicators and acceptable levels of change, the commitment of resources for monitoring, and the use of a fallback prescription, and additional details regarding project-level actions that will be taken if levels of change are unacceptable need to be included and must be provided. This specificity is necessary in order for adaptive management to meet NEPA's standards for mitigation measures that are likely to be effective and enforced. Further, while adaptive management is described with regard to Integrated Vegetation Management (DPEIS, p. 5-131), Visual Resource Management (DPEIS, p. 5-201), and Decommissioning and Site Reclamation (DPEIS, p. 5-141), monitoring commitments and criteria should also be included for other key resources, such as BLM special status species, lands with wilderness characteristics, wild and scenic river segments and ACECs. Indicators can include the status of wilderness characteristics, outstanding river values, and the relevant and important values for which ACECs have been designated.

An example of sufficiently detailed adaptive management approach is contained in the Record of Decision for the Jack Morrow Hills Coordinated Activity Plan, prepared by the Rock Springs (WY) BLM Field Office. Appendix 2 (Implementation, Monitoring, and Evaluation Process) provides the specificity needed to evaluate the planned adaptive management program (and is available on line at http://www.blm.gov/style/medialib/blm/wy/jmhcap/rod.Par.37876.File.dat/02appendices.pdf). We particularly note the following, as examples of the sort of detail that should be contained in any and all adaptive management plans created pursuant to the Solar PEIS:

- Table A2-1 Resource Management Indicators - p. A2-7 – contains a broad set of indicators
- Table A2-2 Indicator Detail - pp. A2-8 – A2-10 – contains multiple sources for data
- Table A2-3 Measurement Detail - pp. A2-11 – A2-13 – contains measures of change and triggers for management actions

- Figure A2-2 CAP Management Process - p. A2-15 – provides a useful illustration of the adaptive management process

***Recommendations:*** In addition to setting out a comprehensive set of measurements, triggers for action, and a range of actions that will be taken to meet the standards set out below, the PEIS must specify that:

- A sufficient inventory of current conditions of affected resources is required. Where the agency does not have a sufficient inventory of baseline conditions, the agency must complete such an inventory prior to using adaptive management.
- The adaptive management approach must incorporate a detailed monitoring plan, describe the resources and specific indicators that will be measured, include defined limits of acceptable change in resource conditions and specify actions to be taken if change reaches or exceeds those limits.
- The adaptive management process should be designed and managed so that the public can actively and effectively participate. This study area is very broad, involving hundreds of millions of acres across six states and citizens interested in the resources administered by the agency reside across those states as well as others; and, involvement of citizens in adaptive management processes can be challenging to interested parties. BLM should continue to seek meaningful citizen participation in compliance with its mandate under FLPMA. *See* 43 U.S.C. § 1739(e). BLM should also begin planning now as to how citizen involvement in adaptive management will meet the requirements of the Federal Advisory Committee Act, and such planning should not be left only to those citizens or community groups wishing to participate.

- To encourage robust science in adaptive management, we recommend that the Bureau actively seek involvement of the U.S. Fish and Wildlife Service and other federal and state wildlife experts as well as independent scientific community in both designing and implementing adaptive management programs.

- The adaptive management approach must include a "fallback" plan should monitoring or other aspects of the adaptive management process not be fully carried out, including adequate funding. Adaptive management must include requirements for when and how the proposed outcome will be reevaluated if it is not being met. The agency's ability to reevaluate or amend desired outcomes should not be the sole fallback if either the adaptive management process is not working or outcomes are not being met. The agency should be required to incorporate provisions to address situations based on new information, circumstances, regulatory requirements, or discontinued agency funding for monitoring that would trigger new NEPA.

***E. The BLM should incorporate the elements of the Modified SEZ Program Alternative, including existing and proposed additional administrative policies and required Design Features in RMP amendments for all lands not excluded from solar energy development.***

The BLM, through the final PEIS and its ROD on the new program, must ensure all existing guidance (e.g., IMs) *and* proposed elements that comprise the new Solar Energy Program are included in RMP amendments for lands not excluded from solar energy development. This will ensure consistency, establish baseline expectations for project proponents and other stakeholders, and minimize confusion about which guidance is in effect at any point in time.

***Recommendation:*** The BLM should amend all RMPs where solar development is not excluded with a Modified SEZ Program Alternative, incorporating all existing IMs relating to solar energy development and included in the Draft Solar PEIS, Appendix A, in addition to the full range of proposed policy elements.

### *F. A Modified SEZ Program Alternative should pilot competitive offering of solar development rights to determine the most effective approach.*

It is clear from historical experience with other energy resources on public lands that offering solar development rights competitively through a leasing process—versus offering parcels on a first-come-first-served basis—will provide the most fair return to the taxpayer.

This is because competitive leasing allows companies to determine the value of federal lands and resources for commercial electricity generation by way of the free market. This shifts the risk burden, at least to some degree, from the public to companies that will profit. In addition, all other energy programs, besides hydropower, have provisions to offer leases competitively if competitive interest exists. Coal, onshore and offshore oil and gas, offshore renewables, and geothermal energy parcels are may be offered competitively depending on the situation.

It is clear that competitive interest exists for solar energy development on public lands by the number of pending applications that overlap. In California, for example, more than half of the 35 applications within zones (i.e., 20) overlapped in whole or part the first-in-line applications as of March 7, 2011, based on the data currently available to us.[38] However, despite the precedents provided by other BLM energy programs, many questions remain about how a competitive system for solar resources might function. Therefore, in order to design the best competitive leasing program possible, BLM should commit to testing different mechanisms for competitive offerings in a Modified SEZ Program Alternative.

BLM can rely on existing authority to develop a pilot program for competitive leasing. IM 2007-097 provided that areas specifically identified in land use plans for "competitive leasing" in land use plans may be offered competitively. Guidance also states that the BLM can consider other factors like public interest and technology in deciding whether to offer lands for competitive leasing. However, BLM must clarify and enhance these provisions by offering a pilot competitive leasing program for solar development rights.

***Recommendation***: Through the Modified SEZ Program Alternative, BLM should establish pilot approaches to competitively offering solar energy development rights and select the system that best protects taxpayers interests and does not unduly or unnecessarily burden project proponents.

[38] The total first in line applications included three that were filed after June 30, 2009.

### *G. The Modified SEZ Program Alternative should revise the legal instrument used to administer solar energy development*

BLM currently administers solar energy development utilizing a right-of-way use authorization as the instrument to convey development rights. The BLM asserts its intent to proceed via the ROW process in administering the new Solar Energy Program. Specifically, the PEIS references solar energy development as by definition a ROW authorized activity: "The BLM program would be applicable to all utility-scale solar energy technologies implemented under BLM jurisdiction in the six-state study area (i.e., projects implemented under a BLM-issued ROW authorization)." DPEIS, p. 2-2. That the BLM will proceed to administering solar energy development utilizing ROW authorization is never questioned in this document despite valid concerns that a lease is more appropriate to the nature and scale of this form of commercial energy development. In the final PEIS, BLM must demonstrate how a ROW grant is legally and programmatically preferable to a lease.

Moreover, the application form used for a solar energy right-of-way grant is a standard form (SF-299) is identical to that used for communication towers, irrigation ditches, temporary roads, and other more traditional ROW-governed development.

See Appendix II for a more thorough discussion of the relative advantages of leasing versus developing using a right-of-way.

***Recommendation:*** The BLM should lease solar energy development rights.

### *H. A Modified SEZ Program Alternative should require that BLM wildlife policy be incorporated in Plans of Development.*

The PEIS states that: "Applicants for solar energy development on BLM-administered lands shall develop a BLM-approved plan of development (POD) that incorporates…the requirements of other existing and relevant BLM mitigation guidance, approved land use plans, and current policies." DPEIS, p. A-30. The final PEIS should clarify how these requirements, including the requirements of agency wildlife policy (found at BLM Manual 6840 and 6500), will be incorporated into PODs and subsequent environmental review. See *Id*.

We commend the BLM for requiring that "management goals and objectives for special status species that the BLM has identified in land use plans" be incorporated into PODs. DPEIS, p. A-30. We recognize that management goals and objectives may vary in their effectiveness across RMPs, however, and therefore would recommend that PODs also be consistent with BLM wildlife policy.

***Recommendation:*** The Modified SEZ Program Alternative should clarify the required content of PODs in order for them to effectively accomplish the goals the BLM claims they are designed to accomplish, including by incorporating key elements of the agency's wildlife policy. For example, the final EIS should clarify what is meant by species objectives that are sustained by the best available information or science.

***I. A Modified SEZ Program Alternative must clarify the design features that require project facilities and activities to "not be located in or near occupied habitats of special status animal species."***

This design feature is one of the most important features for protecting sensitive species, but should be clarified in two respects. First, there is no explanation of how the BLM will determine which habitats are "occupied." This must be done early in the process and in a way that is effective and consistent from project to project. Second, there is no explanation of why plants are excluded from this requirement.

***Recommendation:*** The Modified SEZ Program Alternative should require that potentially occupied habitats be surveyed to confirm the presence or absence of sensitive species. The BLM should also ensure consistency in design features and explicitly include plants in this requirement.

***J. The Modified SEZ Program Alternative should apply land exclusions to supporting infrastructure.***

We support the PEIS's commitment to ensuring that the program will be implemented in accordance with approved land use plans, including ROW exclusion areas, but question why "the exclusions would only apply to siting of utility scale solar energy generation facilities and not to any required infrastructure" (including roads and transmission lines). DPEIS, p. 2-7. It would seem generally appropriate to apply exclusions to these elements as well, rather than relying on project specific environmental reviews to avoid conflicts and potential controversy.

The PEIS points out that many of the exclusions "refer back to decisions made in the approved land use plans" and that the BLM "will continue to amend or revise land use plans over time to adapt to changing circumstances (and) new information." *Id.* We are concerned that relying on older, out of date RMPs to guide solar development may pose risks to wildlife and natural resources due to the fact that no consideration was given to either this type or this scale of development when those RMPs were created. For this reason, we are also recommending that projects must comply with BLM wildlife policy (as mentioned above in relation to PODs).

We support the BLM's exclusion of critical habitat for threatened or endangered species, Areas of Critical Environmental Concern, Desert Wildlife Management Areas as well as habitat for select species from project development. However, we are concerned over the implementation of criterion #8 in Table 2.2-2. The criterion states that: "All areas where solar development proposals are not demonstrated to be consistent with land use management prescriptions for or where the BLM has made a commitment to take certain actions with respect to sensitive species habitat" will be excluded. In these critical cases it is unclear how the program will be implemented to ensure that a proposal will be deemed "consistent" with either agency prescriptions or commitments to certain actions for sensitive species.

***Recommendations:*** The ROD should apply exclusions to not only solar energy development but also, generally, to associated infrastructure. The ROD should also revise criterion #8 in Table

2.2-2 to state that "…where the BLM has made a commitment to take any action with respect to sensitive species habitat" shall be excluded.

***K. The Modified SEZ Program Alternative should clarify ROW application denial criteria.***

In order to be effective, a screening program must contain meaningful denial criteria which ensure that applications for projects in areas deemed unsuitable for development do not move forward. We commend the BLM for articulating the agency's discretion to deny applications "that it finds to be inappropriate for solar ROW uses" and that "(p)rojects that will cause unacceptable impacts to important resources and values will be denied." DPEIS, p. A-28. To be effective, the denial criteria should be well understood and designed to minimize ambiguity.

***Recommendations:*** The following clarifications to ROW denial criteria should be incorporated into the Modified SEZ Program Alternative:

- In order to effectively review and apply the "best available landscape-scale information" (including information from forthcoming Rapid Ecoregional Assessments and other efforts like California's DRECP), to establish project consistency, the agency should clearly define "other high-priority conservation, restoration, and/or adaptation objectives." DPEIS, p. A-28. These objectives should be clearly defined in the final EIS or at minimum prior to implementation of the program to ensure consistency with these critical conservation objectives.
- In order to effectively screen applications, the agency must define "high priority landscape features or focal areas important for conservation, restoration, and/or adaptation to climate change, including core areas, corridors, and buffers for vulnerable species." DPEIS, pp. A-28, A-29. It is our understanding that these may be features of the Rapid Ecological Assessments. We expect that if information provided by the Rapid Ecological Assessments is used to modify Resource Management Plans, those modifications would be reflected in the Solar Program. It is imperative that the Solar Program be consistent with information derived from the Rapid Ecoregional Assessments, given the goals and objectives of that critical effort.
- The DPEIS should clarify how "strong consideration" will be given to proposals utilizing previously disturbed areas and areas that will not impact sensitive resources in order to further encourage use of these lands as an alternative to undisturbed areas. DPEIS, p. A-28.
- The DPEIS states that "[t]o the extent that land use plans and/or this PEIS anticipate issues and concerns associated with individual projects, including potential cumulative impacts, the BLM will tier from land use plans and/or the PEIS analysis, thereby limiting the required scope and effort of additional project-specific NEPA analysis. For projects that are proposed in SEZs, only limited additional NEPA analysis may be necessary because of the depth of the analysis contained in the PEIS." As discussed in Section 1.II of this letter, the final PEIS should more clearly state how NEPA analysis would be constructed and used to support a decision regarding the denial of a solar ROW application. DPEIS, p. A-31.

### *L. The Modified SEZ Program Alternative should insist sensitive species habitat is protected in furtherance of its wildlife management objectives*

The Draft PEIS states that "the BLM will review applications for land use plan conformance" at page A-27 and references Table 2.2-2 (at page 2-8) which includes as an exclusion area: "All areas where solar energy development proposals are not demonstrated to be consistent with the land use management prescriptions for or where the BLM has made a commitment to take certain actions with respect to sensitive species habitat." The final PEIS must clarify how proposals will demonstrate that they are consistent with RMP prescriptions for sensitive species habitat. All applications should conform to RMP wildlife objectives, including population management objectives for special status species.

***Recommendation:*** The Modified SEZ Program Alternative should require applications to conform to RMP wildlife objectives, such as sensitive species management objectives and protected habitat areas.

### *M. The Modified SEZ Program Alternative should directly address the on-site use of fossil fuel to supplement the variable nature of solar energy.*

The PEIS does not adequately address the potential on-site use of natural gas or other non-renewable fuels in the generation of electricity to "firm" solar generation. Natural gas-fired generation is a logical match with variable power resources like wind and solar. But the economic and environmental advantages of wind and solar can be eclipsed if a distinction is not clearly drawn between wind and solar development technologies that may require a minimal amount of natural gas and those whose primary fuel is a non-renewable fossil fuel.

***Recommendation:*** The Modified SEZ Program Alternative should address the potential for on-site use of natural gas and other non-renewable fuels to supplement the variable nature of solar energy by establishing a reasonable cap in terms of the amount of power that can be produced by natural gas as part of the nameplate capacity of the proposed project.

### *N. The Modified SEZ Program Alternative should better protect the government's interests in the event of a transfer of project ownership*

There have already been two high-profile ROW grant transfers resulting from the "fast track" process. In both cases, we understand the BLM had no role in the transfer of its approved ROWs from the sellers to the buyers. Thus, for example, the agency did not have a role in evaluating the implications of the transfer for the viability of the project as approved. In both cases, the new owners have already expressed their interest in significantly modifying the approved projects, upending months of work spent completing environmental reviews and processing permits. As important, the scarce resources available to conduct these environmental reviews were unable to be spent instead on processing other applications.

The government has a clear interest in ensuring that the transfer of an approved permit will improve, or at least not adversely affect, the chances of successful completion of the project. The BLM must ensure the Solar Energy Program evaluates technical and economic viability of

parties interested in acquiring approved right-of-way grant authorization before transfer regardless of whether the ROW grant is formally reassigned. Additionally, current and future right-of-way grants must include language requiring BLM review and application of the same criteria in the event of a change in ownership of the company holding the grant.

***Recommendation:*** The BLM must ensure the that its Solar Energy Program is equipped to evaluate the viability of parties interested in acquiring approved right-of-way grant authorization before transfer. The Modified SEZ Program Alternative should incorporate a requirement for BLM to review right-of-way grants if ownership of the company holding the grant changes and consider whether the ROW should be continued.

### *O. The PEIS treatment of technology should be strengthened in the Modified SEZ Program Alternative.*

We have a number of concerns regarding the draft PEIS's overview of solar technologies. These are addressed in greater detail in Appendix VI to our comments. Four key substantive points are summarized here.

1. BLM's approach to solar technology should be principle-based. We believe it is important that the BLM explicitly acknowledge that solar technology is rapidly evolving and that there are a number of possible permutations and advancements that are now on the horizon that could significantly affect this technology. Consequently, the BLM's approach to solar development should be principle-based and not based on current technology capabilities and characteristics.

2. BLM should revise the criteria used to evaluate solar technologies. The criteria by which the BLM proposes to evaluate the merits of certain solar technologies should be revised to focus on:
   a. Resource consumption per annual megawatt hours (MWh) produced by the plant. We recommend that this metric be used to judge all cross-system (not just cross-technology) comparisons. Under this criterion, for example, the requirements for land and water would be compared in acres/MWh/year and acre-ft/MWh/year. In addition, some qualitative benefits would accrue to a plant that used storage to match its output to the peaking needs of the grid it is serving.
   b. Compatibility with the existing grid. Although this can be difficult to define in the most general way, it should include such characteristics as dispatchability, load balancing, and dependability of providing peaking capacity. We believe that use of these criteria can reduce need for additional infrastructure, including for example combustion turbines for spinning reserves and so on.
3. BLM should revise its treatment of how CSP systems operate. The draft PEIS does not accurately describe two important aspects of how CSP systems operate. These relate to a CSP plant's capacity and size and to operating temperature and efficiency. The mischaracterizations detailed in Appendix VI could lead the BLM to unfairly evaluate the potential benefits associated with proposed CSP projects. We recommend that the BLM rewrite the technology-related sections of the draft PEIS to correct these significant inaccuracies.

3. BLM should include climate change impacts on the performance of technologies. The draft PEIS makes no reference to climate change impacts may have on either the future need for, or the performance of, the solar systems. We recommend that the BLM include references to the results of current climate change models, and briefly describe how the predicted changes could impact these technologies. Inclusion of these effects would increase the draft PEIS' adaptability as these effects become more apparent. It is important for BLM to address this issue, so that both the BLM and other stakeholders can fairly evaluate a broad range of projects and programs in the future.
4. BLM should include in their analysis the amount of land produced per megawatt as part of a technology analysis. We believe this is an important metric to use in evaluating solar energy technologies.

***Recommendations:*** BLM must strengthen the treatment of technology in the PEIS by revising the criteria it uses to evaluate solar energy technologies, the discussion of how CSP systems operate, and the discussion of how climate change impacts the performance of technologies.

### *P. BLM should make decisions under the ROD on the basis of capacity-factor adjusted power production, not nameplate capacity power production.*

The RFD estimates the need for additional acres by analyzing a total number of megawatts that could be installed on public lands under the SEZ Alternative and the Preferred Alternative. In the RFD scenario, BLM uses two approximations for determination of a reasonable build out under state RPSs and NREL's Regional Energy Deployment System (ReEDS). This is a useful first pass at approximating how many acres could be included in each of the alternatives, but to increase the accuracy and transparency of its SEZ program in a Modified SEZ Program Alternative, BLM should analyze needs based on megawatt-hours of demand for renewables instead of nameplate capacity. By analyzing and reporting demand in megawatt-hours, or power produced, the capacity factor of solar technologies will be built into BLM's recommendation for total acres that should be designated within zones.[39] Defining acres in terms of megawatt-hours of demand supports already existing planning exercises at the local, state, and regional level geared towards meeting demand, which describe load forecasts in terms of power produced, not nameplate capacity.

There are logical benefits of describing needs in megawatt-hours instead of megawatts. First, state RPS goals—calculated as a percentage of total demand that must be met through renewable energy—are set in megawatt-hours. In addition, planning entities at the sub-state, state and regional level, calculate megawatt-hours as they are spread over the length of the planning period. These load forecasts vary over peak load and off-peak load seasonal and daily demand

[39] Alternative capacity factors result in differences the MW/acre potential output of each solar technology and therefore the number of total acres needs to meet renewable demand, dependent on which technology is used. BLM has determined a capacity factor of solar technologies available on the market in setting a "Megawatt Capacity Fee" for three solar technologies in its Instruction Memorandum No. 2010-141, dated June 10, 2010. As of the date of this filing, BLM's capacity factors for solar are: Photovoltaic (PV), 20% capacity factor; concentrated PV and concentrated solar, 25% capacity factor; concentrated solar with storage of 3+ hours, 30% capacity factor.

curves. The groups submitting these comments recommend that BLM remain consistent with the existing methods for describing electricity demands that are already in place at regulatory agencies and planning authorities. In effect, the designation of zones amounts to a reprioritization of resource management plans for federal lands, towards energy production in lieu of other values. BLM solar zones should reflect the state and regional energy objectives that have already been established. BLM's role in managing public lands should follow the direction of existing electricity policy.

***Recommendation:*** The Modified SEZ Program Alternative should use capacity-factor adjusted power production rather than nameplate capacity power production to ensure consistency with existing methods for describing electricity.

### *Q. The Modified SEZ Program Alternative should employ science-based management*

When considering the intensive development under a solar energy program, there will certainly be significant impacts to biological resources, including sensitive habitat types and associated fish, wildlife and plant populations. The degree of those impacts rests a great deal on how BLM structures siting and mitigation decisions. Given the magnitude of the development and the range of biological resources at risk, it is of utmost importance that BLM clearly define a science-based planning strategy to first avoid, then minimize, and, for truly unavoidable impacts, mitigate impacts to biological resources.

The key to building an environmentally sound, legitimate solar development program will be through the consistent and transparent adherence to science-based planning and decision-making processes, along with well-articulated policy objectives, decision and evaluation criteria that permit stakeholders and the public to understand and support the rationale behind BLM zoning, siting, and mitigation decisions.

According to scientists in the field of decision-making, there are three essential "ingredients" to science-based management:

- Well-defined, measurable standards (i.e. wildlife population or habitat condition targets), developed via public involvement processes;
- The employment of science-based analytical tools to evaluate compliance with the standards (e.g. population viability analysis, or the spatially explicit Decision Support System recommended by the Western Governors' Association); and
- Consistent implementation of science-based analysis and decision-making (i.e. dedicated funding for monitoring and science-based adaptive management processes).[40]

Science-based management of natural resources encourages the development of policy objectives and standards that will give shape to these aspirational goals, as well as the construction of effective and efficient methods to evaluate whether or not the objectives are being met. A second example exists with the statutory objective to "minimize" impacts to the environment.

[40] D.J. Rohlf, *Science, Law, and Policy in Managing Natural Resources: Toward a Sound Mix Rather than a Sound Bite*, 127-142 (2004) *in* K. Arabas and J. Bowersox, eds. *Forest futures: science, politics, and policy for the next century.* Rowman and Littlefield, Lanham, Maryland, USA.

Decisions that are based on clear criteria, including threshold criteria, both for the avoidance and mitigation of impacts to biological resources, are likely to be more structured than decisions that are made absent clear decision criteria. Structured decisions are those where stakeholders can agree upon clear policy objectives, as well as the means of measuring those objectives.

BLM should take the opportunity to avoid controversy and conflict from the outset in this new program for solar development. One suggested method, and one that the BLM appears to be using, is to avoid designation and development of land types with known high-conflict values, and instead prioritize low-conflict areas (substantive detail on high-conflict and low-conflict land types are described below). Threatened, endangered and sensitive species habitats; unique habitat features; high integrity terrestrial and aquatic ecosystems; wildlife movement corridors – all should be considered high-conflict land types. On the other hand, mechanically-disturbed lands (including non-Federal lands) located in proximity to existing infrastructure, including road networks and transmission facilities, will enjoy much higher probability of project success and sustainable energy production.[41] Of course, land management decisions are often most challenging for the "places in between," where values collide and there is not a clear path to avoid conflict. Having a structured decision-making process, with clear criteria that can guide tradeoff decisions, in place for these types of scenarios is essential to achieving sustainable conservation outcomes.

Challenges associated with the application of biological information to decision-making are significant. While we applaud the BLM for recognizing sensitive resource areas, we understand that knowledge of BLM-managed ecosystems and the components of those ecosystems are limited, as is our understanding of how large-scale energy development will impact the structure, composition and function of desert ecosystems. We applaud the fact that the BLM is embarking on comprehensive science-driven "ecoregional assessments" of the ecosystems of interest to this planning effort. The need for these assessments validates the fact that biological data, information, and knowledge of these ecosystems is limited. For this reason, we expect the BLM to not only provide information on known biological resources (*e.g.* sensitive species population/habitat conditions) within the study areas, but also a comprehensive discussion of uncertainty (both of baseline biological conditions, as well as in relationships between solar development and biological resources), known information gaps, and processes to collect and apply information future decision-making processes. We expect, for example, a complete inventory of sensitive species population/habitat conditions for all solar study areas, based on our research.

***Recommendation:*** BLM should define a science-based management strategy for biological impacts in its Modified SEZ Program Alternative. This should be based on science-based planning as well as sound policy objectives.

[41] Our groups do not consider lands that have been grazed by domestic livestock, whether publicly or privately owned, to be "disturbed."

## SECTION 2. DEPARTMENT OF ENERGY ACTION

The Department of Energy (DOE) has a long history of promoting and advancing utility-scale solar energy research and technology, particularly within its Office of Energy Efficiency and Renewable Energy, the Solar Energy Technologies Program, and the Loan Guarantee Program. The accomplishments of DOE's solar energy programs are based on directives laid forth in a number of statutory requirements and Executive Orders, such as expedited review of permits, technological advances related to access to transmission and water use, and advancement of local planning efforts.[42] These gains have resulted in the expansion and advancement of utility-scale solar projects.

DOE's participation in and contribution to the Draft Solar Programmatic Environmental Impact Statement (DPEIS) is defined in its purpose and need statement: "to satisfy both [Executive Orders] and comply with congressional mandates to promote, expedite, and advance the production and transmission of environmentally sound energy resources, including renewable energy resources and, in particular, cost-competitive solar energy systems at the utility scale" (Section 1.4.1).

In its preferred alternative, DOE proposes to integrate environmental analysis, mitigation measures, and other considerations as enumerated in the DPEIS into its evaluation and selection of solar energy projects and technologies seeking DOE funding and support. The agency believes that inclusion of these considerations will help increase the pace of solar energy development and decrease environmental damage, project costs, and stakeholder opposition associated with solar energy projects, therefore helping DOE to meet its legal mandates.

More specifically, DOE proposes to use the Bureau of Land Management's (BLM) analysis in the DPEIS to "provide a technical basis for development of guidance." This guidance would be used to help DOE determine which solar energy projects and technologies to invest in, as well as to develop recommendations for project proponents applying for DOE funding to consider in their applications. Notably, this guidance would apply to all solar energy technologies funded by DOE on federal, state, and private lands.

Because the goals of increasing solar energy development and protecting ecological and cultural resources are not mutually exclusive, we support DOE's preferred alternative. However, DOE should make improvements to this alternative to ensure that it can make informed decisions that support projects and technologies with minimized impacts.

### I. Analysis of Alternatives

DOE proposes two alternatives: no action and the proposed action. Under the no action alternative, DOE would continue its business-as-usual methodology of analyzing environmental concerns with the solar projects it supports. It would not develop guidance to improve

[42] Executive Order 13212 (2001), Executive Order 13515 (2009), and Section 603 of the "Energy Independence and Security Act of 2007."

environmental analysis and consideration or recommend mitigation measures that would be applied to DOE-funded solar projects.

The proposed action—and the preferred alternative—would require DOE to use the findings in the DPEIS to develop programmatic guidance that would integrate environmental considerations into its selection process for project funding. The guidance would also specify best practices for DOE solar funding applicants to consider when submitting applications for funding, especially for investment and deployment strategies. Basing this new guidance in the findings of the PEIS allows DOE to make more thorough and sound decisions, and would allow the agency to invest in the least-impactful solar technologies. In addition, the new DOE guidance would include mitigation recommendations for project developers to consider when applying for funding that would address programmatic technology performance goals. This new guidance would help streamline analysis and documentation for projects funded by DOE.

DOE recognizes a number of benefits of selecting the preferred alternative (Section 7.1).

- With new guidance, the agency will be empowered to make more informed decisions about investing in projects that minimize environmental impacts such as land disturbance and water usage.
- Guidance to develop mitigation recommendations for funding applicants will streamline environmental analyses and provide developers with more certainty about the prerequisites for winning DOE financing.
- Guidance for DOE and project funding applicants will spark faster approval in federal and state permitting processes, decreased costs linked to project modification, and reduced opposition. This new funding criteria will also result in quicker construction of renewable energy projects that reduce greenhouse gases and other hazardous combustion-related pollutants.

These benefits help DOE to meet its mandates as described in the purpose and need statement.

Adverse environmental impacts can be caused by a quicker pace of solar energy development, but are hard to quantify given the goals of DOE's proposed action.

## I. Support for the Department of Energy's Preferred Alternative

We support DOE's preferred alternative to develop guidance both that would incorporate environmental concerns into DOE's own review of projects and for project proponents seeking to win funding. This alternative will minimize adverse environmental impacts and also help DOE to meet its legal requirements to increase the pace and decrease the costs of solar energy development.

In scoping comments for this PEIS, which many of our organizations submitted, we called on DOE to use the DPEIS as an opportunity to mirror the process and analysis being conducted by the BLM. DOE has undertaken this task in proposing to develop new guidance for selecting environmentally-sound solar projects.

Even though DOE notes that "In all likelihood, only a small percentage of utility-scale solar energy development projected in the [Reasonably Foreseeable Development Scenario] would be

directly attributable to DOE's proposed action," it nevertheless makes sense to screen projects early on to make sure that they succeed. With better decisions on where to make technology and resource investments that minimize environmental impacts, as well as mitigation recommendations for solar developers, DOE will be working towards an increased pace of solar development, stronger and more resilient projects, and lowered costs for solar energy systems at the utility scale. Our organizations support all of these goals.

## II. Recommendations for Improvements to the Department of Energy's Preferred Alternative

In the Final PEIS, DOE should improve its analysis in order to strengthen the proposed action and preferred alternative. In particular, it should:

- Improve the description of the current DOE solar energy program and its existing guidance. BLM details its current process for issuing rights of way for large solar energy projects (Section 3.7), but DOE does not describe its current process for identifying which solar energy projects and technologies to fund. In the Final PEIS, DOE should disclose the types of solar projects that it currently funds in addition to the specific environmental concerns that it takes into account for funding through its various solar energy programs. DOE should also establish which program offices will utilize the PEIS and new guidance in their decision-making processes.
- Broaden the scope of its analysis with regard to categories of affected lands and resources. BLM describes and evaluates the lands and resources to be affected by the PEIS (Chapter 4), and DOE must expand upon this analysis because it funds projects sited on federal, state, private, and tribal lands.
- Clarify what is meant by the intention to streamline future environmental analysis and documentation for DOE-supported projects (Section 2.3.2.1).

Additionally, DOE has an opportunity the Final PEIS to provide even further certainty to developers and promote the right kind of solar energy development by commiting to supporting only low conflict projects. Specifically, DOE should:

- Provide assistance to only those public lands solar projects only that BLM's screening tool finds to be "low conflict" or that are located within zones. This would lead to solar development that is faster, cheaper, and better for the environment, consumers and project developers.
- Give a preference and/or incentive for solar energy projects on previously-disturbed lands in order to minimize environmental impacts and create jobs in the places that need them the most.
- Demonstrate its commitment to rapid deployment of solar energy projects by indicating a presumption against funding projects on public or private lands in areas with sensitive natural or cultural resources; projects in these areas are likely to be litigated and delayed.
- Commit to only supporting projects for which thorough cultural resource consultation has been completed.

## APPENDIX I. ANALYSIS OF REASONABLY FOREESEABLE DEVELOPMENT SCENARIO

### *A. Overview*

The BLM, the Interior Department and the Energy Department are to be commended for including a Reasonably Foreseeable Development Scenario (RFD) in the draft Solar Energy Development PEIS. Such an analysis relates directly to the task that this PEIS as a whole has been assigned to fulfill and the failure to present one would have constituted a fatal flaw of this document. The RFD that is presented is aggressive both in terms of amount of renewable energy needed in the study area through 2030 and in terms of the amount of solar energy the public lands will provide to meet that need. Precisely because the RFD is so aggressive, it clearly documents that the Solar Energy Zones alternative – supplemented by a system for designating additional zones as needed as the groups submitting these comments advocate – will allow ample room for solar to grow responsibly and thrive sustainably on our public lands. In this section of these comments we comment on the methodology used to create the RFD, suggest some improvements and then detail our conclusions about the RFD and its assumptions.

Development of the RFD. The Draft PEIS used two methods to estimate the RFD scenario or amount of power that would be generated in the six-state study area over the next 20 years. One involved the Regional Energy Deployment System model developed by NREL, while the other used each state's Renewable Portfolio Standard (RPS) to estimate corresponding renewable energy and solar development. Both of these methodologies are appropriate tools for accomplishing the task at hand and we doubt that there is a "better" single way to estimate the RFD scenario for the study area. [43]

Table 1 shows the results of the two methods of scenario development.

**Table 1. Results of the Renewable Energy Modeling used in the Draft PEIS**

| Solar Capacity from: | | Arizona | California | Colorado | Nevada | New Mexico | Utah |
|---|---|---|---|---|---|---|---|
| **ReEDS Model (MW)** | BLM | 1,768 | 2,207 | 98 | 1,153 | 353 | 0 |
| | Non-BLM | 1,724 | 8,487 | 2,197 | 548 | 3,204 | 0 |
| **RPS-based Method (MW)** | BLM | 485 - 2,424 | 3,084 - 15,421 | 439 - 2,194 | 348 - 1,701 | 167 - 833 | 244 - 1,219 |
| | Non-BLM | 162 - 808 | 1,028 - 5,140 | 146 - 731 | 116 - 567 | 56 - 278 | 81 - 406 |

While the results of the two modeling approaches utilized predict extensive solar development, there is substantial variation between them as shown above. The Draft PEIS used the maximum

[43] Were the BLM to prepare a new RFD scenario and do so with the goal of obtaining a more realistic estimate of future needs, rather than one that established the outer bound of expected development, we suggest that rather than use a single RFD analysis for all states, an approach should be taken that would allow the analysis to take into account such factors as state RPS requirements, amount of private land, and where development is being proposed.

estimated development as projected by the RPS-based method to establish an upper bound on potential development and associated environmental impacts. It then employed various assumptions to predict how the maximum estimated development might be allocation between BLM-administered lands and private lands. These assumptions are discussed below.
To evaluate the RFD scenario, we contracted with Aspen Environmental Group to review the following items for each state:

- current renewable energy capacity,
- current RPS compliance,
- perceived capacity to achieve RPS compliance,
- renewable energy proposed (both on land managed by the BLM and on private, state, or other federal land), and
- Public Utility Commissions' (or equivalent) concerns and communications.

Some of the data assembled for this analysis are included at the end of this Appendix.

***B. Primary Conclusions Regarding RFDS***

Based on the available information for each state, it appears clear that the RFD scenario is very aggressive, i.e., that it significantly overestimates the amount of renewable energy that will be needed in the study area in general and the amount of solar energy development that will take place on public lands. Because of these features, the RFD provides a useful basis on which to assess the upper bound of environmental impacts that such development might result in as well as of the need for and viability of the two approaches to development that are considered in the PEIS – the solar zones option and the preferred alternative. Indeed, the RFD scenario amply demonstrates that there is more than enough room in the proposed zones to allow solar development and the solar industry to continue to grow on public lands while simultaneously allowing the BLM, other land and wildlife managers and stakeholders to gain experience with the processing, permitting, construction and operation of these huge projects as well as that there is enough time to permit the identification and designation of additional zones for additional development if and when needed.

**1. The RFD Overestimates Renewable Energy Demand That Will Be Met By Utility Scale Generation In General and By Utility Scale Solar Plants In Particular**

The RFD scenario overestimates the amount of renewable energy demand that will be met in the study area by utility scale generation in general and by utility scale solar generation in particular in three ways each of which is discussed below: first, because it assumes applicable RPSs will be met chiefly by utility scale generation, an assumption that is clearly changing in at least California and Arizona; second, because it assumes that 50% of applicable RPSs will be met by solar development at whatever scale; and third, because it assumes that 75% of the solar that will be generated to meet 50% of RPS will come from public lands. These assumptions, as indicated, have produced an RFD that is definitely very aggressive in terms of the kinds and amount of solar energy to be produced from the public lands.

a. Assumptions about the role of large utility scale generation in meeting RPS are changing.

The RFD scenario assumes that the bulk of RPS needs will be met by large utility scale generation. Even two years ago, this assumption might have been sound. At that time, solar developers, regulators, utilities and members of the Public Utility Commissions (PUCs) in many states were assuming that the permitting, construction and operation of utility scale solar projects would proceed with relative ease and, as a result, they favored a paradigm which relied heavily on such projects to meet RPS goals. However, such an assumption is clearly changing – perhaps as a result of experience with the "fast track projects" that were permitted in 2010 in the study area.

Regulators in California set records in permitting large scale solar projects in 2010, on both public and private lands. Even as those records were being set, however, utilities began showing marked interest in projects significantly smaller than utility scale. For example, in California there are a number of rooftop projects currently proposed/being developed by several of the investor owned utilities. See, e.g., CPUC Quarterly Report (which reveals that there are over 250 projects between 1-2 MW in size requesting interconnection to the grid for a total of over 500 MW). In addition, numerous projects smaller than utility scale have been proposed for private lands in California. For example, according to a chart produced by the Renewable Energy Action Team, a team comprised of federal and state regulators and formed for the purpose of facilitating renewable energy generation in California, that is entitled 2011 Generation Tracking for Renewable Projects (hereinafter referred to as "2011 REAT chart"), approximately 70 solar projects of 50 MW or less in size have been proposed and are potentially permittable in 2011. (This REAT chart is included as Attachment 1 at the back of this Appendix.) These projects, together with six that are between 60 and 90 MW in size, would produce almost 2000 MW. Id. Similarly, in Arizona, there is a clear trend by the state PUC to permit smaller projects, albeit projects that are still large by most measures (i.e., up to 100 MW. These examples reveal that, as a result of assuming that renewable energy demand in the study area will be met by large utility scale generation, the RFD scenario over-estimates how much large utility scale is needed.

b. Assuming that 50 percent of RPS will be met by solar development is very aggressive

The RFD scenario assumes a high solar scenario (50% solar and 50% other renewables).[44] While some states' RPS goals prescribe the percentage of solar energy required to achieve those goals, the highest percentage of solar prescribed in the six states covered by the PEIS at the time the draft was written was 20%.[45] Based on our analysis of the types of energy currently used to achieve the interim RPS goals and on these states' histories with renewable energy, a 50% scenario is definitely aggressive, and likely does not adequately account for grid integration issues such as demand profile and storage requirements.

[44] As noted above, the reason for assuming this high solar scenario was to enable the upper bound on potential environmental impacts of solar development on public lands to be estimated.

[45] The California RPS was increased to 33% by law on April 12, 2011. However, the investor-owned utilities are close to meeting their 20% target and are expected to be fully compliant by the end of next year. See, e.g., "CALIFORNIA: Private utilities reached 18 percent renewables in 2010, using mostly geothermal and wind," Energy and Environment, March 4, 2011. Hence all the energy produced from projects permitted on public lands after completion of the PEIS will be allocatable to meeting the new standard.

To date, data from state public utilities commissions in the study area states or individual providers reveal that states are achieving their RPS goals primarily through wind and geothermal power (and hydroelectric power in those states that allow hydroelectric power to count toward the RPS goals). See Attachment 2 at the back of this Appendix. In Colorado, for example, a total of 1224.5 MW of renewable energy capacity is on line, 1200 MW of which comes from wind and 24.5 MW from solar. In Nevada, there is 79.3 MW of solar energy capacity out of a total of 418.2 MW; geothermal makes up the lion's share of renewable energy in that state – 315 MW. In Utah, out of a total of 570.7 MW of renewable energy capacity on line, the bulk comes from hydro – 286.5 MW – and from wind – 224.8 MW. The picture is similar when it comes to renewable energy net generation by source. See Attachment 3 at the back of this Appendix.

To date, there are no indications that the utilities in the six state study area will stop purchasing large amounts of geothermal and wind power and switch to purchasing solar power except to achieve any applicable diversity requirements. Accordingly, we would submit that it is clear that, because the RFD scenario assumes that 50% of RPS will be met by solar, it significantly overestimates that technology's contribution to the energy needs of the region.

c. Assuming that 75% of solar development will occur on BLM Land is also aggressive.

The RFD scenario assumes that 75% of all solar projects in the six state study area will be constructed on public lands because of the Administration's decision to prioritize solar energy development. As recently as two years ago, the solar industry, utilities and regulators assumed that the bulk of renewable energy development including especially solar development would take place on public lands. Today this assumption too is changing, however.

For example, California currently has more solar energy proposed on private land than on BLM land. As revealed by the 2011 REAT chart, attached to this Appendix, there are currently 8,258 MW potentially permittable on public lands at this time out of a total of a total of 16,950 MW. In addition, California currently has close to the RFD scenario estimate for solar energy on BLM-administered land proposed on private/state land. Id. [46] Indeed, it appears that, as of February 2011, 12,842 MW have been planned, proposed or permitted on public lands in that state. [47] The 2011 REAT chart indicates that 3,965 MW of large-scale projects (100 MW and above) are proposed, along with the almost 2000 MW of smaller projects referred to above. Clearly, these examples indicate that developers are re-assessing the desirability of putting all their eggs in the federal land basket.[48]

Moreover, while regulators in California set records in permitting large scale solar projects in 2010 – proving beyond a shadow of a doubt that they could permit such projects speedily despite their lack of experience with the technologies involved, the scale of the projects proposed and

[46] This MW total, which was calculated based on available information including the 2011 REAT chart, does not include rooftop solar projects currently proposed/being developed by the state's investor owned utilities.

[47] [insert from HOS] his figure does include the projects that were permitted last year in California on private land for a total of at least 480 MW.

[48] Mitigation costs may be among the reasons for this re-assessment. Because most BLM-land is undeveloped, many public land projects will have higher mitigation costs than those on private disturbed lands. As a result the mitigation burden on public lands may well result in a comparative financial disadvantage when compared to that alternative.

their impacts, the fact is all the projects permitted on public lands to date have been challenged in federal court and it remains to be seen whether the approvals and permits issued will withstand those challenges. The outcome of those cases, in other words, may well affect the desirability of development on public lands to potential developers. Indeed, the available data clearly indicate that, even before all the pending suits were filed, developers were re-assessing the desirability of public lands based on the 2010 experience.

The draft PEIS itself provides information about solar proposals on public lands that suggests that the public land paradigm is shifting. According to data provided in Appendix B of the PEIS, there were 31 fewer proposed projects at the end of 2010 when the PEIS went to print than there were at the beginning: 1 fewer in New Mexico and 35 fewer (or 50% of all proposed projects) in California while very small increases of 1, 2 and 2 more projects in Nevada, Colorado and Arizona respectively.[49] At the end of the year, Utah still had no renewable applications on public lands. At a minimum, these data may also reflect the trend away from public lands in California discussed above.

The RFDS assumes that 75% of all solar projects would be constructed on BLM-administered lands because of the agency's decision to prioritize solar energy development on those lands. This percentage may turn out to be the case in states such as Nevada, where the BLM administers a large proportion of the lands within the states' borders and/or where there is a history of renewable energy development on BLM-administered land. In Nevada, for example, close to 40% of the RFD scenario estimate has already been approved for development on BLM land.
However, it may not be the case in other western states where there is more available private land on which to build solar projects and where the state itself is prioritizing renewable energy development. For example, as noted above, California currently has more energy proposed on private land than on public land – and has many more acres of lands that have been mechanically disturbed and hence potentially lower resource conflicts in private ownership than on the public estate. Many of these private land projects too are smaller allowing for faster and simpler environmental review. Accordingly it seems quite reasonable to assume that in California less than 75% of the solar development will occur on public lands.

Similarly, the 75% development assumption may not be the case in states which have already indicated certain areas for prioritization of renewable energy. Colorado, for example, has identified Renewable Resource Generation Development Areas where renewable energy could be prioritized. The San Luis Valley GDA currently has approximately 544 MW of solar energy proposed, more than is currently proposed on BLM-administered land in Colorado.

In any event, the assumption that 75% of solar development would occur on public lands unquestionably skews the RFD scenario toward more public land development. This skewing is

[49] The majority of the decrease In California is undoubtedly attributable to the BLM's aggressive screening of applications on file to determine their technical and financial feasibility – an approach that our organizations strongly support. In other states, it may be the difficulties in building large scale solar is slowing interest in these projects and/or that developers have already filed applications on sufficient or more than sufficient public land acreage for their actual development plans. The economy too has undoubtedly affected these trends.

further amplified for some states by the use of a single RFD scenario for all six states despite the significant differences among them as discussed above. Again, as indicated above, this single scenario may turn out to be the case in some states, such as Nevada where 85% of the land is administered by the federal government and there is a history of renewable energy development on BLM-administered land, but it may not be the case in other states, such as California where the amount of energy projected under the RFDS seem both exaggeratedly skewed toward solar and skewed toward solar on BLM land.

**Conclusion. The very aggressive RFD Scenario Clearly Supports a Comprehensive Zone-based Approach.**

The Interior Department clearly had a reasonable basis for adopting an aggressive RFD scenario in connection with the preparation of the PEIS. As noted above, use of such a scenario allows for the estimation of the upper bound of likely environmental impacts from the proposed program and alternatives. That said, it is clear from the analysis above that the scenario that was used over-estimates what is likely to occur in the future on our public lands.

As a result, the RFD scenario supports selection of only a comprehensive zones-based approach which is close to only one of the two action alternatives considered in the PEIS – Alternative 2, the zones development alternative. The RFD scenario documents the availability of ample potential in the proposed zones to increase solar generation and grow solar development responsibly – especially considering the large number of existing applications outside of the proposed zones which our groups expect BLM to review,[50] while the BLM gains experience in developing, permitting and monitoring the operation of large scale projects as well as in understanding the impacts of individual projects and other solar projects in the same and different geographic regions.

To be more specific, one can do a rough, back-of-the-envelope calculation of the amount of BLM land that will be required to develop even the very aggressive numbers reflected in the RFD scenario. That scenario envisions a high estimate of up to 23,792 MWs of solar being developed on BLM land (although, as previously indicated, the real number is likely to be

[50] Currently there are about 166 applications for solar development on BLM-administered lands in the study area. See, e.g., NRDC, "Bureua of Land Management Utility-Scale Solar Applications – A Geospatial Survey of Active ROW Applications," April __, 2011, submitted for the record on this draft PEIS by NRDC and others (hereinafter "NRDC Report"). While it appears that a number of these applications are located in proposed zones and many are outside. (One application overlaps a proposed zone slightly.) Id. In Arizona, for example, there are no existing applications within zones but 36 outside them. Id. at 3. In California, according to data provided by the State BLM Office on March 7, 2011, there are currently a total of 19 first in line applications within the four proposed zones, and at least 14 first in line applications outside them. There are no applications within the zones proposed in Colorado, but approximately two outside as of this date. Nevada appears to have six active applications within proposed zones and 44 outside them, while New Mexico has one application within and two outside the zones. See NRDC Report supra. Utah has no public land solar applications, as indicated above.

Although Alternative 2 in the PEIS contemplates no development outside the identified zones, as indicated immediately above, none of our groups actually expect the BLM to reject all applications outside of those zones. Some of these applications will be approved and as a result some development outside zones will unquestionably go forward. This additional development will contribute to actual needs of the states in which it is located as well as to achieving the RFD scenario presented in the draft PEIS. The same is true of any MW generated as the result of projects permitted by the BLM last year.

significantly lower). With a mix of solar technologies, with solar thermal generally requiring fewer acres per MW (5-7) and PV requiring more (as high as 10-12), even using the 12 acre/MW maximum, we get a total acreage of 285,504 necessary for solar production. Using the average, a generous 9 MW/acre, would produce a requirement of 214,128 total acres in the six states. (While additional acres may be needed for substations and transmission, the actual number would be very small by comparison). The proposed Solar Energy Zones in the PEIS include a total of 677,384 acres. Allowing for the fact that not all of these acres will be suitable for solar development, it is still very likely that sufficient land will be available to meet the projected need in these zones alone.

Furthermore, analysis of data in the draft PEIS reveals clearly that in all cases except Arizona, the proposed zones hold more than the RFD scenario build out would require without including any development outside the zones. Indeed, in some states, the zones hold significantly more than is needed to support that build out – again, even without counting generation from any other source. The California SEZs, for example, could potentially produce at least twice as many MWs as projected under the RFD scenario, while the SEZs in Nevada could potentially build out at least nine times as many MWs and those in New Mexico could potentially build out at least 12 times as many MWs. It is equally clear that at least in those states, the proposed SEZs could be reduced significantly and the scenario still achieved[51] – especially if, as we recommend, a process for adding new zones is included in the new program.[52]

In short, the RFD scenario proves that a comprehensive zone-based solar development program would provide a safety net for agency planners and decision-makers as well as the solar industry and the public lands. As noted immediately above, this is even truer if the Department includes in its new solar program a process for adding additional zones if needed which would provide even further assurance to all concerned that real needs for the generation of solar energy on public lands will be met in the future.

In contrast, selection of Alternative 3, the BLM's preferred alternative, which essentially amounts to a free for all approach to siting of large scale solar projects in our deserts, would not only be inconsistent with the RFD scenario, it would also be inconsistent with the requirements of the Federal Land Policy and Management Act of 1976 (FLPMA), 43 U.S.C. § 1701 et seq., the BLM's Organic Act. FLPMA mandates that the Secretary "take any action necessary to prevent unnecessary or undue degradation of the [public] lands." 43 U.S.C. § 1732(b). Throwing open more than 21 million acres of public lands to the siting, construction and operation of huge solar power plants will have attendant significant and, in many cases, unmitigable impacts as revealed in the EISs the Interior Department prepared on the power plants it permitted on public lands in California last year and doing so *when it is demonstrably unnecessary* as revealed by this PEIS simply cannot be squared with that mandate.

[51] The one caveat that applies to this statement relates to BLM's assumption that 80% of the acreage within zones will be developed. This amount of acreage may not actually be available. In California's Riverside East SEZ, for example, less than 80% of the land within the zone may be developable in large measure because of the sand transport corridor which traverses much of the zone. However, as noted above, there is the potential for development outside of the California zones as well as development within new, additional zones to "make up" for this unavailable land. Moreover, the PEIS estimates that it takes 5 acres/MW for solar trough technology and 9 acres/MW for other technologies. The California BLM uses higher ratios for all projects. If the California numbers had been used in the PEIS, the MWs "lost" from that particular zone would be reduced.

[52] The process we recommend that the Interior Department adopt is discussed infra in Section I.

The selection of Alternative 2 is further supported by existing information that we have obtained regarding contract failure. In connection with our research for preparation of these comments, we learned that contract failure is currently at between 15 and 30%.[53] To insure against contract failure, especially failure of utility-scale projects like those that have been permitted and proposed for public lands, utilities are now concentrating on smaller projects (less than 100 MW). The California PUC identified insurance against contract failure as a reason to increase feed-in tariffs for distributed solar projects. Focusing on places where projects are most likely to be successful as the zones-based alternative would do is another and easier way to help utilities guard against contract failure.

## STATE-LEVEL RPS INFORMATION

### Arizona

- *Approximately 17% of the state is BLM-administered land - 12.2 million surface acres*

At this time, Arizona BLM is actively processing three ROW applications while four utility scale solar projects are proposed on BLM land. Therefore, it seems unreasonable to assume most of the utility scale solar development would be on BLM land. The renewable energy that is already developed and currently under development is on private land and the total number of MW of these projects – 350 MW – is close to half of the estimated solar energy on non-BLM land under the RFD scenario.

### California

- *Nearly 15 % of the state is BLM-administered land, 15.2 million acres*

Given the acres of mechanically disturbed (agricultural) land that appears to be available for solar development in the Central Valley, it seems unreasonable to assume that more solar energy would be developed on BLM land than on private land. This is especially the case given the high priority California has placed on renewable energy development throughout the state, not just on BLM-administered land.

It is also important to note that all of the BLM-approved solar projects on BLM-administered land are currently the subject of federal court litigation. Many smaller projects proposed on private land that is less environmentally sensitive have been undergoing environmental review with Negative Declarations or Mitigated Negative Declarations allowing for a faster development schedule. Moreover, the BLM in California reports that it is seeing few new ROW applications and that, more often than not, the new applications that it has received are applications for gen-ties crossing public lands, rather than for solar power plants.

Given the reduced environmental effects of solar projects on previously disturbed agricultural and other private lands as compared to undisturbed pristine desert, it is not only likely that less than 75% of the solar development in California will be on BLM-administered lands, it is even possible that solar development on private land in the state could overtake that of BLM-administered lands over the next couple of years.

[53] Indeed, one utility has suggested that it is using a 40% failure rate for its internal planning purposes.

**Colorado**

- *Almost 12.5 % of the state is BLM land, 8.3 million acres*

For the Colorado RFD scenario, the two models used to estimate the amount of solar required for the RPS goals resulted in virtually opposite estimates. The ReED scenario put close to 100% of solar energy development on private land and the RPS model put close to 100% of the solar energy development on BLM land. Colorado currently has more solar energy proposed on non-BLM administered land than solar energy proposed on BLM-administered land.

Also, Colorado does not require a specific percentage of the RPS to be solar; it focuses instead on distributed generation. Given Colorado's extensive experience with wind power, the capacity for wind energy in Colorado, and the fact that Xcel Energy, the largest energy provider in Colorado, is the utility with the most wind power on the system, the scenario presented in the RFD scenario seems inappropriately skewed toward solar energy.

**Nevada**

- *Approximately 67% of the state is BLM land, 48 million acres*

In Nevada close to 40% of the RFD scenario estimate has already been approved for development on BLM-administered land. However, close to 30% of the currently proposed solar energy is on private land: three projects totaling 634 MW. Some of the solar projects being developed in Nevada, moreover, may serve California's RPS. For example, if developed, the 457 MW El Dorado project in Clark County would count toward California's RPS goals, rather than Nevada's. Additionally, NV Energy continues to focus on geothermal as the primary renewable energy to achieve the Nevada RPS goals.

**New Mexico**

- *Approximately 17% of the state is BLM land, 13.4 million acres*

The diversity requirement for New Mexico mandates 20% from solar, which conceivable could justify a higher RFD scenario for the state. However, the estimate of solar development on BLM land is consistent with current development patterns. More specifically, the New Mexico utilities get most of their solar from smaller projects or from projects that go through a third-person provider which are not currently located on BLM land.

**Utah**

- *Approximately 42% of the state is BLM-administered land, 22.9 million acres*

Given that the Utah RPS is voluntary, it is probable that less solar development will occur on BLM-administered lands than estimated. Currently, there are no proposed solar projects on BLM-administered land. Additionally, the Utah PUC indicated that the solar that was proposed and/or built were smaller projects, often coinciding with public facilities such as schools.

**Additional Background on RFDS Issues**

***Transmission Constraints***

As noted in the CPUC 33% Renewables Portfolio Standard Implementation Analysis Preliminary Results (June 2009), transmission planning, permitting, and construction has been

and may continue to be a challenge to achieving 33% renewables by 2020. The report concluded that to meet the 33% RPS goals, seven transmission lines would be required in addition to four new transmission lines required to achieve a 20% RPS. The zonal approach will facilitate transmission planning and permitting to achieve RPS goals: clustering projects in zones will help prioritize needed transmission and, indeed, the basic outlines of the zones in California that are analyzed in the PEIS in California were drawn by the state's Renewable Energy Transmission Initiative, a voluntary, multi-stakeholder process, as part of a major effort to facilitate transmission planning and permitting of the lines necessary to achieve those goals.

***Contract Failure***

Contract failure has been noted in reports to the California Energy Commission and California Public Utilities Commission as a difficulty in reaching the RPS goals. The rate of contract failure and/or project viability has been addressed as follows:

- Between 2002 and 2011 a total of 27 of the 219 RPS contracts approved or under review (approximately 12%) were terminated (CPUC, Progress Towards California's Renewables Portfolio Standard Goals, Senate Oversight Hearing Feb 1, 2011)
- Utilities should expect a minimum overall contract failure rate of 20 to 30% (Consultant Report for the California Energy Commission, January 2006)
- Of the overall sample used in the report, 54% were categorized as "successful", either online or scheduled to meet online date, 23% were canceled, 14% were delayed, and 9% were in default (Consultant Report for the California Energy Commission, January 2006).
- According to the Database of Investor-Owned Utilities' Contracts for Renewable Generation, Contracts Signed Toward Meeting the California RPS Targets (August 2010), 15% of the contracts signed have been canceled, 21% are delayed, and 64% are on track.
- Top causes of contract failure included siting and permitting issues, developer financial troubles, capital cost increases, and transmission and interconnection issues.
- According to the RPS Status Report Q4 2010, existing RPS contracts should achieve the 2010 20% RPS mandate in 2012 with projects that are online or viable at more than 90%[54] (see Figure 2: Risk Profile of Executed RPS Contracts). To achieve 33% renewable energy by 2020, approximately 20,000 MW of executed RPS contracts that are less than 90% viable, some as low as 50 percent viable, would be necessary.

***Permitting Constraints***

The permitting processes for utility scale solar projects in California during 2009 and 2010 were completed remarkably quickly, removing the developers' earlier challenges to agencies' abilities to issue permits for these large projects in an expeditious manner. However, it remains to be seen whether the approvals and permits issued will stand up to the current legal challenges. BLM and other responsible agencies should look carefully at the legal challenges to the 2010 decisions and consider whether the NEPA process for future projects requires more time and attention.

[54] The CPUC Project Viability Calculator includes project development experience, ownership/O&M experience, technical feasibility, resource quality, manufacturing supply chain, site control, permitting status, project financing status, interconnection progress, transmission requirements, and reasonable of commercial online date

**Sources**

***All States:***

Draft Solar PEIS, 2010, U.S. Energy Information Association, 2010

***Arizona:***

Arizona Public Services Company 2009 Renewable Energy Standard Compliance Report

Arizona Public Services Company website Commitment to Renewable Energy < http://www.aps.com/main/green/choice/interactive-map.html#> accessed February, 2010

Tucson Electric Power Company Renewables Data for Year-end 2009

UNS Electric, Inc. Renewables Data for Year-end 2009

2009 Annual Compliance Report by Sulphur Springs Valley Electric Cooperative, Inc., 2009

Annual Compliance Report by the Arizona Electric Power Cooperative

***California:***

CPUC Renewable Portfolio Standard Quarterly Report 4th Quarter 2010

2010 REAT – Generation Tracking for Renewable Projects (Revised 12/8/2010)

POU RPS Deliveries updated August 2010

***Colorado:***

2010 Renewable Energy Standard Compliance Plan Public Services Company of Colorado (Xcel)

Wheatland Electric Cooperatives, Inc. 2009 Renewable Energy Standard Compliance Report

"Renewable Energy: Complementary Policies for Climate Legislation" Testimony of Ronald J. Binz Chairman Colorado Public Utilities Commission

***Nevada:***

Portfolio Standard Annual Report 04/01/10 Docket # 10-04002

***New Mexico:***

New Mexico Public Regulation Commission and Renewable Energy in New Mexico

El Paso Electric Company's Application for Approval of Its 2009 Annual Procurement Plan

El Paso Electric Company's Application for Approval of its 2010 Annual Procurement Plan

Public Service Company of New Mexico Renewable Energy Portfolio Procurement Plan for 2009

Public Service Company of New Mexico Revised Renewable Energy Portfolio Procurement Plan for 2010

Southwestern Public Service Company (Xcel) 2009 Annual Renewable Energy Portfolio Procurement Plan

Southwestern Public Service Company 2010 Annual Renewable Energy Portfolio Procurement Plan

***Utah:***

Utah Energy and Mineral Statistics, Chapter 6. Renewable Resources.
http://geology.utah.gov/emp/energydata/renewenergydata.htm

Appendix I

Attachments to Appendix I

| | 2011 RENEWABLE ENERGY ACTION TEAM - GENERATION TRACKING FOR RENEWABLE PROJECTS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Revised 12/31/2010 | | | | | | | |
| | | | | | | | | |
| | Project Name | County | Developer | ID | Cap. (MW) | Type | Lead Agency | DOE Guarantee |
| 2011 Priority Projects | | | | | | | | |
| | Solar | | | | | | | |
| 1 | First Solar Kern | Kern | First Solar | CACA 48820 | 745 | Solar PV | BLM | |
| 2 | Maricopa Sun Solar Complex | Kern | Granville Homes | GPA 5, CUP 5, | 700 | Solar PV | Kern County/DFG/USF | Yes. |
| 3 | Antelope Valley Solar | Kern | Renewable Resources | | 650 | Solar PV | Kern County | |
| 4 | Quartzite | Riverside | First Solar | CACA 49397 | 600 | Solar PV | BLM | ROD target 2012 |
| 5 | Desert Sunlight | Riverside | First Solar | CACA 48649 | 550 | Solar PV | BLM | ROD target 2011 |
| 6 | Topaz Solar Farm | San Luis Obispo | First Solar | DRC2008-000 | 550 | Solar PV | San Luis Obispo County | |
| 7 | Sunpeak Solar | Imperial | Superstition Solar | CACA 49150 | 500 | Solar PV | BLM | ROD target 2012 |
| 8 | Palen | Riverside | Solar Millennium, LLC | CACA 48810 | 484 | Solar Thermal | BLM | ROD target 6/2011 |
| 9 | Solargen Panoche Valley Sola | San Benito | Solargen | CUP 1023-09 | 399 | Solar PV | San Benito County | No. |
| 10 | Stateline | San Bernardino | First Solar | CACA 48669 | 380 | Solar PV | BLM | ROD target 2012 |
| 11 | Caithness Soda Mtn, LLC | San Bernardino | Caithness Soda Mtn, | CACA 49584 | 350 | Solar PV | BLM | ROD target 2012 |
| 12 | McCoy | Riverside | NextEra | CACA 48728 | 250 | Solar PV | BLM | ROD target 2012 |
| 13 | California Valley Solar Ranch | San Luis Obispo | Sun Power | DRC2008-000 | 210 | Solar PV | San Luis Obispo County/DFG | |
| 14 | Chocolate Mountains Solar F | Imperial | 8 Minute Energy | | 50 | Solar PV | Imperial County | Yes. |
| 15 | Calipatria Solar Farm II | Imperial | 8 Minute Energy | | 50 | Solar PV | Imperial County | Yes. |
| 16 | Lucerne Valley Solar | San Bernardino | Chevron, Fotowatio R | CACA 49561 | 45 | Solar PV | CDFG | |
| 17 | High Plains Ranch III | San Luis Obispo | SunPower | | 40 | Solar PV | San Luis Obispo County | Yes. |
| 18 | Ocotillo Sol | Imperial | SDG&E | CACA 51625 | 14 | Solar PV | BLM | ROD target 2011 |
| 19 | Cantil Solar Project | Kern | Nautilus Solar LLC | | 9 | Solar PV | Kern County | Yes. |
| 20 | North Muroc | Kern | Nautilus Solar LLC | | 9 | Solar PV | Kern County | Yes. |
| | | | | | 6,585 | | | |
| | Wind | | | | | | | |
| 21 | Ocotillo Express | Imperial | Pattern Energy Group | CACA 51552 | 560 | Wind | BLM | ROD target 12/2011 |
| 22 | Iberdrola Tule Wind | San Diego | Pacific Wind, LLC | CACA 49698 | 200 | Wind | BLM | ROD target 7/2011 |
| 23 | AES Daggett Ridge | San Bernardino | AES Wind Genergatio | CACA 49575 | 84 | Wind | BLM | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 24 | Granite Wind, LLC | San Bernardino | RES North America | CACA 48254 | 74 | Wind | BLM | |
| 25 | Walker Ridge | Lake and Colusa | Alta Gas REP | CACA 51667 | 70 | Wind | BLM/DFG | ROD target 11/2011 |
| 26 | Invenergy Horse Lake | Lassen | Invenergy | CACA 49709 | 51 | Wind | BLM | ROD target 12/2011 |
| 27 | Rising Tree | Kern | Rising Tree Wind, LLC | CACA 52363 | 234 | Wind | BLM/Kern County | ROD target 12/2011 |
| | | | | | **1,273** | | | |
| | **Geothermal** | | | | | | | |
| 28 | Black Rock Geothermal 1,2, a | Imperial | CalEnergy Obsidian Er | 2002-AFC-02 | 159 | Geothermal | CEC | No. |
| 29 | East Brawley - Ormat | Imperial | Ormat | | 49 | Geothermal | Imperial County | Yes. |
| 30 | Wister - Ormat | Imperial | Ormat | | 49 | Geothermal | Imperial County | Yes. |
| 31 | Casa Diablo Geothermal | Mono | Casa Diablo Geotherm | CACA 11667, | 40 | Geothermal | USFS/BLM | |
| | | | | | **297** | | | |
| | | | | | **8,155** | | | |
| **Other 2011 Projects** | | | | | | | | |
| | **Solar** | | | | | | | |
| 32 | Power Partners Southwest | San Bernardino | EnXco | CACA 49585 | 1,000 | Solar PV | BLM | |
| 33 | Brightsource | Riverside | Brightsource | | 750 | Solar Thermal | CEC | No |
| 34 | Brightsource | Inyo | Brightsource | | 500 | Solar Thermal | CEC | No |
| 35 | Trilobite | San Bernardino | PG&E | CACA 49432 | 500 | Solar Thermal | CEC/BLM | |
| 36 | Fort Irwin Solar Energy EUL | San Bernardino | Clark-Acciona | | 500 | Solar Thermal | CEC/ARMY | |
| 37 | Ogilby Solar | Imperial | Iberdrola Renewables | CACA 49615 | 450 | Solar Thermal | CEC/BLM | No |
| 38 | Oro Verde Solar (Edwards AF | Kern | Fotowatio Renewable Ventures | | 450 | Solar PV | USAF | |
| 39 | Gateway Solar Project | Kern | East Kern Properties, LLC | | 350 | Solar PV | Kern County | |
| 40 | EnXco I | Riverside | EnXco Development | CACA 49488 | 300 | Solar PV | BLM | |
| 41 | EnXco III | Riverside | EnXco Development | CACA 49490 | 300 | Solar PV | BLM | |
| 42 | EnXco IV | Riverside | EnXco Development | CACA 49491 | 300 | Solar PV | BLM | |
| 43 | Iberdrola Renewables | San Bernardino | Iberdrola Renewables | CACA 49813 | 300 | Solar Thermal | CEC/BLM | |
| 44 | Cadiz Lake | San Bernardino | Iberdrola Renewables | CACA 49430 | 300 | Solar Thermal | CEC/BLM | |
| 45 | Sunpower Kern/LA1 | Kern/LA | Sunpower | | 250 | Solar PV | Kern/LA | |
| 46 | Sunpower Kern/LA3 | Kern/LA | Sunpower | | 219 | Solar PV | Kern/LA | |
| 47 | Chuckwalla Solar | Riverside | Chuckwalla Solar LLC | CACA 48808 | 200 | Solar PV | BLM | |
| 48 | Mount Signal Solar Farm I | Imperial | 8 Minute Energy | | 200 | Solar PV | Imperial County | No. |
| 49 | Sunpower Kern/LA2 | Kern/LA | Sunpower | | 181 | Solar PV | Kern/LA | |
| 50 | Willow Springs Solar Array | Kern | First Solar | CUP 26, Map | 160 | Solar PV | Kern County | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 51 | Midway Solar Farm II | Imperial | 8 Minute Energy | | 155 | Solar PV | Imperial County | No. |
| 52 | Ward Valley | San Bernardino | Solar Reserve, Leopol | CACA 49002 | 150 | Solar Thermal | CEC/BLM | No |
| 53 | Great Valley | Kern | Element Power | CACA 51812 | 150 | Solar PV | BLM | |
| 54 | Leo Solar | Merced | Fotowatio Renewable Ventures | | 150 | Solar PV | Merced County | |
| 55 | Sunpower Central Valley Q2 | Unk | Sunpower | | 138 | Solar PV | Unk | |
| 56 | Centinela Solar Energy Facilit | Imperial | LS Power | | 130 | Solar PV | Imperial County | |
| 57 | Rosamond Solar Project | Kern | SGS Antelope Valley | 0 | 120 | Solar PV | Kern County | |
| 58 | US Solar Holdings Riverside | Riverside | US Solar Holdings | PP24616 | 100 | Solar PV | Riverside County | |
| 59 | Salton Sea Solar Farm II | Imperial | 8 Minute Energy | | 100 | Solar PV | Imperial County | No. |
| 60 | Imperial Solar Energy Center | Imperial | Solar Reserve, LLC | CACA 49884 | 100 | Solar Thermal | CEC/BLM | |
| 61 | El Mirage | San Bernardino | Axio Power Holdings | | 90 | Solar PV | San Bernardino County | |
| 62 | Cygnus Solar | Kern | Fotowatio Renewable Ventures | | 80 | Solar PV | Kern County | |
| 63 | Regulus | Kern | Fotowatio Renewable Ventures | | 80 | Solar PV | Kern County | |
| 64 | Colgreen Energy | Riverside | Colgreen Energy | CUP03635 | 75 | Solar PV | Riverside County | |
| 65 | Weldon Solar Project | Kern | Renewable Resources | ZCC 3, CUP 1, | 60 | Solar PV | Kern County | |
| 66 | Sunpower Kern W1 | Kern | Sunpower | | 60 | Solar PV | Kern County | |
| 67 | Calipatria Solar Farm I | Imperial | 8 Minute Energy | | 50 | Solar PV | Imperial County | TBD |
| 68 | Midway Solar Farm I | Imperial | 8 Minute Energy | | 50 | Solar PV | Imperial County | No. |
| 69 | Salton Sea Solar Farm I | Imperial | 8 Minute Energy | | 50 | Solar PV | Imperial County | No. |
| 70 | Alpaugh Solar | Tulare | Solar Project Solution | PSP 10-030 | 50 | Solar PV | Tulare or Kings | |
| 71 | US Solar Borrego One | San Diego | NRG Borrego Solar One, LLC | | 46 | Solar PV | San Diego County | |
| 72 | Lightsource Renewables, LLC | San Bernardino | Lightsource Renewables, LLC | | 40 | Solar PV | San Bernardino County | |
| 73 | Tehachapi Photovoltaic Proje | Kern | GE Energy by URS Corp | | 40 | Solar PV | Kern County | |
| 74 | Borrego Solar Farm | San Diego | Eurus Energy | CASE NUMBE | 45 | Solar PV | San Diego County | No |
| 75 | Orion Solar | Kern | Fotowatio Renewable Ventures | | 40 | Solar PV | Kern County | |
| 76 | SR Solis Vestal Herder | Tulare | SolarGen USA, LLC | PSP 10-017 SR | 18 | Solar PV | Tulare County | TBD |
| 77 | Ridge Rider Solar Park | Kern | Global Real Estate Investment Partn | | 38 | Solar PV | Kern County | |
| 78 | Sunpower Central Valley 1 | Unk | Sunpower | | 30 | Solar PV | Unk | |
| 79 | Sunpower Tribal | Unk | Sunpower | | 30 | Solar PV | Unk | |
| 80 | Granite Construction I | Tulare | SolarGen USA, LLC | | 30 | Solar PV | Tulare County | TBD |
| 81 | GWF Tracy Amendment | San Joaquin | GWF Tracy | | 30 | Solar PV | CEC | |
| 82 | Split Mountain Solar Farm | San Diego | EnXco | | 26 | Solar PV | San Diego County | |
| 83 | Imperial Valley Solar Co. I | Imperial | Imperial Valley Solar Co. | | 23 | Solar PV | Imperial County | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 84 | Smyrna Solar | Kern | EnXco | CUP 5, Map 7 | 20 | Solar PV | Kern County | |
| 85 | Mojave Solar 1 | Kern | Fotowatio Renewable Ventures | | 20 | Solar PV | Kern County | |
| 86 | Mojave Solar 4 | Los Angeles | Fotowatio Renewable Ventures | | 20 | Solar PV | Los Angeles County | |
| 87 | Rosamond I | Kern | Recurrent Energy | | 20 | Solar PV | Kern County | |
| 88 | Rosamond II | Kern | Recurrent Energy | | 20 | Solar PV | Kern County | |
| 89 | Porter and Associates | Kern | Porter and Associates | | 20 | Solar PV | Kern County | |
| 90 | Tehachapi | Kern | Recurrent Energy | | 20 | Solar PV | Kern County | |
| 91 | Columbia II | Kern | Recurrent Energy | | 20 | Solar PV | San Bernardino County | |
| 92 | DTE Energy I | Tulare | DTE Energy | PSP 09-077 | 20 | Solar PV | Tulare County | No |
| 93 | DTE Energy II | Tulare | DTE Energy | PSP 09-078 | 20 | Solar PV | Tulare County | No |
| 94 | Element Power I | Tulare | Element Power | PPA 10-002 | 20 | Solar PV | Tulare County | |
| 95 | SR Solis Terra Bella | Tulare | SolarGen USA, LLC | PSP 10-016 | 20 | Solar PV | Tulare County | TBD |
| 96 | SR Solis Mouren 3 | Fresno | SolarGen USA, LLC | | 20 | Solar PV | Fresno County | TBD |
| 97 | SR Solis City of Gustine | Merced | SolarGen USA, LLC | | 20 | Solar PV | Merced County | TBD |
| 98 | SR Solis City of McFarland | Kern | SolarGen USA, LLC | | 20 | Solar PV | Kern County | TBD |
| 99 | Cal S.P. IV, LLC | Tulare | Cal S.P. IV, LLC | PSP 10-039 | 20 | Solar PV | Tulare County | No |
| 100 | White River | Tulare | Solar Project Solutions (SPS) | | 20 | Solar PV | Tulare County | |
| 101 | Corcoran | Tulare | Solar Project Solutions (SPS) | | 20 | Solar PV | Kings County | |
| 102 | Alpaugh North | Tulare | Solar Project Solution | PSP 10-029 | 20 | Solar PV | Tulare | |
| 103 | Victor Phelan Solar One | San Bernardino | Recurrent Energy | | 20 | Solar PV | San Bernardino County | |
| 104 | LSR Kramer South | San Bernardino | LSR Kramer South | | 20 | Solar PV | San Bernardino County | |
| 105 | North Edwards Solar | San Bernardino | North Edwards Solar | | 20 | Solar PV | San Bernardino County | |
| 106 | Old River I | Kern | Recurrent Energy | | 20 | Solar PV | Kern County | |
| 107 | SR Solis Oro Loma | Fresno | SolarGen USA, LLC | | 19 | Solar PV | Fresno County | TBD |
| 108 | SR Solis Oro Loma Teresina | Fresno | SolarGen USA, LLC | | 19 | Solar PV | Fresno County | TBD |
| 109 | SR Solis Vestal Fireman | Tulare | SolarGen USA, LLC | PSP 10-054 | 19 | Solar PV | Tulare County | TBD |
| 110 | SR Solis Vestal Almond | Tulare | SolarGen USA, LLC | PSP 10-015 | 18 | Solar PV | Tulare County | TBD |
| 111 | SR Solis Lucas | Tulare | SolarGen USA, LLC | | 18 | Solar PV | Tulare County | TBD |
| 112 | SR Solis Mouren 2 | Fresno | SolarGen USA, LLC | | 18 | Solar PV | Fresno County | TBD |
| 113 | SR Solis Avenal | Kings | SolarGen USA, LLC | | 18 | Solar PV | Kings County | TBD |
| 114 | Goose Lake Solar | Kern | EnXco | CUP7 Map 53 | 15 | Solar PV | Kern County | |
| 115 | Newberry Springs, Lucerne V | San Bernardino | First Solar | | 15 | Solar PV | San Bernardino County | |
| 116 | SR Solis Crown | Tulare | SolarGen USA, LLC | PSP 10-058 | 15 | Solar PV | Tulare County | TBD |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 117 | SR Solis Borden | Tulare | SolarGen USA, LLC | | 15 | Solar PV | Tulare County | TBD |
| 118 | SR Solis Yancey Farms | Merced | SolarGen USA, LLC | | 15 | Solar PV | Merced County | TBD |
| 119 | Southwestern Solar Power II | Riverside | Southwestern Solar | PP24680 | 13 | Solar PV | Riverside County | |
| 120 | SR Solis Rector | Tulare | SolarGen USA, LLC | PSP 10-059 | 10 | Solar PV | Tulare County | TBD |
| 121 | Columbia III | Kern | Recurrent Energy | | 10 | Solar PV | Kern County | |
| 122 | TA-High Desert | Los Angeles | TA-High Desert | | 10 | Solar PV | Los Angeles County | |
| 123 | Elk Hills Solar | Kern | EnXco | CUP16, Map 1 | 7 | Solar PV | Kern County | |
| 124 | SR Solis Firebaugh | Fresno | SolarGen USA, LLC | | 7 | Solar PV | City of Firebaugh | TBD |
| 125 | SR Solis East Reedley | Fresno | SolarGen USA, LLC | | 7 | Solar PV | Fresno County | TBD |
| 126 | San Bernard Solar | Kern | EnXco | CUP 5, Map 1( | 6 | Solar PV | Kern County | |
| 127 | Great Lakes | Kern | Recurrent Energy | | 6 | Solar PV | Kern county | |
| 128 | SR Solis City of Huron | Fresno | SolarGen USA, LLC | | 5 | Solar PV | Fresno County | TBD |
| 129 | SR Solis Mouren 1 | Fresno | SolarGen USA, LLC | | 5 | Solar PV | Fresno County | TBD |
| 130 | SR Solis Gonzalez | Kern | SolarGen USA, LLC | | 5 | Solar PV | Kern County | TBD |
| 131 | Rio Grande | Kern | Recurrent Energy | | 5 | Solar PV | Kern County | |
| 132 | Southwestern Solar Power I | Riverside | Southwestern Solar | PP24682 | 5 | Solar PV | Riverside County | |
| 133 | Avenida Del Sol Solar Project | Kern | Avenida del Sol Solar | | 5 | Solar PV | Kern County | |
| 134 | Old River II | Kern | Recurrent Energy | | 5 | Solar PV | Kern County | |
| 135 | Amonix Borrego Solar | San Diego | Avalon Solar, LLC | | 2 | Solar PV | San Diego County | |
| 136 | Avalon Riverside | Riverside | Avalon Solar, LLC | PP24670 | 2 | Solar PV | Riverside County | |
| 137 | Temescal Canyon RV, LLC | Riverside | Temescal Canyon RV, | PP24075R1 | 2 | Solar PV | Riverside County | |
| 138 | Ormat Solar PV I | Imperial | Ormat | | Unk | Solar PV | Imperial County | No. |
| 139 | Ormat Solar PV II | Imperial | Ormat | | Unk | Solar PV | Imperial County | No. |
| 140 | Ormat Solar PV III | Imperial | Ormat | | Unk | Solar PV | Imperial County | No. |
| 141 | Ormat Solar PV IV | Imperial | Ormat | | Unk | Solar PV | Imperial County | No. |
| | | | | | **10,365** | | | |
| | **Wind** | | | | | | | |
| 142 | Avalon I | Kern | EnXco | | 610 | Wind | Kern County | |
| 143 | North Sky River Energy, LLC ( | Kern | NextEra | CACA 52348 | 300 | Wind | Kern County/BLM | |
| 144 | Oak Creek Sun Creek | Kern | TerraGen | CACA 44611 | 300 | Wind | BLM | |
| 145 | Manzana Wind Project | Kern | PG&E | CPCN A.09-12-( | 246 | Wind | Kern County/CPUC | |
| 146 | Shiloh III | Solano | EnXco | | 200 | Wind | Solano County | |
| 147 | Camp Rock | Kern | Horizon Wind | CACA 51605 | 150 | Wind | Kern County/BLM | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 148 | Whitewater Hill | Riverside | Shell Cabazon | | 105 | Wind | Riverside County | |
| 149 | Windswept | Kern | Western Wind Energy Corp. | | 72 | Wind | Kern County | |
| 150 | Tylerhorse Wind | Riverside | Power Partners South | CACA 51561 | 60 | Wind | BLM | |
| 151 | Sand Canyon of Tehachapi | Kern | Sand Canyon of Tehachapi | | 40 | Wind | Kern County | |
| 152 | Clear Vista Ranch Wind | Kern | Clear Vista Ranch | | 20 | Wind | Kern County | |
| 153 | Avalon/Catalina | Riverside | Power Partners South | CACA 52309 | 15 | Wind | BLM | |
| 154 | Lower West Wind Energy Pro | Kern | AERO Energy LLC | | 14 | Wind | Kern County | |
| 155 | Coram ZC 60 | Kern | Coram Development | | 6 | Wind | Kern County | |
| 156 | Shiloh IV | Solano | EnXco | | Unk | Wind | Solano County | |
| 157 | Sand Ridge | San Bernardino | AES Wind Generation | CACA 50612 | Unk | Wind | BLM | |
| 158 | Black Mountain | Imperial | Imperial Wind RES | CACA 48272 | Unk | Wind | BLM | |
| 159 | Soledad Mountain Wind | Kern | Oak Creek Energy | CACA 48536 | Unk | Wind | BLM | |
| 160 | Pattern Energy Wind | Imperial | Pattern Energy | | Unk | Wind | Imperial County | |
| 161 | Invenergy, LLC | Modoc | Invenergy, LLC | CACA 48110 | Unk | Wind | BLM | |
| | | | | | **2,138** | | | |
| | **Geothermal** | | | | | | | |
| 162 | Black Rock 4, 5, 6 | Imperial | CalEnergy Obsidian Energy, LLC | | 159 | Geothermal | CEC | No. |
| 163 | Black Rock 7, 8, 9 | Imperial | CalEnergy Obsidian Energy, LLC | | 159 | Geothermal | CEC | No. |
| 164 | West Chocolate Geothermal | Imperial | Ormat | CACA 43965 | 50 | Geothermal | CEC/BLM | |
| 165 | Hudson Ranch II | Imperial | Hudson Ranch | | 49 | Geothermal | Imperial County | |
| 166 | East Brawley Iceland America | Imperial | Iceland America, LLC | | 49 | Geothermal | Imperial County | |
| 167 | South Brawley | Imperial | Iceland America, LLC | | 49 | Geothermal | Imperial County | |
| 168 | IAE Truckhaven I | Imperial | Iceland America, LLC | | 49 | Geothermal | Imperial County | |
| | | | | | **564** | | | |
| | **Other Technologies** | | | | | | | |
| 169 | Eagle Mountain Pumped Stor | Riverside | Eagle Crest | | 1,300 | Pumped Stora | FERC/BLM | |
| 170 | El Dorado Irrigation District | El Dorado | El Dorado Irrigation District | | 21 | Small hydro | FERC | |
| 171 | Sunshine Landfill | Los Angeles | DTE | | 20 | Landfill Gas | Los Angeles County | |
| 172 | Portrero Hills Landfill | Solano | DTE | | 8 | Landfill Gas | Solano County | |
| | | | | | **1,349** | | | |
| | | | | | **14,416** | | | |
| | | | | | **22,571** | | | |
| | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Transmission Lines** | | | | | | | |
| 1 | Rice Solar Transmission Line | San Bernardino | Solar Reserve, LLC | CACA 51022 | 161 kV | Gen-tie from Sc | BLM | Yes ROD 6/2011 |
| 2 | Centinela Solar | Imperial | Lightsource Renewables | CACA 52092 | 230 kV | Gen-tie from Sc | BLM | |
| 3 | C Solar South | Imperial | LIghtsource Renewables | CACA 51645 | 230 kV | Gen-tie from Sc | BLM | |
| 4 | C Solar West | Imperial | Lightsource Renewables | CACA 51644 | 230 kV | Gen-tie from Sc | BLM | |
| 5 | Abengoa telecommunications | San Bernardino | SCE | | fiber opt | Abengoa | BLM | |
| 6 | Colorado River Substation and l | Riverside | SCE | CACA 48771 | 500 kV | Transmission Li | BLM/CPUC | |
| 7 | Barren Ridge Transmission Line | Kern & Los Angeles | LADWP | CACA 48871 | 230 kV | Transmission Li | BLM/LADWP | |
| 8 | Ivanpah to El Dorado Transmiss | San Bernardino | SCE | CACA 49834 | 230 kV | Transmission Li | BLM/CPUC | |
| 9 | Red Bluff Loop in DPV2 | Riverside | SCE | | 500/230 | Needed for Pal | CPUC | |
| 10 | Red Bluff Substation and Loop i | Riverside | SCE | | 500/230 | Needed for Des | CPUC | |
| 11 | West of Devers Upgrades | Riverside | SCE | | 500 kV | Needed for Ge | BLM/CPUC | |
| 12 | Pisgah Substation | San Bernardino | SCE | | 500/230 | Calico | BLM/CPUC | |
| 13 | Pisgah to Lugo rebuild | San Bernardino | SCE | | 500 kV | Calico | BLM/CPUC | |
| 14 | Calico telecommunications | San Bernardino | SCE | | fiber opt | Calico | CPUC | |
| 15 | Coolwater to Lugo rebuild | San Bernardino | SCE | | 230 kV | Abengoa | BLM/CPUC | |
| 16 | Lockhart Substation and loop in | San Bernardino | SCE | | 230 kV | Abengoa | CPUC | |
| 17 | ECO substation | Imperial | SDG&E | | 500/230 | Tule Wind and | CPUC | |
| 18 | Morro Bay to Gates reconducto | San Luis Obispo | PG&E | | 115 kV | Carizzo Plain pr | CPUC | |
| 19 | Walker Ridge | Lake and Colusa | PG&E | | | | | |
| 20 | Path 42 | Unk | SCE/IID | | | | | |
| 21 | Borden to Gregg | Unk | PG&E | | | | | |

**Attachment 2 to Appendix 1: Renewable Portfolio Standards Data (for analysis of Solar Energy Development PEIS)**

| | | | | | | |
|---|---|---|---|---|---|---|
| RPS satisfied for compliance year 2009? | Yes | No | Yes | Yes | Yes | N/A |
| How is RPS satisfied? | • Met 2009 compliance year target<br>• On target to meet 2010 compliance year target | • Slightly under 50% of RPS goal.<br>• IOUs have more renewable electricity under contract than needed to achieve 33% RPS target but anticipate that not all this energy will come on line | • PSC expects to meet or exceed RPS requirements by 2020. | • Slightly under 50% of RPS goal.<br>• Likely to achieve RPS assuming sufficient transmission between north of the state (geothermal) and south of the state (biggest load centers) | • Approximately 25% of RPS goal achieved | • Approximately 5% of goal achieved but RPS is voluntary |
| RPS Satisfied by currently proposed projects? | • More than satisfied | • More than satisfied | • No (but minimal information is available regarding proposed projects) | • More than satisfied | • More than satisfied | • No |
| Renewable Energy capacity online<br>(data from State PUC or individual provider information) | • Total: 20 MW (but does not include APS)<br>• SSVEC: 3.1MW<br>• Tucson Electric Power: 9.9 MW (utility scale) and 3.1 MW DG<br>• UniSource Energy Services: 2.2 MW<br>• AZ Electric Power Cooperative: 1.6 MW solar, .1 MW wind, 49 solar water heaters w/ 140 kW energy savings | • Total: 1,702 MW | • Total: 1224.5 MW<br>• Wind: 1200 MW<br>• Solar: 24.5 MW | • Total: 418.2 MW<br>• Geothermal: 315<br>• Solar: 79.3<br>• Biomass/Methane: 12.4<br>• Hydro: 11.5 | | • Total: 570.7 MW<br>• Biomass: 7.8 MW<br>• Geothermal: 50.1 MW<br>• Solar: 1.5 MW<br>• Wind 224.8 MW<br>• Hydro: 286.5 MW |
| Renewable Energy online (data from State PUC or individual provider information) MWh | APS: 653,800 MWh | | | | PNM: 525,000 MWh (wind) | 1,069,876 MWh (primarily hydro) |

**Attachment 3 to Appendix 1: Renewable Portfolio Standards Data (for analysis of Solar Energy Development PEIS)**

| | | | | | | |
|---|---|---|---|---|---|---|
| Renewable Energy Net Generation by State by source (MWh)[7]<br>n/d = No data reported | Total: 182,960 MWh<br>• Biomass: 159,645 MWh<br>• Geothermal: -<br>• Solar Thermal/PV: 13,759 MWh<br>• Wind: 9,555 MWh | Total: 25,461,867MWh<br>• Biomass: 6,062,631 MWh<br>• Geothermal: 13,022,836 MWh<br>• Solar Thermal/PV: 611,763 MWh<br>• Wind: 5,764,637 MWh | Total: 3,009,191 MWh<br>• Biomass: 50,528 MWh<br>• Geothermal: -<br>• Solar Thermal/PV: 16,530 MWh<br>• Wind: 2,942,133 MWh | Total: 1,768,426 MWh<br>• Biomass: 890 MWh<br>• Geothermal: 1,616,677 MWh<br>• Solar Thermal/PV: 150,858 MWh<br>• Wind: n/d | Total: 1,561,148 MWh<br>• Biomass: 17,433 MWh<br>• Geothermal: -<br>• Solar Thermal/PV: -<br>• Wind: 1,543,715 MWh | Total: 372,884 MWh<br>• Biomass: 696,991 MWh<br>• Geothermal: 279,121 MWh<br>• Solar Thermal/PV: -<br>• Wind: 64,497 MWh |

## APPENDIX II. ANALYSIS OF PREFERABLE LEGAL INSTRUMENT FOR ADMINISTERING SOLAR ENERGY PROGRAM

In Appendix A of the Draft Solar Programmatic Environmental Impact Statement (DPEIS), the Bureau of Land Management (BLM) details current and proposed solar energy development policies and design features. In part A.2.1.2 of Appendix A, Proposed Authorizations Policies to be applicable to all future and existing solar energy applications as part of the "Proposed Solar Energy Program" are listed, with part A.2.1.2.4 specifically concerning "ROW Authorization." However, a critical element is not addressed in this section of the DPEIS, that of the appropriateness of using BLM's current right-of-way (ROW) system for permitting solar projects rather than a lease. If BLM proposes to continue operating under its current leasing framework in the Proposed Solar Energy Program, it must demonstrate how a ROW grant is legally and programmatically preferable to a lease.

BLM currently offers solar energy project permits with a ROW grant, as authorized under Title V of the Federal Land Policy and Management Act (FLPMA) and in accordance with Title 43, Part 2800 of the Code of Federal Regulations (CFR). Instruction Memoranda 2007-097, 2010-141, and 2011-003 specify further guidance for permitting, assessing rental fees, terms of the authorization, and other features of ROW applications. BLM recommends in the PEIS that utility-scale solar energy projects on public lands continue under the current model: authorizing ROW permits for terms not to exceed 30 years.

### Sufficiency in question of ROW grants in place of leases for solar energy projects

BLM must use the Final PEIS to demonstrate that ROW grants are the most legally-adequate and fiscally-sound documents for permitting solar energy projects on public lands. Current statutes, guidance, and case law seem to suggest otherwise, that leases not only have more precedent for permitting energy projects, but are more appropriate for legal and fiscal reasons.

Because legislation has not been enacted to establish a formal solar energy program at BLM, the agency has relied on permitting projects with ROW grants under its FLPMA multiple use authority, even though FLPMA and additional regulations do not specifically speak to solar projects. For this reason, BLM has promulgated a series of Instruction Memoranda to clarify the use of FLMPA for processing ROW permits for solar projects.

The more traditional legal document for permitting energy projects on public lands, and used for all forms of energy development besides hydropower and wind, is a lease. Leasing is also the traditional legal instrument for conveying commercial energy development rights on private lands.

Pursuant to Title 43, Part 2920 of the CFR, a lease is defined as an "authorization to possess and use public lands for a fixed period of time."[55] Alternatively, leases "shall be used to authorize uses of public lands involving substantial construction, development, or land improvement and the investment of large amounts of capital which are to be amortized over time."[56]

[55] http://edocket.access.gpo.gov/cfr_2003/octqtr/pdf/43cfr2920.0-1.pdf
[56] http://edocket.access.gpo.gov/cfr_2003/octqtr/pdf/43cfr2920.1-1.pdf

The first issue with using ROW authorizations over leases is their appropriateness for long-term renewable energy projects. ROW grants have traditionally been utilized for permitting a *use* of the lands, rather than the commercial *development of a resource* emanating from those lands. Commercial development of energy and other natural resources have historically been managed with leases that include specific terms and conditions to govern that development. As noted by a former career attorney with the Congressional Research Service (CRS), this distinction makes the ROW legal instrument "a bad fit" for solar energy projects.[57]

It is important to note that ROW grants are legally-effective decisions that are effective during any appeals, but that significant inadequacies remain. Because ROW grants were not intended to permit long-term, large-scale solar energy projects, or any energy project for that matter, their legal adequacy is called in to question. And, the fact that BLM is forced to rely on FLPMA ROW regulations plus a set of clarifying Instruction Memoranda further proves the insufficiency of this instrument for commercial energy purposes.

Secondly, as described in a recent report by the CRS, "the most significant difference between leases and rights-of-way are the substantial rights to use of the land in question retained by the lessor, the United States."[58] This is because, according to Title 43, Part 2920 of the CFR, "A lease conveys a possessory interest and is revocable only in accordance with its terms and the provisions of…this title." On the other hand, BLM retains many rights under a ROW authorization, including access to lands and facilities, requiring common use of the land, ability to deny renewal of the grant, authority to change the terms and conditions of the grant "as a result of changes in legislation or regulation or as otherwise necessary to protect public health or safety or the environment."[59] Companies have fewer legal rights under a ROW permit than they would with a lease, as leases are more flexible, established, and allow for significant input from developers.

Also problematic is the fact that FLPMA ROW regulations and the clarifying solar energy Instruction Memoranda fall short of laying out clear requirements and standards for projects, which "may result in significant variation in individual wind and solar project authorizations and call into question the reviewability of those authorizations."[60] ROW permits do not provide the certainty needed to solar energy developers.

Additionally, the Proposed Solar Energy Program's reliance on ROWs, Instruction Memoranda, and project-by-project National Environmental Policy Act analyses avoids critical and legally-mandated public participation in the development of solar energy programs and projects. The development and promulgation of a legal framework for a solar energy program at BLM (of which an analysis of ROWs and leases would be a part) would provide significant opportunity

[57] Baldwin, Pamela. "Fair Market Value for Wind and Solar Development on Public Land." November 1, 2010. [57] http://wilderness.org/files/Fair-Market-Value-Whitepaper.pdf
[58] Vann, Adam. "Energy Projects on Federal Lands: Leasing and Authorization." Congressional Research Service. September 8, 2009. http://assets.opencrs.com/rpts/R40806_20090908.pdf
[59] Vann, Adam. "Energy Projects on Federal Lands: Leasing and Authorization." Congressional Research Service. September 8, 2009. http://assets.opencrs.com/rpts/R40806_20090908.pdf
[60] Baldwin, Pamela. "Fair Market Value for Wind and Solar Development on Public Land." November 1, 2010. http://wilderness.org/files/Fair-Market-Value-Whitepaper.pdf

for public comment. At this point, decisions about the solar energy program at BLM are undertaken unilaterally by the agency via Instruction Memoranda, and no other federal agencies, public groups, or other stakeholders are able to take part in the decision-making . As one author noted, "This closing out of the public is a departure from the usual federal land management approach and will curtail useful input and concerns."[61]

[61] Baldwin, Pamela. "Fair Market Value for Wind and Solar Development on Public Land." November 1, 2010. http://wilderness.org/files/Fair-Market-Value-Whitepaper.pdf

## APPENDIX III. ANALYSIS OF PROPOSED POLICY ELEMENTS IN APPENDIX 2

| Location in PEIS | Details | In existing guidance? | If so, which? | Critique |
|---|---|---|---|---|
| A.2.1.2.1.1 | The BLM authorized officer will schedule a pre-application meeting with developers to explain BLM's Solar Energy Program and to identify potential issues and land use conflicts (43 CFR 2804.10). | Yes | IM 2011-061 | |
| A.2.1.2.2.1 | The BLM will review applications for land use plan conformance (43 CFR 1610.5-3). | Yes | Required by regulation, reaffirmed and strengthened in IM 2011-061 | This should be existing policy as it is required by regulation. What is sorely lacking is predictability in terms of a time frame for when this test gets applied; Land use plan conformance should be evaluated during pre-application meetings and project proponents should be clearly informed in those discussions that<br>• applications that are not consistent with underlying land use plans will not be accepted OR<br>• applications that are not consistent with underlying land use plans will be rejected upon receipt as inconsistent with agency regulation |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.2.2 | Entities seeking to develop a solar energy project on BLM-administered lands shall coordinate with potentially affected/appropriate federal agencies (e.g., USFWS, NPS), in conjunction with BLM staff, regarding specific projects as early in the project development process as appropriate to ensure that all issues and concerns (e.g., Migratory Bird Treaty Act [MBTA], Bald and Golden Eagle Protection Act [BGEPA], potential impacts on National Park resources) are identified and to ensure that there is potential for those issues to be adequately addressed. | Yes | Recommended, not required, in IM 2011-003 | §This is a principle not a policy statement that is not already in prevailing ROW policies (eg, Manual); Language is appealing but would accomplish little without greater specificity to guide field staff implementing these provisions• 'early in the project development process as appropriate' does little to provide developers predictability required for rational development• Provisions do not clearly link to the specific prevailing statute, regulation, regulation, policy, or guidelines that would apply, offering little new information to parties including field staff§ Presumption here is that all applications are worthy of review, which should not be the case |
| A.2.1.2.2.3 | Entities seeking to develop a solar energy project on BLM-administered lands shall also coordinate with the U.S. Department of Defense (DoD), in conjunction with BLM staff, regarding the location of solar power tower projects early in the application process…An interagency protocol will be developed to establish a coordination process and the scope of issues to be addressed by such coordination. | Yes | Recommended, not required, in IM 2011-003. Interagency protocol not addressed. | Coordination with DOD is to be lauded but need clear timeframes for when DOD coordination is to occur and tie to progression through NEPA review |
| A.2.1.2.2.4 | Entities seeking to develop a solar energy project on BLM-administered lands shall coordinate with appropriate state agencies and local land managers, in conjunction with BLM staff, regarding specific projects as early in the project development process as appropriate to ensure that all issues and concerns are identified and that there is potential for those issues to be adequately addressed. | Yes | Recommended, not required, in IM 2011-003 | Establish timeframes for engagement and tie to progression through NEPA review; RECOMMEND establishing a single point of contact for each zone to facilitate this engagement pre-application |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.2.5 | Entities seeking to develop a solar energy project on BLM-administered lands shall contact the owner of any federal mining claim located with the boundaries of the proposed solar energy project, in conjunction with BLM staff, to ensure that there is a potential for resolving any conflicts with federal mining claims. | Yes/No | IM 2011-061 requires pre-application meetings to Identify other existing authorized uses, but mining not specifically mentioned. | Zone-based development would not require this additional step, saving time and scarce resources; As long as the BLM does not have a time-bounded process, segregation of lands for this purpose could be an indefinite withdrawal only feeding the speculative behavior the agency and most developers have said it wants to dampen |
| A.2.1.2.2.6 | The BLM will determine whether the lands included in the proposed solar energy project should be segregated from appropriation under the public land laws, including the mining laws, while the solar energy application is being considered by the BLM for authorization. | Yes/No | In existing code 43 USC Sec. 1714 ??? Not found in existing IMs. | |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.2.7 | On the basis of the analysis of the application and the necessary coordination described above, the BLM can exercise its discretion to deny an application that it finds to be inappropriate for solar ROW uses (43 CFR 2802.10(3)) or to be insufficient under any section of the ROW regulations . Projects that will cause unacceptable impacts to important resources and values will be denied. The denial of an application is an appealable decision. Offices must develop a rationale and record to support their decision to deny an application. Although they do not form a comprehensive list of items for consideration , the following items must be considered in the analysis of applications. | Yes | IM 2011-060 reaffirms BLM authority to reject appplications that cannont demonstate technical or financial feasibility. IM 2011-061 clarifies authority to reject appplication if the proposal does not avoid conflict with sensitive resources and values, and authority to screen applications for "potential for conflict" and prioritize processing based on those issues. | This restatement of the authority to reject is a helpful step forward by creating a third decision point (other than the terminal decision point under NEPA and, for some state offices, the POD evaluation required under FLPMA) for managing applications. However, fact that tied back to regulations NOT designed for this type of development is troublesome and is not responsive to the concerns raised by developers and conservationists to date |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.2.7.1 | At the time a ROW application is submitted, the BLM will review the best available landscape-scale information (including information developed through complete or ongoing landscape conservation cooperatives [LCCs], partnerships, and rapid ecological assessments [REAs]) and will determine whether areas proposed for solar ROW uses and/or associated transmission facilities are inconsistent with other high-priority conservation, restoration, and/or adaptation objectives. | No | | • Spirit here is sound and should be applauded<br>• There is no description of where in process this analysis would be undertaken |
| A.2.1.2.2.7.2 | The extent to which the proposal will result in impacts to open space, particularly large and/or regionally important, undisturbed tracts. In general, proposals that utilize previously disturbed areas or areas that otherwise lack important open-space values will be given strong consideration | No | | "Strong consideration" is not meaningful or proscriptive - should be favored with description of how or in what process. |
| A.2.1.2.2.7.3 | The extent to which the proposal will result in impacts on areas of critical environmental concern (ACECs) and other special areas or sensitive cultural, recreational, wildlife, or visual resources, including special areas and resources administered by other agencies or organizations. In general, proposals that avoid impacts on resources that are the basis for special designations (e.g., National Parks and Monuments) will be given strong consideration. | No | Although ACECs are "medium potential for conflict" in IM 2011-061. | |
| A.2.1.2.2.7.4 | The extent to which the proposal will result in impacts to high priority landscape features or focal areas important for conservation, restoration, and/or adaptation to climate change, including core areas, corridors, and buffers for vulnerable species. | No | | Assume mean "adverse impact." |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.2.7.5 | The extent to which the proposal will result in impacts on mitigation lands identified in previously approved projects, including those lands onto which plants or wildlife are translocated and any lands that are restored or managed more intensively to mitigate project impacts. | No | Although IM 2011-61 requires pre-application discussions, one of the purposes of which is to identify other existing authorized uses near the project area. Are mitigation lands considered authorized uses? | |
| A.2.1.2.2.7.6 | The extent to which the proposal will result in impacts to lands donated or acquired for conservation purposes. Applicants will be advised to avoid these lands or provide details on how they would plan to operate or mitigate their project in a manner consistent with the values of the lands donated or acquired for conservation purposes. | No | | Needs to be linked to terms of the donation. |
| A.2.1.2.2.8 | The BLM may consider proposed solar energy projects in areas with potential wilderness characteristics or in areas of citizen-proposed wilderness. Where these lands have not previously been inventoried, or where the BLM determines that the inventory should be updated, then, as part of the environmental review for proposed solar energy projects, these lands will be inventoried for wilderness characteristics. If an inventory determines that the lands have wilderness characteristics, then, consistent with applicable policy, the BLM shall consider whether to initiate a land use plan amendment process to determine how these lands should be managed. After completing the inventory process, if the BLM determines that wilderness characteristics are not present, it may proceed to process the proposed solar energy project consistent with applicable policy. | No | Although IM 2011-061 lists "lands with Wilderness characteristics outside Wilderness and Wilderness Study Areas that have been identified in an updated inventory" as "medium potential for conflict." | Revised policy approach sense – why not also do for habitat? If lands are found to be of wilderness quality pursuant to prevailing SO, the lands should be immediately segregated from consideration for further development pending Congressional action |

| | | | |
|---|---|---|---|
| A.2.1.2.2.9 | The BLM will review the lands for sensitive resources and resource uses (e.g., paleontological, Endangered Species Act [ESA] listed, and BLM sensitive status species) and for potentially affected resources and values under the administration of other agencies (NPS, etc.). Assessment of the resources will include coordinating with appropriate federal, state, and local agencies that have regulatory authority for such resources. Coordination with the NPS may include a determination by the NPS as to whether a proposed project has the potential to cause unacceptable impacts to the resources and values of NPS-administered areas. (See recommendation to establish a local coordination protocol in Administration Policies above.) | No | Coordination with agencies recommended, not required, in IM 2011-003. |
| A.2.1.2.2.10 | The BLM will consider the visual resource values of the public lands that could be affected by proposed solar energy development projects, consistent with BLM visual resource management (VRM) policies and guidance. The BLM will also coordinate with other potentially affected land managing agencies (including the NPS) regarding potential impacts to visual resources within shared viewsheds. | Yes, to some extent | IM 2011-061 places Visual Resource Management classes in different levels of "potential conflict." |
| A.2.1.2.2.11 | To enhance the consideration and protection of the resources and values associated with shared landscapes (including nearby county, state, Tribal, or other federal agency lands, such as NPS lands), the BLM will coordinate and/or consult, as appropriate, with stakeholders who may be adversely affected by the BLM's decision to issue a ROW authorization for a solar energy development project. Potentially affected federal and state land managers will be provided the opportunity to participate in pre-application meetings with prospective project applicants (see Pre-application Meeting section above). | Yes | IM 2011-059, and IM 2011-061 requires pre-application meetings. |
| A.2.1.2.2.12 | The BLM will review applications to determine if the applicant can demonstrate adequate financial and technical capability to construct, operate, and maintain the solar energy facilities. | Yes | Preceded by IM 2011-003 as modified by IM 2011-060. |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.2.13 | The BLM will review applications to determine completeness. If necessary, the applicant will provide, in a timely manner, additional information requested by the BLM to process an application. | Yes | Due diligence requirements in IM 2011-060. | |
| A.2.1.2.2.14 | Applicants will be required to submit an initial processing fee deposit and enter into a formal cost recovery agreement with the BLM for each solar energy ROW application filed. The applicant will provide, in a timely manner, the required processing fees. | Yes | Processing fees in 43 CFR 2804.14. Cost recovery requirements in IM 2007-097 and IM 2011-061. | Strongly agree but significant additional information is needed to ascertain whether materially different from a general restatement of existing direction. RECOMMENDATIONS:<br>• Increase amount to $75,000 to dampen speculation, non-refundable<br>• Charge holding fee<br>• Offer different cost recovery options outside of zones? |
| A.2.1.2.3.1 | Applicants for solar energy development on BLM-administered lands shall develop a BLM-approved plan of development (POD) that incorporates the required programmatic design features and SEZ-specific design features established in the BLM's Solar Energy Program and, as appropriate, the requirements of other existing and relevant BLM mitigation guidance, approved land use plans, and current policies. The POD must address all components of a solar energy generation facility, including the installation and maintenance of solar collectors, water for steam generation and cooling purposes, oil or gas used by backup generators, thermal or electrical storage, turbines or engines, access roads, and electrical inverters and transmission facilities. | No | IM 2011-060 states that PODs must have enough basic information to begin environmental review but does not go into detail on these further components. | |
| A.2.1.2.3.2 | Management goals and objectives for special status species (such as the sage grouse and desert tortoise) that the BLM has identified in land use plans or goals and objectives substantiated by best available information or science shall be incorporated into the POD for proposed solar energy projects. | No | BLM special status species policy is in BLM Manual 6840, but no requirements to include in POD ??? | |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.3.3 | Individual projects will incorporate adaptive management strategies to ensure that potential adverse impacts of solar energy development are avoided, minimized, or mitigated to acceptable levels. Operators will be required to develop monitoring programs in coordination with the BLM, to establish metrics against which monitoring observations can be measured, to identify additional potential mitigation measures, and to establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures and project-specific stipulations. | No | | BLM should develop standard monitoring protocols for biomes and require their use. Should be funded by surcharge on all pending and new applications |
| A.2.1.2.3.4 | The BLM must complete an environmental review of solar energy ROW applications in accordance with NEPA prior to issuing a ROW authorization. The coordination and considerations discussed above will also be an integral part of the necessary NEPA analysis. The level of environmental analysis to be required under NEPA will be determined at the field office level on an individual project basis . To the extent that land use plans and/or this PEIS anticipate issues and concerns associated with individual projects, including potential cumulative impacts, the BLM will tier from land use plans and/or the PEIS analysis, thereby limiting the required scope and effort of additional project-specific NEPA analysis. For projects that are proposed in SEZs, only limited additional NEPA analysis may be necessary because of the depth of the analysis contained in the PEIS. Potentially affected federal, state, local, and Tribal land managers and government agencies should be invited to participate as cooperating agencies in BLM's site-specific NEPA processes for solar ROW applications. | No | NEPA for solar clarified in IM 2011-059, but not with regard to zones. | |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.3.5 | The BLM will conduct project-specific public involvement prior to issuing a ROW authorization for solar energy development to ensure that all concerns and issues are identified and adequately addressed. Public involvement may occur as part of the NEPA process or separately, depending on the type of NEPA analysis undertaken. Opportunities for public involvement include, but are not limited to, scoping, public meetings, and public review and comment on completed NEPA documentation. | Yes | NEPA for solar clarified in IM 2011-059. | |
| A.2.1.2.3.6 | The BLM will initiate government-to-government consultation with Indian Tribal governments whose interests might be directly and substantially affected by activities on BLM-administered lands and as required under Section 106 of the National Historic Preservation Act of 1966 (NHPA) as early in the project development process as appropriate to ensure that construction, operation, and decommissioning issues and concerns are identified and adequately addressed. | Yes/No | In statute. ??? Tribes may be included in pre-application discussions in IM 2011-061, but not required. | |
| A.2.1.2.3.7 | The BLM will consult with the appropriate State Historic Preservation Officer(s) (SHPOs) and the Advisory Council of Historic Preservation, as required by Section 106 of NHPA | Yes | In statute. | |
| A.2.1.2.3.8 | When lands are identified for project mitigation, the BLM will consider amending the applicable land use plan to identify those lands as ROW exclusion areas. Examples of project mitigation lands may include, but are not limited to, lands onto which plants or wildlife are translocated and any lands that are restored or managed more intensively to mitigate project impacts | No | | Should amend, not "consider amending" |
| A.2.1.2.3.9 | The BLM will determine if the proposed action may affect any listed or proposed threatened or endangered species or critical habitat. If so, the authorized officer would comply with Section 7 of the ESA | Yes | In statute. | |
| A.2.1.2.3.10 | On the basis of the required NEPA analysis and public process, the BLM may decide to deny an application for a solar ROW authorization. | Yes | This authority is reaffirmed in IM 2011-060 and IM 2011-061. | |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.4.1 | Utility-scale solar energy projects will be authorized as ROW authorizations under Title V of the Federal Land Policy and Management Act and 43 CFR Part 2800. | Yes | Reaffirmed many times, most recently in IM 2011-061. | ROW are a poor fit as a legal instrument - should lease. At a minimum, create a new right-of-way grant application form for solar (different from SF299) or create a supplement to the SF299 specific to solar energy |
| A.2.1.2.4.2 | The BLM will issue all solar energy ROW authorizations for a term not to exceed 30 years; shorter terms may be justified in some cases. Each solar energy ROW authorization will contain a specific provision allowing for renewal, consistent with the regulations. | Yes | IM 2011-003. | concerns with renewal terms in regs |
| A.2.1.2.4.3 | All solar energy ROW authorizations will be issued subject to valid existing rights. | Yes | Statute. | |
| A.2.1.2.4.4 | The BLM will require payment of annual rent for use of the public lands on the basis of a rental schedule. The rental schedule will include a base rent for the acreage of public land included within the solar energy ROW authorization and an additional megawatt capacity fee based on the total authorized megawatt capacity for the approved solar energy project on public lands administered by the BLM. The BLM may adjust the rental whenever necessary, to reflect changes in fair market value as determined by the application of sound business management principles, and so far as practicable and feasible, in accordance with comparable commercial practices. The rental provisions of the authorization may also be modified consistent with the provisions of any regulatory changes or pursuant to the provisions of new or revised statutory authorities. | Yes | IM 2010-141. | Raise concerns about the inherent limitation of a rent-based system to precisely accomplish the goals of FLPMA; Value of phase-in and relief; Reserve right to amend at any time = less certainty; Efficiency argument on rents (but what is solution?); Revenue reinvestment |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.4.5 | The BLM will require a Performance and Reclamation Bond, in an amount determined by the authorized officer, for all solar energy development projects on BLM-administered lands to ensure compliance with the terms and conditions of the ROW authorization and to address environmental liabilities associated with hazardous waste and hazardous substances; decommissioning, removal, and proper disposal of improvements and facilities; and reclamation, revegetation, restoration, and soil stabilization. The authorized officer will require that the holder submit a Reclamation Cost Estimate for review and to assist the authorized officer in determining the bond amount. The authorized officer will review the bond on an annual basis to ensure the adequacy of the bond amount. The authorized officer may increase or decrease the bond amount at any time during the term of the ROW authorization, consistent with the regulations. | Yes | IM 2011-003. | RCE sound; Concerns about effectiveness of reclamation |
| A.2.1.2.4.6 | All solar energy ROW authorizations will include a provision that specifies that ground-disturbing activities cannot begin until the BLM authorized officer issues a Notice to Proceed (Form 2800-15). Each Notice to Proceed will authorize construction or use and occupancy only as therein expressly stated and only for the particular location or use and occupancy therein described (i.e., a construction phase or site location). The holder will not initiate any construction or other surface disturbing-activities on the ROW without such prior written authorization of the BLM authorized officer. | Yes | IM 2011-003. | |

| | | | |
|---|---|---|---|
| A.2.1.2.4.7 | Upon issuance of a ROW authorization that precludes livestock grazing, the BLM authorized officer will issue a separate proposed grazing decision to the grazing permittee/lessee that includes a copy of the ROW authorization. The proposed grazing decision will (a) state that the effective date of the permit/lease cancellation, and issuance of a new permit/lease for any remaining permitted use, will be 2 years from the permittee's/lessee's receipt of the certified letter; (b) address compensation for range improvements; (c) inform the permittee/lessee of his/her ability to unconditionally waive the 2-year notification requirement; and (d) address grazing management changes as required by the ROW issuance decision. The proposed grazing decision will become final unless protested. | No | |
| A.2.1.2.4.8 | Upon issuance of a ROW authorization that includes meteorological or power towers or other tall structures that could pose a hazard to air navigation, the BLM will ensure the locations of such facilities are noted on aerial navigation hazard maps for low-level flight operations that may be undertaken by the BLM and other federal or state agencies for fire operations, wild horse and burro censuses and gathers, wildlife inventories, facility maintenance, or other activities. | No | But is included in IM 2009-043 for wind. |
| A.2.1.2.4.9 | Failure of the holder to comply with any diligent development provision of the authorization may cause the authorized officer to suspend or terminate the authorization in accordance with 43 CFR 2807.17–2807.19 and use the posted Performance and Reclamation Bond to cover the costs for removal of any idle or abandoned equipment and/or facilities. | Yes | In 43 CFR 2807.17–2807.19 and reaffirmed in IM 2011-003. |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.4.10 | The holder shall perform all operations in a good and workmanlike manner, consistent with the approved POD, so as to ensure protection of the environment and the health and safety of the public. The authorized officer may order an immediate temporary suspension of operations, orally or in writing, in accordance with 43 CFR 2807.16 to protect public health or safety or the environment. | Yes | In terms and conditions as required by 43 CFR 2805.12. | |
| A.2.1.2.4.11 | Upon the request of the BLM authorized officer, the holder shall provide access to environmental, technical, and financial records, reports, and information related to construction, operation, maintenance, and decommissioning of the ROW authorization. | Yes | IM 2011-003. | |
| A.2.1.2.4.12 | The BLM authorized officer may change the terms and conditions of the authorization as a result of changes in legislation, regulations, or as otherwise necessary to protect public health or safety or the environment in accordance with 43 CFR 2801.15(e). | Yes | Statute. | |
| A.2.1.2.4.13 | Operators of solar power facilities on BLM-administered lands shall coordinate with the BLM and other appropriate federal, state, and local agencies regarding any planned upgrades or changes to the solar facility design or operation. Proposed changes of this nature may require additional environmental analysis and/or revision of the POD. | No | In terms and conditions for some projects. | |
| A.2.1.2.4.14 | The solar ROW authorization, shall, at a minimum, be reviewed by the BLM authorized officer at the end of the 10th year and at regular intervals thereafter not to exceed 10 years. | No | In terms and conditions for some projects. | How will this conform with adaptive management ideas? |
| A.2.1.2.4.15 | The solar ROW authorization may be assigned consistent with the regulations, but all assignments are subject to approval by the BLM authorized officer. | No | In terms and conditions for some projects. | Real concern fuel speculation and waste scarce resources; already proven insufficient |

| | | | | |
|---|---|---|---|---|
| A.2.1.2.4.16 | An application for renewal must be submitted at least 120 days prior to the expiration of the existing authorization. The BLM authorized officer will review the application for renewal to ensure the holder is complying with the terms, conditions, and stipulations of the existing authorization instrument and applicable laws and regulations. If renewed, the ROW authorization shall be subject to the regulations existing at the time of renewal and any other terms and conditions that the authorized officer deems necessary to protect the public interest. | No | In terms and conditions for some projects. | Should be viewed as relicensing not just renewing land use – comprehensive chance to review whether current technology is optimal use of space, configuration could be modified given new conditions, etc.; need to move up deadline to 360 days given reclamation obligations |

## APPENDIX IV. EVALUATION OF EXISTING METHODOLOGIES FOR DETERMINING NEED

Determining whether additional acreage should be made available for solar development is key to ensuring both that taxpayers receive a fair return for the use of public lands as an input into commercial electricity production, and that project proponents and agencies can focus on only the most promising areas for solar development to ensure faster and cheaper project reviews. States have traditionally been the primary determiner of need for new electric generating facilities in the West. An examination of the states featured in the Draft Solar Energy Programmatic Environmental Impact Statement (DPEIS) six-states shows that directed efforts are underway, and that BLM should consider how to integrate into a five-year reassessment process.

### Assessing Need: Acres as Megawatts

BLM's Reasonably Foreseeable Development Scenario (RFD) presents an aggressive solar energy development scenario on the public lands. With greater attention and recognition of already-existing electricity planning processes, BLM can better tailor its Solar Energy Zones (SEZ) towards policy objectives for renewable energy generation set through states and regional entities. BLM should view the need for additional acres in solar energy zones through the lens of renewable energy goals set in megawatt-hours of demand, which accounts for the capacity factor of various solar technologies. If BLM were to act independently of existing electricity planning exercises, the agency would risk inaccurately assessing the number of acres that should be made available for solar energy development.

When considering acres for inclusion in a SEZ, BLM should rely on outside expert consultation regarding electricity demands, markets, and renewable energy policies. Utility approved plans, state public utility commissioners, and regional planning entities such as California-Independent System Operator (ISO) and the Western Energy Coordinating Council can all provide useful inputs into BLM's determination of needed additional acreage to meet new renewable generation goals. BLM should take into consideration policy goals and trends in the solar market.

### How is Need Determined?

Developers licensed to sell power in a state must comply with specific laws within each state to regulate electricity. Every state in the U.S. has established a regulatory agency known as the "public service commission" (PSC) or "public utility commission" (PUC) which oversees public utilities.[62] These are an independent regulatory agencies made up of staff and a judicial body (appointed by the state legislature) which determines the "just and reasonable price" that a utility can charge for its service.

The basis for additional capacity in the electricity system is determined by an assessment of "need" for system upgrades, also termed a "load forecast." Need is evaluated under the economic

[62] Municipalities and cooperatives responsible for serving customers are not regulated by utility commissions and individual state rules apply to these electricity providers.

and reliability frameworks by the regulatory agency which oversees rates paid by consumers, also referred to as the "rate base." Utility proposals for new capital investments (new generation, transmission, or distribution infrastructure) are presented to the state regulatory agency for review to determine the necessity of a system upgrade before the utility may proceed with a building project. Frequently this request is in the form of an application for a "certificate of public convenience and necessity." This is the recognition that there is a need for new generation or transmission capacity that will ensure that the reliability needs of the system are met while costs are kept prudent.

Load forecasts are constantly evaluated through a number of planning processes including utility, municipality, or cooperative plans, and through planning processes established within regional markets. "Needs" assessments are based on two principles: ensuring the reliability of the bulk electric power sector and keeping the cost of electricity low by providing access to the lowest cost electricity available in the market. These objectives are constantly evolving as local, state and federal policies and regional electricity markets shift towards renewable goals. At the federal level, the North American Electric Reliability Corporation is responsible for setting the reliability standards and monitoring the bulk electric power system.[63] At the state level, the impact to the customer rate base of a regulated utility is considered by the state's public service commission.

State-Specific Practices

All of the states included in BLM's solar PEIS engage in advance load forecasting for electricity demand.

*Arizona*
The Arizona Corporation Commission requires electric utilities in the state to engage in Integrated Resource Planning. Every two years, utilities file a 15-year plan to identify how they will meet future demand as well as the type of generation that will be used to meet future load.

*California*
Three agencies in California govern generation and transmission, the California Public Utility Commission (CPUC), the California Energy Commission (CEC) and the California-ISO. The CEC is responsible for load forecasting, the CPUC assigns particular utilities the amount of megawatts they need to build, and utilities work through the CA-ISO to design a plan for meeting load forecasts.

California has a specific loading order to meet demand:
1. Energy efficiency
2. Demand-side management
3. Renewables, to meet a Renewable Portfolio Standard
4. Conventional sources, most of which are natural gas, but no coal

[63] NERC was designated by the Federal Energy Regulatory Commission as the national electric reliability organization (ERO). For additional information on NERC, visit www.nerc.gov.

*Colorado*
To determine need, Colorado engages in "electric resource planning" (ERP), similar to "integrated resource planning." The ERP is undertaken every four years and looks out 10 years for projected demand. The ERP is required for regulated utilities, which are responsible for supplying approximately 60 percent of Colorado's electricity needs. All types of resources can be included in the utilities "acquisition plan." Colorado's Renewable Electricity Standard (RES) states that 30 percent of retail electric sales to customers of regulated utilities by 2020 will come from renewable resources. The remainder of Colorado is served by cooperatives which are not regulated by the PUC. Cooperatives have a lower RES goal of 10 percent by 2020.

*Nevada*
Load forecasting in Nevada is determined through an IRP process. Ninety to ninety-five percent of the state's electricity is met by investor owned utilities (IOU). Under the IRP, IOUs are required every three years to file a 20-year forecast. This forecast includes current resources, projected load, and planned retirements. IOUs then file a new generation plan to meet future load which is subject to review by the Nevada PUC.. IOUs are tasked with determining an optimal level of cost-effective DSM to meet future load. The Nevada PUC approves rates for the subsequent three years of the plan and oversees placeholder agreements for generation and transmission for the 20-year plan. Once approved, IOUs can file amendments to the IRP to accommodate shifts in demand and technological advances.

The RPS requirement is a component of the IRP. IOUs are not required to have in place contracts for RPS requirements more than three years out. On April 1st each year, Nevada compiles a progress report on how utilities are meeting their RPS requirements.

*New Mexico*
The Renewable Energy Act ("REA"), §§ 62-16-1 et seq. NMSA 1978 and Title 17.9.572 NMAC[64] ("Rule 572") establish an RPS applicable to all IOUs in New Mexico. IOUs must have in their portfolio as a percentage of total retail sales to New Mexico customers, renewable energy of no less than 15 percent by 2015 and 20 percent by 2020.

In addition to the RPS, Rule 572 requires that IOUs must offer a voluntary renewable energy program to their customers. In addition to and within the total portfolio percentage requirements, utilities must design their public utility procurement plans to achieve a fully diversified renewable energy portfolio no later than January 1, 2011, as follows:

- *No less than 20 percent wind*
- *No less than 20 percent solar*
- *No less than 10 percent other technologies*
- *No less than 1.5 percent distributed generation (2011-2014) and 3 percent distributed generation by 2015*

[64] http://www.nmcpr.state.nm.us/NMAC/parts/title17/17.009.0572.htm

*Utah*

The Utah Public Service Commission has jurisdiction over the only public utility in the state. Pacific Corps serves 80 percent of the load in Utah, and the remainder is served by municipalities and cooperatives. Pacific Corps engages in an IRP process for their service territory in six-states every two years in order to provide a framework for resource acquisition. The IRP process is acknowledged by the Utah PSC and serves as the basis for determining load forecasting to meet the state's RPS. Pacific Corps files a progress report for meeting the RPS with the Utah PSC.

## APPENDIX V. RECOMMENDATIONS FOR PERFORMING DROP-DOWN ENVIRONMENTAL ANALYSIS WITHIN DESIGNATED ZONES

This appendix details the methods used to approximate impacts for Solar Energy Zones (SEZs) in the Draft Solar Energy Programmatic Environmental Impact Statement (DPEIS), and suggests additional analyses that would be necessary to provide a basis for development. Although the analyses performed in the PEIS are not currently sufficient to permit tiering at the project level, the monitoring program defined below would build the baseline data needed and would provide a foundation for a defensible zone-based solar program that streamlines environmental review at the project level. Suggested monitoring efforts and protocols mirror those being pursued by other agencies as well as those the Bureau of Land Management (BLM) is in the process of implementing in other contexts.

### *Special Status Species Analysis Performed in the PEIS*

The methods used for the Special Status Species (SSS) analysis in the PEIS are summarized below.

- Define the area of direct effects (the zone itself as well as projected road and transmission access corridors to access the nearest transmission and state/U.S. highways).
- Define the area of indirect effects by buffering each solar energy zone by five miles. These are areas with no ground disturbance that could be affected by dust, runoff, noise, lighting, pollution, etc.
- Define a "SEZ region" around each SEZ that includes all lands within a 50-mile buffer of the SEZ centroid.
- Use heritage, state fish and game, and Southwest Regional Gap Analysis Project (SWReGAP) data to define species lists of all SSS that might be present in the SEZ region, direct, and indirect effects areas. These species include:
    - Threatened or endangered under the Endangered Species Act (ESA)
    - Proposed for listing, review, or candidate species under ESA
    - BLM sensitive species
    - State listed species
    - Species that have been ranked as critically imperiled (S1) or imperiled (S2)
    - State or U.S. Fish and Wildlife Service (FWS) species of concern
- Use SWReGAP habitat models to project the proportion of habitat for each species in the direct effects area relative to the SEZ region.
- Assign a projected impact of low (<1 percent), medium (1-10 percent), or high (>10 percent) based on the proportion of habitat in the direct effects area compared to the SEZ region.

The critical stage of this analysis is defining suitable habitat for SSS. The model output used for this purpose, SWReGAP, is based on associating species with vegetation cover types, then further restricting distribution using elevation and knowledge of the geographic range of the species in question. It is well documented that these models over-predict suitable habitat for most species, and for some quite dramatically. For example, SWReGAP models associate Great

Basin amphibian species with blackbrush when they are actually associated with water bodies found within blackbrush-dominated systems. Accuracy assessments of these models for a range of species found in Utah's national parks (Edwards et al. 1996) compared park verified species lists with those predicted from SWReGAP models and found the models consistently over-predicted for well studied taxa (birds and mammals) and that accuracy decreased with study area. The authors state that extrapolating results at scales smaller than that of Utah's national parks "is problematic and should be viewed with caution." Although there are two SEZs in California that approximate this size (Iron Mountain and Riverside East), all other SEZs are approximately one order of magnitude less than this, making it fairly certain that presence of SSS in the direct and indirect impacts areas of most SEZs has been overestimated. The inaccurate results that come out of this analysis extend beyond over-defining species that might be present; by over-predicting distribution of species, the output of the analysis also potentially under-represents the vulnerability of a species. In other words, if a species is present in a SEZ or in the area of indirect effects, its habitat is likely more limited than predicted, and the habitat that is actually being used in this area could be far more important than indicated by the analysis.

For the reasons detailed above, the scope and detail of this analysis is insufficient to allow the PEIS to be tiered off through the use of project-level Environmental Assessments. In addition to over-predicting, the analysis presented in the DPEIS allows no inference to the status and trend of SSS or to the amount of habitat actually occupied.

We feel that the existing analysis provides enough detail at the programmatic level to inform the next level of SSS analysis, however. Specifically, it provides a conservative species list for each SEZ that can be used as the basis for the assessment and monitoring program detailed below. A comprehensive consideration of impacts will require the use of two additional layers of Environmental Impact Statements, one layer that examines cumulative impacts at the scale of individual SEZs and their surrounding landscapes, and one that builds off the SEZ-level EIS to quantify impacts and mitigation at the individual project level.

***Previous BLM Monitoring Efforts***

The legal obligation of BLM to initiate and maintain monitoring programs that quantify the status and trends for a range of special status species was discussed previously. Although systematic monitoring has been initiated on some BLM lands, effort has historically been patchy and inconsistent, particularly in areas where there is little public interest and few obvious, high profile resource values to protect. By the Bureau's own admission (Falise et al 2005), monitoring programs until very recently frequently lacked clear objectives, gathered incomplete information, failed to analyze collected data, did not tie monitoring to management actions, and lacked targets and thresholds to influence future management. For the most part, past evaluations have focused on "moment in time" assessments and on projects and leases at the local scale. In addition to spatial and temporal limitations, data were not collected using a statistically designed sampling method, allowing no inference to cumulative impacts at the landscape scale and no basis to support a monitoring program (BOA 1994, Pellant et al. 2005). However, these previous efforts do provide some baseline data, background knowledge of ecological systems and their key drivers, and information relevant to selection of monitoring sites (Habich 2001, O'Brien et al. 2003, Pellant et al. 2005).

***Recently Proposed and Ongoing BLM Monitoring Relevant to the Solar PEIS***

Recently there have been several exciting developments in BLM monitoring protocols that, if executed properly, would effectively define ecological baseline data and determine status for many sensitive species. The BLM's flagship monitoring program for the new National Monitoring Strategy is detailed in Kotliar et al. 2008, where it is applied to create a regional approach to wildlife monitoring in oil and gas development areas in Colorado. This framework is quite flexible, and could be adapted to the range of species found in the various SEZs, as well as to abiotic resources such as groundwater, surface water, and soils. The basic approach detailed in Kotliar et al. 2008 is suggested as a framework to organize and focus field surveys and modeling that will feed into a cohesive monitoring system for SEZs and the projects sited within them. The authors describe a seven-step framework that is executed iteratively in a three-phase process that could be applied at the level of the SEZ region and scaled up to landscapes or ecoregions. Phase I, which synthesizes existing data and model outputs to evaluate the cumulative effects of solar development, would take place at the scale of individual SEZ regions. Phase II takes place at the same scale, and uses the data collected in Phase I to clarify management objectives and link them to management decisions. Phase III scales the previous analyses up to the field office scale and beyond, linking them with similar studies in adjacent SEZs and providing a broad context for project level analyses. Thorough implementation of this three-phase process would be sufficient for the SEZ-level EIS. Provided that analyses at the SEZ level create a sound baseline of data to assess status and trend across landscapes for focal species, project specific efforts could tier extensively off this research and be completed with a reduced level of effort.

An implicit part of the framework is identification of the highest priority species and management issues for the study area, as well as the ability to update all information sources listed above as new information, tools, and insights become available in later phases. Proper use of this process would allow inference to the status and trends of SSS as well as the stressors that affect them, linking stressors to indicators and to management and mitigation. In short, it would allow BLM to meet its legal obligation for stewardship of lands and sensitive species related to solar energy development.

***Application of BLM's New National Monitoring Strategy to Further SEZ Review***

As required by BLM, the monitoring protocol described in Kotliar et al. used a seven-step framework adapted from Mulder et al. (1999). This framework could be applied to the DPEIS if the agency takes the following steps:

1. **Develop, Refine, and Prioritize Initial Monitoring Goals and Objectives**
   Extensive meetings with personnel from BLM and other agencies as well as stakeholders is essential at this stage to define objectives and the scale(s) at which they should be analyzed. A preliminary list generic to all SEZs is given below.
   - Prior to SEZ development, evaluate population status of selected SSS and/or focal species. If possible, use the same analysis along with existing data to evaluate trend for those species.

- Define the natural range of variation of parameters of interest (abiotic and biotic) and explore how cumulative effects of development would affect this range of variation.
- Define areas not available for solar development, whether inside or outside SEZs, that could be used to offset impacts in areas to be developed.
- Ensure that the net effect of development (taking into account areas to be developed as well as any mitigation to offset impacts) do not result in unacceptable impacts to focal species.

**2. Identify Key Stressors**

Stressor identification occurs concurrently with formulation of goals and objectives, and also requires diverse agency and stakeholder input. As mentioned above, all work is subject to revision; stressors must have clear ties to ecosystem processes and states, but they must also be possible to assess with a degree of precision in order to be useful. An iterative process is needed to determine the best set for a given area. Stressors might include:

- Habitat loss within developed areas.
- Habitat loss outside of developed areas due to fragmentation, disturbance, erosion, invasive weeds, dust loading, and other indirect and cumulative effects on surface habitat features.
- Drop in groundwater levels directly impacting species (e.g. vegetation dependent on phreatic water).
- Drop in groundwater levels indirectly affecting surface water dependent species through surface water hydrology.
- Blockage of migration/movement corridors needed for population viability.
- Loss of soil fertility due to ground disturbance and associated loss of topsoil and biological soil crusts.
- Direct mortality to species from equipment.
- Indirect mortality due to loss of forage or prey.
- Invasive exotic species displacing native species and disrupting plant communities.

3. **Create Conceptual Models For Ecosystem Function and Stressors, Develop Regional Questions**

The general conceptual model used in Kotliar et al. generally applies to the southwest desert and Great Basin cold desert ecosystems being considered for development in the DPEIS.

In the figure below, the dominant ecological processes are shown in text outside the boxes, processes and pathways that drive ecosystem changes are represented by arrows, and major biotic and abiotic components of the ecosystem are within the polygons. Stressors disrupt the

processes, but are not shown explicitly.

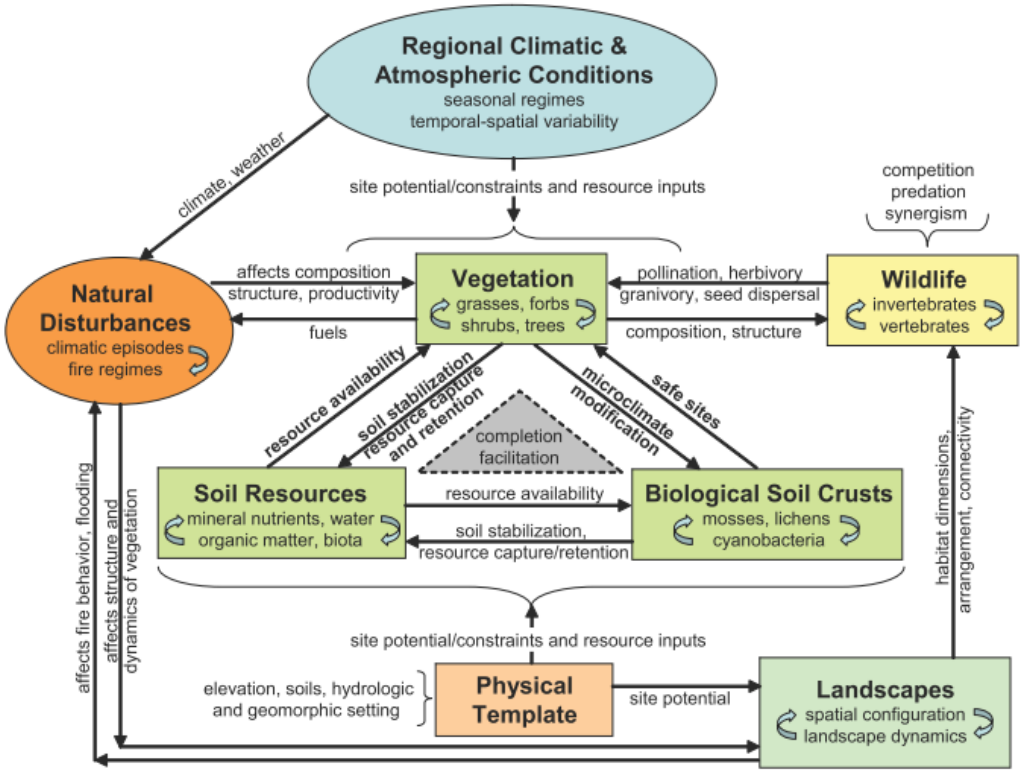



**Figure 9.** Conceptual model illustrating key structural components (rectangles) and functional relationships (arrows) of ecosystems for the Colorado focal area. Ovals represent natural drivers of temporal variability and change (adapted from Miller, 2005).

Regional questions would be expected to vary across the range of desert ecosystems encompassed in the solar PEIS. Several examples of these questions are:

- In the Chihuahuan desert, how can solar development proceed without exacerbating pre-existing trends of conversion of native grasslands to habitats dominated by invasive shrubs such as creosote?
- In the Great Basin deserts of Nevada and Utah, how can water use for solar development and other existing uses avoid regional groundwater depletion effects that cascade through connected basins?
- In multiple desert ecosystems, how can ground clearing associated with development avoid impacts associated with loss of topsoil and soil crusts, spread of invasive weeds, associated changes in nutrient and fire regimes, dust loading and air quality issues, accelerated snowmelt and changes in groundwater availability, etc.?
- In multiple desert ecosystems, how can solar development be made compatible with the need to preserve long-lived keystone plant species such as Saguaro cactus, Joshua tree, and tall sagebrush species that are already compromised by development activities, and for which restoration efforts have been largely unsuccessful?

**4. Select and Prioritize Indicators, Assess Information Availability and Needs**

The conceptual models provide the initial basis for selection and prioritization of indicators, which would again be chosen using inputs gathered through a stakeholder process. Indicators suggested below are a small, generic subset of those that could be selected. References associated with the use of each indicator are provided; some references support the use of the indicator while others detail how it can be quantified. Most of the indicators suggested below are ones that lend themselves to the use of remotely sensed data; practical implementation of the suggested monitoring should minimize field data collection requirements while still capturing important ecosystem properties and maximizing predictive power. However, remote sensing would not be sufficient by itself to quantify baseline data. SEZ and region-specific field data, both existing and new, would also be required to both supplement and calibrate remotely sensed data (Wallace and Marsh 2005, Wallace et al. 2008). Indicators derived from new field data would be defined in Phases II and III of the process, and are not listed here.

- Percent bare ground, mean bare patch size, and other metrics of ground cover (Whiteford et al. 1998, de Soyza et al. 2000, Pyke et al. 2002, O'Brien et al. 2003, Herrick and Pyke 2008).
- Percent cover by life form, species, or species type (de Soyza et al. 2000, Knick et al. 1997, Whiteford et al. 1998).
- Percent cover by sagebrush (Sivanpillai et al. 2009).
- Non-native and/or invasive species (Everitt and Yang 2007, Herrick and Pyke 2008).
- Plant species of management concern (Herrick and Pyke 2008).
- Plant species richness (Herrick et al. 2009).
- Plant density (Herrick et al. 2009).
- Soil stability (Herrick and Pyke 2008, Herrick et al. 2009).
- Disturbance of soil crusts (Brotherson and Rushforth 1983, Belknap 1995, Belknap and Gillette 1998, Evans and Johansen 1999, Stohlgren et al. 2001, Ustin et al. 2009).
- Density of harvester ant mounds as indicators of shrub and invasive annual grass invasion (Bestelmeyer 2005, Fletcher et al. 2007, Ostoja et al. 2009).
- Percent cover of exotic annual grasses (Miller 2005).
- Road density, infrastructure density, and other measures of anthropogenic disturbance (Trombulak and Frissell 2000,Gelbard and Belknap 2003, Wilburt et al. 2008, Frair et al. 2008).
- Suitable habitat and activity areas for focal species (Lambeck 1997, Maes and Bonte 2006, Penrod et al. 2010).

**5. Select Final Indicators and Design Sampling and Research Program**

This stage requires a full evaluation of legacy data to incorporate any existing information that can be used to meet monitoring objectives. Status of populations and habitats for priority species must be evaluated, historical range of variation for important landscape processes quantified, data gaps identified, field methodologies for needed information defined, and a data management framework implemented. Based on this work, indicator selection would be further refined, defining a set of indicators that are not only encompass meaningful attributes of the ecosystem being studied, but also respond to ecosystem change in a predictable and useful manner, are

feasible to collect, make predictions at useful spatial and temporal scales, and have sufficient existing data associated with them to define the historical range of variation.

**6. Identify Thresholds of Change and Triggers for Management Action**
In Phase I, status and trends for priority habitats and their relationship to indicators are examined, and management targets and triggers are incomplete and mostly based on expert opinion solicited from scientists and managers. As existing data are further synthesized with newly-collected field data and knowledge of the current status and trend of monitored resources, their historical range of variation, and the behavior of selected indicators to monitor their status improves, thresholds and triggers can be further refined.

**7. Integrate Monitoring into Planning, Evaluation, and Management**
As above, incorporating monitoring into mitigation, restoration priorities, and proposed management action is tentative and based on incomplete information in Phase I, but is expanded in Phase II to adaptively reflect new information.

The design presented in Kotliar et al. has been further refined to make it specific to the White River Field Office in an appendix of BLM Colorado's White River Field Office Resource Management Plan Amendment. We understand that this appendix describes a Resource Management and Monitoring Protocol that builds off the work in Kotliar et al. to monitor soil, vegetation, disturbance, atmospheric, landscape spatial pattern, and water resources in addition to focal species. The focus of this effort is on monitoring surface disturbance and reclamation activities related to oil and gas development, but the general extension of the monitoring framework is exactly what would be needed to define a rigorous monitoring program for BLM lands to be developed for utility-scale solar.

This adaptation of Kotliar et al. bases indicator selection on the coarse filter approach (Noss 1987, Hunter et al. 1988), in which representative communities are protected that sustain the needs of most associated species. To cover the needs of species not adequately conserved by the coarse filter, the fine filter component tailors management to optimize habitat for these exceptions, which are ideally umbrella species (Roberge and Angelstam 2004) whose diverse habitat requirements are shared by a variety of species. In general, indictors were prioritized that were relevant to landscape changes of interest, demonstrated to be effective in the literature, feasible and reliable to quantify as a long-term metric, interpretable to decision makers and the public, and relevant to existing baseline data. The three main types of indicators proposed are attributes of key ecosystem services, direct measures of species abundance; and general descriptive or spatial statistics used to describe abundances.

Given the large anticipated data gaps, the monitoring framework suggested for solar development on BLM lands will need to emphasize efficient field data collection protocols and the use of advanced modeling techniques. The most detailed modeling process proposed for solar development to date is currently being developed for the California Energy Commission by researchers from the University of California Santa Barbara, the U.S. Geological Survey, and Conservation International.[65] This research uses an array of state of the art models capable of

[65] David, Frank et al. "Cumulative Biological Impacts Framework for Solar Energy Projects in the California Desert." http://www.energy.ca.gov/research/notices/2011-01-

accepting relatively sparse wildlife survey data and other inputs to extrapolate wildlife habitat use, approximate population status, model habitat connectivity and fragmentation. Results from these analyses can be used to guide siting, project cumulative effects, and define potential offsite mitigation areas. Monitoring abiotic indicators will also need to make use of similar modeling approaches to make the best use of existing data and monitoring resources.

The data development and analysis processes recommended above have good support in the literature, are in line with comprehensive monitoring efforts that have been underway for years at other federal agencies and non-governmental organizations, (Noss 1987, Hunter et al. 1988, Debinski and Brussard 1992, Bascietto and Higley 1992, Preston and Ribic 1992, Walker and Jones 1992, Gentile et al. 1994, NRC 1994, Paulsen and Linthurst 1994, Herlihy et al. 1997, NPS 2002, Turgeon et al. 1992, Fisher et al. 2003, Ringold et al. 2003, Lazorchak et al. 2003, O'Brien et al 2003, Parrish et al. 2003, USDA 2004, USDA 2009, Miller 2005, Herrick et al. 2009), and reflect the direction BLM has recently committed to with its National Monitoring Strategy. This overarching and long overdue initiative will ultimately extend to all energy development on BLM lands. The recommendations above are not unique to solar, nor are they to be funded by the solar energy industry: the monitoring at the SEZ and SEZ-region scale recommended above are part of BLM's ongoing stewardship obligations under the Federal Land Policy and Management Act , and are a prerequisite to further project level studies prior to development, studies that will be facilitated by the breadth of knowledge gathered at the SEZ level.

**References**

Bascietto JJ, Higley KA. 1992. Ecological assessment at U.S. Department of Energy environmental restoration sites. In: McKenzie DH, Hyatt DE, McDonald VJ, editors. Volume 1, Ecological Indicators. New York (NY): Elsevier Applied Science. p 1219-38.

Belnap, J. 1995. Soil surface disturbances: their role in accelerating desertification. Environmental Monitoring and Assessment 37:39-57.

Belnap, J., and D.A. Gillette. 1998. Vulnerability of desert biological soil crusts to wind erosion: the influences of crust development, soil texture, and disturbance. Journal of Arid Environments 39:133-142.

Bestelmeyer, B.T. 2005. Does desertification diminish biodiversity? Enhancement of ant diversity by shrub invasion in south-western USA. Diversity and Distributions 11:45–55. http://usda-ars.nmsu.edu/biblio/pdf/05-001.pdf

Board on Agriculture. 1994. Rangeland health: new methods to classify, inventory, and monitor rangelands. National Academies Press, Washington D.C. http://www.nap.edu/openbook.php?record_id=2212&page=R1

---

27_workshop/presentations/Cumulative_Biological_Impacts_Framework_for_Solar_Energy_Projects_in_CA_Desert.pdf

Bretthauer, E.W. 1992. Protecting the environment: A research strategy for the 1990s - an indicator of change in EPA. In: McKenzie DH, Hyatt DE, McDonald VJ, editors. Volume 1, Ecological Indicators. New York (NY): Elsevier Applied Science. p 53-9

Brotherson, J.D., and S.R. Rushforth. 1983. Influence of cryptogamic crusts on moisture relationships of soils in Navajo National Monument, Arizona. Great Basin Naturalist 43(1): 73-78.

Debinski DM, Brussard PF. 1992. Biological diversity assessment in Glacier National Park, Montana: I. Sampling design. In: McKenzie DH, Hyatt DE, McDonald VJ, editors. Volume 1, Ecological Indicators. New York (NY): Elsevier Applied Science. p 393-407.

de Soyza, A.G., J.W. Van Zee, W.G. Whitford, A. Neale, N. Tallent-Hallsel, J.E. Herrick, and K.M. Havstad. 2000. Indicators of Great Basin rangeland health. Journal of Arid Environments 45:289-304.

Edwards, T. C., Jr., E. Deshler, D. Foster, and G. G. Moisen. 1996. Adequacy of wildlife habitat relation models for estimating spatial distributions of terrestrial vertebrates. Conservation Biology 10:263-270. http://gis.fs.fed.us/rm/ogden/research/publications/downloads/journals/1996_conbio_edwards.pdf

Evans, R. D., and J. R. Johansen. 1999. Microbiotic crusts and ecosystem processes. Critical Review in Plant Sciences 18:183-225.

Everitt, J.H., Yang, C. 2007. Mapping broom snakeweed through image analysis of color-infrared photograpy and digital imagery. Environmental Monitoring and Assessment. 134:287-292.

Falise, R., Durtshe, B., Spencer, D., Rinkes, T., Payne, J., Belinda, S., and Claerbout, A., 2005, Progress report for the regional energy monitoring strategy for wildlife: Lakewood, Colorado, U.S. Bureau of Land Management, unpublished report, 12 p.

Fisher WS, Jackson LE, Kurtz JC. 2003. U.S. EPA Office of Research and Development guidelines for technical evaluation of ecological indicators. In: Rapport DJ, Lasley BL, Rolston DE, Nielson NO, Qualset CO, Damania AB, editors. Managing for Healthy Ecosystems. Boca Raton (FL): Lewis Publishers. p 277-84.

Frair, J.L., E.H. Merrill, H.L. Beyer, and J.M. Morales. 2008. Thresholds in landscape connectivity and mortality risks in response to growing road networks. Journal of Applied Ecology 45:1504-1513.

Gelbard, J.L., and J Belknap. 2003. Roads as Conduits for Exotic Plant Invasions in a Semiarid Landscape. Conservation Biology 17(2):420-432.

Gentile JH, Scott KJ, Paul JF, Linthurst RA. 1994. The role of monitoring in ecological risk assessment: An EMAP example. In: Volume 2, A review of ecological assessment case studies from a risk assessment perspective. Washington (DC): Risk Assessment Forum, U.S. Environmental Protection Agency, Office of Research and Development. p 5-1 to 5-40.

Fletcher R., J. H. Everitt and L. Drawe. 2007. Detecting red harvester ant mounds with panchromatic QuickBird imagery. J. Appl. Remote Sens. 1:013556

Habich, E.F. 2001. Ecological site inventory, Technical reference 1734-7. Bureau of Land Management. Denver, Colorado. BLM/ST/ST-01/003+1734. 112 pp.

Herlihy AT, Kaufmann PR, Reynolds L, Li J, Robison EG. 1997. Developing indicators of ecological condition in the Willamette Basin - an overview of the Oregon prepilot study for EPA's EMAP program. In: Laenen A, Dunnette D, editors. River quality: dynamics and restoration. Boca Raton (FL): Lewis Publishers. p 275-82.

Herrick, J., S. Wills, and D. Pyke. 2008. Terrestrial indicators: selection process and preliminary recommendations. Unpublished report. http://www.ars.usda.gov/research/publications/publications.htm?seq_no_115=250882

Herrick, J., J.W. Van Zee, K.M. Havstad, L.M. Burkett and W.G. Whitford. 2009. Monitoring manual for grassland, shrubland, and savannah ecosystems, Vol. 1 and Vol. 2. USDS-ARS Jornada Experimental Range.

Hunter, M.L., Jr., G.L. Jacobson, Jr. and T. Webb, III. 1988. Paleoecology and the coarse-filter approach to maintaining biological diversity. Conservation Biology 2:375-385.

Jones, J.B., and D. Wagner, 2006. Microhabitat-specific controls on soil respiration and denitrification in the Mojave desert: the role of harvester ant nests and vegetation. Western North American Naturalist 66(4):426–433. https://ojs.lib.byu.edu/ojs/index.php/wnan/article/viewFile/1525/1855

Knick, S.T., J.T. Rotenberry, and T.J. Zarriello. 1997. Supervised classification of Landsat Thematic Mapper imagery in a semi-arid rangeland by nonparametric discriminant analysis. Photogrammetric Engineering & Remote Sensing 63:79-86.

Kotliar, N.B., Bowen, Z.H., Ouren, D.S., and Farmer, A.H., 2008, A regional approach to wildlife monitoring related to energy exploration and development in Colorado: U.S. Geological Survey Open-File Report 2008–1024, 66 p. http://pubs.usgs.gov/of/2008/1024/

Lambeck, R. J. (1997), Focal Species: A Multi-Species Umbrella for Nature Conservation. Conservation Biology, 11: 849–856. http://flash.lakeheadu.ca/~rrempel/ecology/Biodiversity_Papers/PDF0242-Lambeck.pdf

Lazorchak JM, Hill BH, Brown BS, McCormick FH, Engle VD, Lattier DJ, Bagley MJ, Griffith MB, Maciorowski AF, Toth GP. 2003. USEPA biomonitoring and bioindicator concepts

needed to evaluate the biological integrity of aquatic systems. In: Markert BA, Breure AM, Zechmeister HG, editors. Trace metals and other contaminants in the environment. p 831-74.

Maes, D., and D. Bonte, 2006. Using distribution patterns of five threatened invertebrates in a highly fragmented dune landscape to develop a multispecies conservation approach. Biological Conservation 133 (4), pp. 490-499 133 (4), pp. 490-499. http://users.ugent.be/~dbonte/pdf/MaesBonte_BiolCons_onlineFirst.pdf

Miller, M.E. 2005. The structure and functioning of dryland ecosystems – conceptual models to inform long-term ecological modeling. U.S. Geological Survey, Reston, Virginia. Scientific Inestigations Report 2005-5197. http://pubs.usgs.gov/sir/2005/5197

Mulder, B.S., Noon, B.R., Spies, T.A., Raphael, M.G., Palmer, C.J., Olsen, A.R., Reeves, G.H., and Welsh, H.H., 1999, The strategy and design of the effectiveness monitoring for the Northwest Forest Plan: Portland, Oreg., U.S. Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-437, 114 p. plus 5 appendices. http://www.fs.fed.us/pnw/pubs/pnw_gtr437.pdf

Noss, R.F. 1987. From plant communities to landscapes in conservation inventories: a look at the Nature Conservancy (USA). Biological Conservation 41:11-37.

NPS (US National Park Service). 2002. Air quality in the national parks. National Park Service Air Resources Division, Lakewood, Colorado, US Department of the Interior, Washington, DC.

NRC (National Research Council, Committee on Rangeland Classification). 1994. Rangeland health: new methods to classify, inventory, and monitor rangelands. National Research Council, National Academy Press, Washington, DC

O'Brien, R.A., C.M. Johnson, A.M. Wilson, and V.C. Elsbernd. 2003. Indicators of rangeland health and functionality in the Intermountain West. US Department of Agriculture, Rocky Mountain Research Station. General Technical Report RMRS-GTR-104.

Ostoja, S.M., E. W. Schupp,and K. Sivy. 2009. Ant assemblages in intact big sagebrush and converted cheatgrass-dominated habitats in Tooele County, Utah. Ant Assemblages in Intact Big Sagebrush and Converted Cheatgrass-Dominated Habitats in Tooele County, Utah. Western North American Naturalist 69(2):223-234.

Paulsen SG, Linthurst RA. 1994. Biological monitoring in the Environmental Monitoring and Assessment Program. In: Loeb SL, Spacie A, editors. Biological monitoring of aquatic systems. Boca Raton (FL): Lewis Publishers. p 297-322.

Pellant, M., P. Shaver, D.A. Pyke, and J.E. Herrick. 2005. Interpreting indicators of rangeland health, Version 4. USDI Bureau of Land Management, National Science and Technology Center, Information and Communications Group, Denver, Colorado. Technical Reference 1734-6.

Penrod, K., W. Spencer, E. Rubin, and C. Paulman. 2010. Habitat Connectivity Planning for Selected Focal Species in the Carrizo Plain. Prepared for County of San Luis Obsipo by SC Wildlands, http://www.scwildlands.org. http://www.sloplanning.org/EIRs/CaliforniaValleySolarRanch/feir/apps/Ap08E_Widlife_Corridor_Study.pdf

Preston EM, Ribic CA. 1992. EMAP and other tools for measuring biodiversity, habitat conditions, and environmental trends. In: Finch DM, Stangel PW, editors. Status and management of neotropical migratory birds. Washington (DC): U.S. Environmental Protection Agency. p 14.

Pyke, D.A., J.E. Herrick, P. Shaver, and M. Pellant. 2002. Rangeland health attributes and indicators for qualitative assessment. Journal of Range Management 55:584-597.

Ringold PL, Mulder B, Alegria J, Czaplewski RL, Tolle T, Burnett K. 2003. Design of an ecological monitoring strategy for the Forest Plan in the Pacific northwest. In: Busch DE, Trexler J, editors. Monitoring Ecosystems. Washington (DC): Island Press. p 73-99.

Roberge, J.-M. and P. Angelstam. 2004. Usefulness of the umbrella species concept as a conservation tool. Conservation Biology 18:76-85.

Sivanpillai, R., S.D. Prager, and T.O. Storey. 2009. Estimating sagebrush cover in semi-arid environments using Landsat Thematic Mapper data. International Journal of Applied Earth Observation and Geoinformation 11:103-107.

Stohlgren, T.J., Y. Otsuki, C. Villa, M. Lee and J. Belnap. 2001. Patterns of plant invasions: a case example in native species hotspots and rare habitats. Biological Invasions 3:37-50.

Trombulak, S.C. and C.A. Frissell. 2000. Review of ecological effects of roads on terrestrial and aquatic communities. Conservation Biology 14:18-30.

Turgeon DD, Bricker SB, O'Connor TP. 1992. National Status and Trends Program: Chemical and biological monitoring of U.S. coastal waters. In: McKenzie DH, Hyatt DE, McDonald VJ, editors. Volume 1, Ecological Indicators. New York (NY): Elsevier Applied Science. p 425-57.

USDA (US Department of Agriculture). 2004. Forest inventory and analysis national core field guide: field data collection procedures for phase 2 plots, Version 2.0; Vol. 1. Intern. Rep. On file with: USDA Forest Service, Forest Inventory and Analysis, Rosslyn Plaza, 1620 North Kent Street, Arlington, VA 22209.

USDA (US Department of Agriculture). 2009. Summary Report: 2007 National Resources Inventory, Natural Resources Conservation Service, Washington, DC, and Center for Survey Statistics and Methodology, Iowa State University, Ames, Iowa. 123 pages.

Ustin, S.L., P.G. Valko, S.C. Kefauver, M.J. Santos, J.F. Zimpfer, and S.D. Smith. 2009. Remote sensing of biological soil crust under simulated climate change manipulations in the Mojave Desert. Remote Sensing of Environment 113(2):317-328.

Walker J., and K.B. Jones. 1992. The U.S. Environmental Monitoring and Assessment Program (EMAP): Towards the use of indicators to assess ecological sustainable development at regional and continental scales. In: Hamblin A, editor. Environmental Indicators for Sustainable Agriculture. Canberra (Australia): Goanna Print. p 44-53.

Wallace, C.S.A., and Marsh, S.E., 2005. Characterizing the Spatial Structure of Endangered Species Habitat Using Geostatistical Analysis of IKONOS Imagery. International Journal of Remote Sensing, v. 26, no. 12, pp. 2607-2629

Wallace, C.S.A., R.H. Webb, and K.A. Thomas, 2008. Estimation of perennial vegetation cover in the Mojave Desert using MODIS-EVI data and pre-existing field data. GIScience and Remote Sensing. 45-2, 167-187

Whiteford, W.G., A.G. De Soyza, J.W. Van Zee, J.E. Herrick, and K.M. Havstad. 1998. Vegetation, soil, and animal indicators of rangeland health. Environmental Monitoring Assessment 51:179-200.

Wilbert, M., J. Thomson, and N.W. Culver. 2008. Analysis of habitat fragmentation from oil and gas development and its impact on wildlife: a framework for public land management planning. The Wilderness Society, Washington, DC

## APPENDIX VI. EVALUATION OF SOLAR ENERGY TECHNOLOGIES IN THE DRAFT PEIS

**BLM Solar Draft PEIS –**

**Comments & Recommendations**

February 28, 2011
Clean Energy Solutions LLC

### *Major Thematic Concerns & Recommendations*

#### Generality of PEIS Standards

Recommendation: The BLM criteria for evaluating technologies should be principle-based and not become prescriptive based on current technology capabilities and characteristics.
Explanation: We believe that the most rational and adaptable PEIS standards will come from a careful consideration of the general nature of the public costs (e.g. natural resource impacts) vs. the public benefits (i.e. cleaner energy and reduced emissions).
The information currently included in the PEIS seems to be based heavily on the project proposals the BLM is currently reviewing and has recently approved. While these proposals are substantially more mature than previous plants, they still do not represent a mature technology in a mature industry, and there are a number of possible permutations and advancements that are now on the horizon that could affect the technology characteristics significantly.

#### Figures-of-Merit

Recommendation: In line with Section 1.1 of our comments, we recommend that the BLM base their EIS decisions on two primary criteria:

A. Resource consumption (such as land and water use) per annual Megawatt hour (MWh) produced by the plant, and

B. Compatibility with the existing grid.[66]

We recommend that these be used to judge all cross-system (not just cross-technology) comparisons. Under these criteria, for example, the requirements for land and water would be compared in acres/MWh/year and acre-ft/MWh/year. In addition, some qualitative benefits would be accrued to a plant that used storage to match its output to the peaking needs of the grid it is serving.

[66] Although difficult to define in the most general way, these criteria should include such characteristics as dispatchability, load balancing, and dependability of providing peaking capacity. We believe that use of these criteria can reduce need for additional infrastructure, including for example combustion turbines for spinning reserves and so on.

Explanation: When developing the solar program contemplated by the PEIS and evaluating individual proposed solar projects, the BLM is required to follow the multiple-use mandate required by FLPMA and complete environmental reviews required by NEPA. In order for the BLM to fairly evaluate proposed projects, the agency needs to have good information about how a project would fit within the requirements FLPMA and NEPA, including the project's likely impacts and benefits. This information is also critical for informed engagement by the public, environmental organizations, and other stakeholders involved in the NEPA process.

The BLM is well versed in analysis of potential impacts, but less experienced in assessing potential benefits. The benefits from proposed solar projects are namely: a) the amount of clean energy produced and the associated displacement of emissions of $CO_2$ and other criteria pollutants, and b) the "value" that the new generation source provides in integrating with, and supporting, the rest of the electric grid, thereby minimizing the investment in additional infrastructure.

The best indicator of $CO_2$ emissions displaced is the total MWh of "no carbon" electricity generated by the new systems. Because, as shown in Table 1, the majority of conventional generation in the Southwestern states is from coal and gas, the solar generation will be displacing electricity from some type of fossil fuel fired plant.[67] This metric -- MWh generated per year -- is notably different from the nominal output capacity (measured in MW) of the plant because solar plants do not typically run all of the time.[68] A reliance on nominal output capacity would potentially place promising solar power technologies -- particularly those with storage -- at a significant disadvantage despite their important capability to provide dispatchable power during a utility's peak demand period and the fact that their actual annual power output - could potentially be greater.

**TABLE 1. PERCENT OF ANNUAL GENERATION FROM FOSSIL FUELS (2008)**

| State | % from Coal | % from Nat Gas |
|---|---|---|
| Arizona | 37% | 32.5% |
| California | 1.1% | 57.7% |
| Colorado | 65.2% | 25.2% |
| Nevada | 22.3% | 68.5% |
| New Mexico | 73.0% | 21.5% |
| Utah | 81.6% | 15.8% |

The first and probably most important indication of how well the new generation sources will interface with the existing grid is the dispatchability of the plant – that is, the ability to deliver the power to the utility when it is needed, as opposed to simply whenever the sun is shining. This capability is becoming increasingly important as peak demand in the Southwest continues to grow, not only in maximum capacity delivered, but also in duration during the day and an increasing amount of power is being produced from non-dispatchable sources, mainly solar PV and wind.

For example, in the PEIS the land area required for a power tower plant and a PV plant are estimated to be the same in terms of acres/MW. However, these values are NOT good metrics for the benefits -- or value – of the plant to the public. In particular, when the tower's higher capacity factor is taken into account we can see that the acres/MWh/year would be expected

[67] Although AZ and CA in particular, have significant nuclear capacity, these plants provide base load power and are not designed for load-following. It is unlikely they would be turned down to accommodate solar generation.

[68] The difference can be obtained through comparison of the capacity factor of equally sized plants. This is the ratio of the energy actually produced by the plant in a year divided by the amount of energy produced if the plant were able to run at its nameplate capacity for the full year. It is not defined well in the PEIS document.

to be much better (i.e. smaller) than for the PV plant.[69] Similarly when comparing two CSP plants -- one with, and one without storage -- the plant without storage would have a decided advantage in acres/MW, even though the unit with storage would most likely have a lower value in acres/MWh.[70] In fact, measuring water consumption on a MWh/year basis would obviate the need for the huge (3x) range of water consumption rates listed for the trough plants, since much of this range is attributed to differences in capacity factor.

The second figure-of-merit suggested, the value of the electricity generated to the grid, is clearly much more difficult for the BLM to measure. However, the utilities have largely incorporated this metric into the prices that they offer to the developers. As a consequence probably the best figure of merit for this characteristic is the comfort of both the utility and the developer with the power purchase agreement (PPA) that they can negotiate.

The approach recommended here is both more general and less prescriptive than the variety of metrics listed in the draft PEIS. As a result it should be more adaptable to changes in the technology, or even to completely new technologies like the Solar Tower (also known as 'Solar Chimney') plants currently being proposed in Arizona.

### Plant Design and Operating Characteristics

Recommendation: We recommend that the BLM rewrite the sections of the PEIS that describe the solar technologies to make them shorter, with more description of the general characteristics of the technology, and much simpler to understand. In particular, these sections should clearly identify the operating principles behind key subsystems of the CSP plants. These principles can then be used to form the basis for the plant descriptions offered later. Using this more general approach will allow the BLM and the public to fairly evaluate various proposed plants based on these descriptions.

Explanation: The draft PEIS does not accurately describe two important aspects of how CSP systems operate. First, a CSP system consists of three major sub-systems: the solar field, the power block, and the storage system (if storage is part of the plant). Within certain limits, the capacity of each of these subsystems can be varied independently to produce plants that

*Important Plant Characteristics:*

**Solar Multiple and Hours of Storage**

Solar Multiple is the ratio of the peak thermal output capacity of the solar field relative to the capacity of the power block. Thus, a plant with a solar multiple greater than 1.0 will actually collect more thermal energy than it can immediately use at solar noon on the summer equinox. Note that even when no storage is included in the design, engineers will typically use a solar multiple of 1.4 or larger, to maximize the utilization of the high-cost power block equipment.

Hours of Storage is the period of time that the fully charged storage system could drive the power block at its design capacity. The size of the storage relative to the power block is usually determined by the price paid for "on-peak" power and the daily duration of the on-peak period.

Note that increasing the size of the storage almost certainly implies increasing the solar multiple, since a larger field would be required to charge the larger storage. This will cause the acres/MW to increase, but could actually cause the acres/MWh/yr to decrease, since the capacity factor of the plant will go up significantly.

[69] In fact, for a tower plant the acres/MW ratio is NOT even a constant – it is a strong function of the radius of the field and the height of the tower, both of which are closely related to the size of the plant. This is intuitively seen by noting that the heliostats on the outer perimeter of the field need to be significantly farther apart to avoid shading and blocking. This is another example of using the characteristics of current designs to describe a technology that is in its commercial infancy.

[70] This mistake is actually made at least once in the PEIS document.

are optimized for specific economic considerations.[71] Because of the importance of these relationships, engineers have defined several terms – "Solar Multiple" and "Hours of Storage" -- to measure them, as described in the sidebar.

A plant that has a large storage system can potentially provide power through the utility's entire peak period, thus eliminating the need to operate – or potentially even to build -- costly and comparatively "dirty" combustion turbines to meet the peak demand. However under the existing draft PEIS language, such a plant is likely to not be evaluated fairly because it would require a fairly large solar field (and thus land area) relative to its capacity.

The second important mischaracterization in the draft PEIS is the relationship between the "operating temperature,"[72] the efficiency, and the water consumption of the plant. At several points in the draft PEIS it appears that the agency seems to argue against plants with higher operating temperatures, whereas in reality the increase in temperature will tend to allow the plant to operate more efficiently and will minimize the resource impacts per MWh delivered. In other words for every unit of thermal energy input, more electricity is produced.

A higher operating temperature can provide two positive benefits for the resource impacts of the solar system.

- First, since more of the thermal energy is converted to electricity, the amount of cooling -- and thus cooling water -- required is decreased.
- Second, since the power block is now producing more power per unit of thermal energy input, a smaller solar field will be required to drive a given output capacity, leading to a lower land requirement.

We recommend that the BLM rewrite the technology-related sections of the draft PEIS to correct these significant inaccuracies.

### Climate Change Impacts

Recommendation: The current draft PEIS makes no reference to the impacts that on-going changes in the climate of the Southwestern U.S. will have on either the future need for, or the performance of, the solar systems. We recommend that the BLM include references to the results of current climate change models, and briefly describe how the predicted changes could impact these technologies. Inclusion of these effects will make the document more general and should help to increase its adaptability as these effects become more apparent. It is important for BLM to address this issue, so that both BLM and other stakeholders can fairly evaluate a broad range of projects and programs in the future.

Explanation: It no longer seems either reasonable or wise to ignore the changes in our climate that are underway. This is especially true when considering the cost/benefit characteristics of

[71] To take an extreme example, in northeastern Australia there is a nearly constant need for power 24 hours a day to supply the mining operations that are the bulk of the demand. This would require a CSP system that has a very large field and storage relative to the power block. This requirement if very different than the optimized design for a plant providing residential needs of the greater Phoenix, Arizona area.

[72] Although this term is never defined in the draft PEIS, it is used to mean specifically the turbine inlet steam temperature.

plants that have an economic life of more than 20 years. The changes that have been predicted are likely to have significant impacts on both the demand for electricity and the performance of the solar plants. For example, the reduced rainfall and longer, hotter summers predicted for the desert Southwest would likely both increase the size and the duration of the peak electric load, and reduce the availability of water to cool any of the thermal plants (solar, fossil or nuclear) built in this region. In addition they would also increase the production penalty associated with dry-cooling technologies.

On the face of it, these impending changes would seem to indicate a preference for systems that have the highest efficiency and thus lowest water consumption, combined with the flexibility to adapt to changing conditions in the future. This consideration would also seem to argue for the BLM to maintain significant flexibility and adaptability in its technology considerations. All of the technologies described here are immature relative to conventional power generation technologies, and will inevitably evolve considerably over time. Similarly, new solar or other renewable technologies are likely to emerge (see earlier reference to Solar Towers/Solar Chimneys) that challenge today's "conventional wisdom" and offer a different balance of costs and benefits. Again this appears to argue for using principle-based, as opposed to prescriptive, metrics when considering the potential impacts and benefits of solar plants.

### *Organization of Document*

Recommendation: The technology sections of the draft PEIS appears to be designed to accommodate two functions: A primer on solar technology, and a "how to" instruction set for analyzing the potential resource impacts and benefits of varying solar technologies. Unfortunately, these two functions are interwoven in often confusing ways. We recommend that the BLM clearly separate them, make the solar technology description material more general and more analytical (as described in Section 1 above), and then show how the resource impact and benefits assessment relates to the general solar technology descriptions.

Recommendation: Reorganize and rewrite the technology sections, Chapter 3 and Appendix F. It's hard to see much distinction between the material presented in these two sections. In fact, in a number of cases it appears that these were authored by two separate writers who didn't read one another's section. We recommend consolidating them into a single, more general description of the technologies. Then perhaps use the Appendix to list the characteristics of specific current proposals as examples of the more general descriptions in Chapter 3.

Recommendation: We recommend that the BLM develop a glossary of important terms like solar multiple, hours of storage, capacity factor, and so on. If the definitions in this section are carefully designed, it would help a solar technology novice more quickly and completely understand some of the subtleties of the technology.

### *Technical issues*

The following sections contain subjects that are not as general as the topics above. However, they do appear to us to be serious enough to warrant substantial attention.

### Missing topics

- F-4, 11:[73] Provide a better description of how to handle fossil-hybrid system designs. The draft PEIS states that for those plants that will have fossil-fuel fired augmentation, "the environmental impacts… are not evaluated in this PEIS". We know that the BLM has procedures already in place for evaluating the environmental impacts of fossil-fuel burners, such as the procedures described in the draft EIS for the proposed Sonoran Solar project in Arizona. We recommend that these be incorporated by reference.

This important design option should be treated a bit more thoroughly to avoid confusion and potentially negative outcomes. For example, "topping off" the steam with fossil-fuels can increase the efficiency of the plant reducing both the water consumption and the size of the solar field, while also increasing the flexibility and dispatchability of the plant. It will be important that these benefits be balanced against the increased emissions profile of such a design.

### Technical Problems

The following comments refer to specific pages in the document, noted by (Section-Subsection, page #). It will likely be helpful for the reader to have the PEIS at hand to understand some of these comments.

- 3-4, 19: One should be cautious about using current technology as the standard for technology comparisons. For example, in this section it is stated that water is "needed" for cooling. This is obviously incorrect since it is clear that the primary barrier to dry cooling currently is an economic one. In this case it would be correct to state that water is "typically used" for cooling thermal plants.

- 3-4, 27: In this section the water consumption of a solar plant is compared to that of a single individual. This per capita comparison is between items that are neither of the same "type" or "kind." Since land and water use on the scale needed for solar development is much more similar to the requirements for agriculture, a more appropriate comparison might be to the per acre consumption of locally prevalent crops like cotton or alfalfa. Or – if there is a compelling reason to use human consumption as the standard – perhaps compare the solar consumption to the "per acre" water use of a typical Southwestern subdivision.

- 3-11, Table 3.1-1: The range of water use (3x) for CSP is unduly large as a result of including a very large range of capacity factors (30 percent to 60 percent) and other inputs. Water consumption should be measured relative to MWh/yr, instead of

[73] The numbers that precede each point represent the section and page number. For example 3-2,3 is from Section 3-2, page 3. Similarly F-4,11 is from Appendix F, Section 4, page 11.

MW/yr, to eliminate the confusion introduced by the very large range of capacity factors. MWh/yr comparisons would eliminate the uncertainty introduced by the wide range of capacity factors introduced by all of the technologies.

The numbers given in the draft PEIS are not well-supported and are sometimes wildly too general. Examples include the water requirements for troughs (on 3-4,24, 4.5-14.5 ac-ft/yr/MW) and for tower plants (on 3-6,21, 9 ac/MW), as well as the land requirements for PV (on 3-11, Table 3-1.1).

In addition, the estimates for land requirements tend to be notably higher than estimates found in other literature. Trough estimates seem to be based on actual plants that are in operation while estimates for the other technologies are based on proposals for plants. However, it is noted earlier in the draft PEIS that developers tend to submit proposals for dramatically more land than they actually plan to use. For example, the table below details examples of acreage estimates drawn from a recent literature search.

| | **Parabolic Trough** | **Power Tower** | **Dish / Stirling** | **PV** |
|---|---|---|---|---|
| **Required area (acres/MW)** | 6 | 5 | 4 | 4 |
| **Total water usage (Gal/MWh)** | 718 | 718 | 1 | 1 |
| From: "Study of Potential Mohave Alternative/Complementary Generation Resources", Sargent & Lundy Global Energy Consulting (Reviewed and Approved by David W. Cohn), February 2006 | | | | |

- 3-6, 5 – Acreage per MW capacity for Towers can vary widely with the size of the plant, the amount of storage and the tower height. It would probably be best to use a range here.
- 3-6, 19 – The estimated water consumption cited here for power tower plants is the same as for trough plants. This is not only contradicted elsewhere in the document, but most engineers and analysts generally assume that tower plants will require less water per unit output because of their higher operating efficiencies resulting from higher operating temperatures.

- 3-9, 7 – The “excess heat” addressed in this line comes from higher levels of solar concentration, not higher levels of operating efficiency.
- 3-11, 5 - This is a "per power block" number and is an economic optimum, not a physical limitation. It is likely that the economic and technical limitations that cause these economic optima today will change as the technology improves and electricity becomes more expensive.
- F-3, 29 - Quote from text: “One inherent limitation of solar energy technologies is that power can be produced only when the sun is shining.” This is incorrect. It would be correct to say, "energy can be collected only when the sun is shining." But plants with storage can still generate electricity without direct solar thermal input.
- F-4, box – Quote: "the more insolation, the higher temperature". We suggest that this sentence be deleted since it is not necessarily true. A good example is Colorado’s San Luis Valley that has very strong insolation levels because of its high altitude and dry climate, but the high altitude also brings lower ambient temperatures.
- F-7, 5-8 – The description of Organic Rankine Cycle engines (ORCs) is problematic. We recommend that the BLM rewrite this section keeping the following points in mind.
    - No analogy to steam cycles is ever mentioned. ORCs use exactly the same thermodynamic cycle but with a working fluid typically better suited to lower temps.
    - Low temperature Rankine cycles rarely have efficiencies much above 20%. A thermal efficiency of 85% for a Rankine cycle of any sort is a wildly atypical result. At the very least a citation is required to support this statement.[74]
    - There are numerous reasons that conventional power plants use steam – vs. organic fluids -- as their working fluid. This introduction ignores these, and as a consequence would leave the reader wondering why all plants aren’t ORCs?

[74] It may be that the author picked up a “2nd Law” efficiency number by mistake. This is a measure of how well a cycle performs relative to an “ideal cycle” at that same temperature range. However, this type of efficiency rating is NOT comparable to the other efficiencies cited in the draft PEIS.

  - ORCs also require cooling, just like steam turbine generators (STGs). The reason that they don't typically use wet cooling is that they are usually so small that wet cooling would be too costly to justify.
  - F-16,40 – This section describes the "intrinsic benefits of ORC engines" This type of engine is neither new nor innovative. It has a variety of important and well-understood applications, typically for smaller and lower-temperature situations. Solar plants are not limited to the low temperatures that require the use of organic working fluids. It is an advantage to be able to have high enough temperatures and large enough plants to use steam. This is why the operating and proposed plans are all designed to use steam cycles and not ORCs.

- F-8, 43 – This material appears dated. There are not many faceted glass mirrors being installed today because they are too expensive. Curiously there is no mention of polymer membranes, e.g. SkyFuel's ReflecTech.
- F-12,1 – Although this statement is technically true, large tanks for HTF or TES must have containment basins (this is a standard design feature for all large industrial tanks). Salt is easily cleaned up once it freezes (which happens at typical ambient temperatures). Clean up of leaks of organic HTF from existing plants is routinely handled by off-site incineration.
- F.2.2.2.1 (F-14, 23) – The discussion of the CFLR technology seem overly optimistic. We recommend that this discussion include a careful analysis of the proponents' claims, and an examination of the technical hurdles facing this technology.
- F-19, 19 – The term 'solar multiple' is used here but doesn't seem to ever be defined. We recommend that, as part of the more general discussion of solar technologies recommended in Section I above, this be included in a glossary of important solar engineering terms.
- F-19, 26 – The statement is made that plants with TES can produce power during peak loads during times when power is more valuable to system operators and that this "may result in a somewhat higher cost of electricity for consumers". This statement does not make sense since peak power from a solar system is likely to be much LESS costly than the conventional peak power sources such as combustion turbines. This should lead to <u>lower</u> costs to consumers.

- F-20, 8 - Good discussion of capacity factor and the relationship between solar multiple (still yet to be defined), TES capacity and nameplate capacity of power block. This is a critical design characteristic of CSP systems and should be introduced very early and given some prominence. This also is closely related to the concept of normalizing system characteristics to energy output rather than design capacity.
- F-22, text box – The listing of 'Structures and Improvements' is missing the power block facility, which can run 10,000 sq ft. or more. The comparison does include this facility (F-23, 18)
- F-23, 10 – Overestimates a production of 600,000 MWh/yr from a 26.5% capacity factor. These numbers are not internally consistent.
- F-35, 1 - Promoters of CLFR claim a benefit of this technology will be the ability to achieve higher temps than trough technologies, not lower. This would increase operating efficiencies and decrease water consumption.
- F-40, 27 – The sentence "practical limitations exist as to the length of time heat can be stored in molten salt" is very misleading. The limit is not in the length of time heat can be stored, which is very long, but optimizing the size of the tanks to the hours available for full production from the storage. This economic optimization time, in the American southwest, is roughly 6 hours. In other situations this optimum will change dramatically.
- F-41, 5 - This is an amazingly confusing way to present this material. In fact, the challenges with using salt as the HTF fall into 3 categories.
    1) Materials challenges caused by:
        - Higher temperatures, and
        - Corrosion
    2) Increase in parasitic power losses resulting from:
        - Higher viscosity, and
        - Freeze prevention
    3) Increases in maintenance costs caused by all of the above.

Materials issues like these can probably be addressed pretty successfully, although there will likely be some additional capital cost. However, the parasitic power losses are largely intrinsic

and are unlikely to go away. The maintenance issues are probably amenable to some reduction through long-term "learning" and optimization of maintenance procedures.

- F-43, 11 – As with the ORC, this is an unusually high number that at least needs a citation. Manufacturers will often claim to hit 60% in their top-of-the-line combined cycle plants. A claim of 80% First Law conversion efficiency needs a citation, at least.
- F-45, 1 – Incorrect claim and use of standard terminology. Using fuel combustion as the heat source for a Stirling engine does not make it an internal combustion engine. (By this token steam locomotives would also have been internal combustion engines!). "Internal combustion" refers to combustion happening inside the engine proper, e.g. within a cylinder. Stirling engines are intrinsically limited to using external heat sources. (See also 51,17-23)
- F-57, 31 - Asserting that multi-junction cells will ultimately be the most cost-effective choice for utility-scale PV plants seems like an overstatement at this point in the development of the technology. (see also 60,13-15, and 62,19-23)

## Inconsistencies

- In Chapter 1, dish/Stirling solar technologies are categorized with photovoltaic (PV) technologies, as opposed to concentrating solar power (CSP), because these two do not use steam and a power block in electrical production, however after this point dish/Stirling is viewed as a CSP technology because it utilizes the concentration of the sun's thermal energy.
- Ch3 – The acreage and water specifications are internally inconsistent between Ch3 and the Appendices. For example, power tower water consumption is stated to be 800 gal/hr/MW in Ch 3 (3-6,21) and 600 gal/MWh in Appendix F (F-34,26).
- Novel and untested technologies are described in glowing terms with few – or no -- technological hurdles mentioned. For example:
  - Molten salt as a heat transfer fluid (HTF) (Intro-42, 14).
  - Compact linear Fresnel reflectors (CLFR) discussed as a "variation" on trough technology (3-3, 39).
  - Thermal energy storage (TES) for dish technologies (3-6, 40).
  - Organic liquids for cooling loops (3-14, 10).
- No mention of solar tower (chimney) despite project applications in Arizona and a PPA with Southern California Public Power Authority.

- Appendix F asserts that multi-junction cells "will be the choice" of utility-scale PV plants then later observes that current plants tend to be thin-film and that thin-film will be the likely choice for future "grid-connected central plants" (F-62,19; F-59,29-31; F-60,13-16).
- Inconsistent definition of “maximum” plant sizes - PV/dish vs. trough/tower. The “maximum” sizes listed for the trough and tower technologies are, in fact, economically optimal sizes based on current costs and heat transfer considerations. There are already several proposals for projects that consist of multiple adjacent trough and/or tower plants (3-11, Table 3-1.1).

## APPENDIX VII. CRITERIA FOR USE IN IDENTIFYING AND PRIORITIZING LANDS TO BE CONSIDERED FOR NEW OR EXPANDED ZONES

Bureau of Land Management (BLM) lands offer some of the most intact landscapes, wildlife habitats and corridors, and important ecological resources in the United States. In addition, these landscapes include important cultural resources and historic sites and are part of a mix of lands managed by federal and state agencies for their recreational, scenic, historical and cultural values such as units of the National Park System, national monuments, and national wilderness areas.

Human understanding of the arid ecosystems that are most often of greatest value for solar energy development is limited and evolving. While thought of by some as "wastelands," these landscapes are, in fact, rich in biodiversity and in historic, cultural, scenic, and recreational value. For these reasons, a deliberate and thoughtful process for their review for solar energy development based upon a set of criteria that recognize the important values of these landscapes is required.

The following is an approach for screening lands with high solar energy potential that meet appropriate standards for energy potential, aspect, and slope (relative to the technology to be employed) to ensure the protection of important ecological, historic, cultural, and scenic values. In addition to applying these screens in assessing the potential acceptability of sites for solar energy zones, early and frequent stakeholder involvement should be employed to ensure that those who have an interest in the candidate lands and/or may be affected by their potential development are an integral part of the process.

To evaluate new and potential solar energy zones as a part of the Modified Solar Energy Zone Alternative presented in our comments of the Draft Solar Energy Programmatic Environmental Impact Statement, we recommend a two-step process that employs a Landscape-Scale Assessment Approach followed by the identification and prioritization of Least Conflict Lands within identified landscapes deemed to have high solar energy zone potential.

The overarching goal of this approach is to ensure that zones where solar energy projects are located are areas of high energy potential that, when developed, will not adversely affect the persistence, distribution and diversity of the ecoregional biota and all its natural components and processes today and in the future while protecting important historic, cultural, scenic, and recreational values.

The **Landscape-Scale Assessment** should:

- Contain an evaluation of both public and private lands in a geographic area that makes sense from a biological perspective.
- Clearly define objectives that guide selection of conservation targets/goals, structure of impact analyses, and the targets and measures selected for monitoring.
- Evaluate the impact of various planning scenarios on the biodiversity and ecosystem function goals as well as on the target species.

- Implement and improve upon existing conservation and recovery plans
- Result in a conservation reserve design that best satisfies this suite of biological goals while also meeting renewable energy goals.
- Include an adaptive management framework.

From an ecological perspective, the following must be considered as part of developing the reserve design under the landscape-scale assessment:

- Locations that support sensitive biological resources, including federally designated and proposed critical habitat; significant populations of federal or state threatened and endangered species; significant populations of sensitive, rare and special status species; and rare or unique plant communities.
- Areas of Critical Environmental Concern (ACEC), Wildlife Habitat Management Areas, proposed Habitat Conservation Plans and Natural Community Conservation Planning Conservation Reserves.
- Landscape-level biological linkage areas required for the continued functioning of biological and ecological processes and allow for long-term shifts in distribution of native species in response to climate change.
- Wetlands and riparian areas, including the upland habitat and groundwater resources required to protect the integrity of seeps, springs, streams or wetlands.
- Areas that support a geophysical or other ecosystem process upon which sensitive biological resources depend.

The DPEIS states that "all BLM-administered lands are not appropriate for solar energy development." The landscape-scale assessment should incorporate and build off of the following areas, which have already been identified as by the DPEIS as inappropriate for solar energy development based on environmental criteria:[75, 76]

- All ACECs, including Desert Wildlife Management Areas (DWMAs) in the California Desert District.
- All critical habitat areas (designated and proposed) for listed species under the Endangered Species Act of 1973 (as amended).
- All areas where the applicable land use plan designates no surface occupancy.
- All areas where there is an applicable land use plan decision to protect lands with wilderness characteristics.
- All Special Recreation Management Areas, developed recreational facilities, and special-use permit recreation sites (e.g., ski resorts and camps).

[75] Note: some of these overlap with the key ecological considerations identified above.

[76] While this list is focused on ecological considerations, a comprehensive list of cultural resource areas to be avoided was laid out in a letter sent to Secretary Salazar and California Governor Schwarzenegger dated June 29, 2009. This includes areas with a high density of cultural resources requiring inventory and consultation, Historic Property/National Register, National Historic Landmarks and Landmark Districts, National Historic Districts and Archaeological Districts, High potential route segments and high potential historic sites of National Historic Trails, National Historic and Scenic Byways, sacred sites identified by an Indian tribe in accordance with Executive Order 13007, and traditional Cultural Properties eligible for or listed in the National Register of Historic Places or an equivalent state register.

- All areas where solar energy development proposals are not demonstrated to be consistent with the land use management prescriptions or where the BLM has made a commitment to take certain actions with respect to sensitive species habitat, including but not limited to sage-grouse core areas, nesting habitat, and winter habitat; Mohave ground squirrel habitat; and flat-tailed horned lizard habitat.
- All right-of-way (ROW) exclusion areas designated in applicable plans.
- All ROW avoidance areas designated in applicable plans.
- All areas where the land use plan designates seasonal restrictions.
- All desert tortoise translocation sites identified in applicable land use plans.
- Big game migratory corridors identified in applicable land use plans.
- Big game winter ranges identified in applicable land use plans.
- Research Natural Areas.
- Lands categorized as Visual Resource Management Class I or II (and, in Utah, Class IIIb).
- National Recreation Trails and National Back Country Byways.
- National Historic and Scenic Trails, including a corridor of 0.25 mi (0.4 km) from the centerline of the trail, except where a corridor of a different width has been established.
- National Historic and Natural Landmarks.
- Within the boundary of properties listed in the "National Register of Historic Places" and additional lands outside the designated boundaries to the extent necessary to protect values where the setting and integrity is critical to their designation or eligibility.
- Areas with important cultural and archaeological resources, such as traditional cultural properties and Native American sacred sites, as identified through consultation.
- Wild, Scenic, and Recreational Rivers, including a corridor of 0.25 mi (0.4 km) from the ordinary highwater mark on both sides of the river, except where a corridor of a different width has been established.
- Segments of rivers determined to be eligible or suitable for Wild or Scenic River status, including a corridor of 0.25 mi (0.4 km) from the ordinary high-water mark on either side of the river.
- Old-growth forest.
- Lands within a solar energy development application found to be inappropriate for solar energy development through an environmental review process that occurred prior to finalization of the PEIS.

Finally, the following areas should be avoided when identifying areas for directed development because of the high degree of conflict that a proposal for development would cause:

- Lands purchased for conservation including those conveyed to the BLM.
- Proposed Wilderness Areas, proposed National Monuments, and Citizens' Wilderness Inventory Areas.
- Locations directly adjacent (within 2 miles) to National or State Park units.

In addition to screening landscapes in accordance with the above criteria and guidance, we further recommend that a second step in this analysis should be to identify and **prioritize Least Conflict Lands** within the landscapes identified above (or, under some circumstances, though rarely, outside of those larger landscapes) in the selection of future solar energy zones by guiding

zones to areas consisting of or dominated by land types and landscapes that reflect the following characteristics:

- Lands that have been mechanically disturbed, i.e., locations that are degraded and disturbed by mechanical disturbance:
    - Lands that have been "type-converted" from native vegetation through plowing, bulldozing, or other mechanical impact often in support of agriculture or other land cover change activities (mining, clearance for development, heavy off-road vehicle use).
- Public lands of comparatively-low resource value located adjacent to degraded and impacted private lands on the fringes of BLM-managed land. This combination of public and private lands could allow for a conjunctive use area, allowing for the expansion of renewable energy development onto private lands.
- Brownfields and other contaminated or previously contaminated sites identified by the Environmental Protection Agency's RE-Powering America's Land Initiative.
- Idle or underutilized industrialized sites.
- Existing transmission capacity and infrastructure are typically in place.
- Locations adjacent to urbanized areas.
- Locations that minimize the need to build new roads.
- Locations that could be served by existing substations.
- Areas proximate to sources of municipal wastewater for use in cleaning.
- Locations proximate to load centers.
- Locations adjacent to federally-designated corridors with existing major transmission lines with capacity to carry the additional electricity generated by proposed facilities.
- Locations that have been repeatedly burned and invaded by fire-promoting non-native grasses.

It is important to recognize that several ongoing processes have employed this or a similar approach in attempting to guide future solar energy development to locations that would achieve the objectives of high solar energy potential that, when developed, will not adversely affect the persistence, distribution and diversity of the ecoregional biota and all its natural components and processes today and in the future, nor negatively affect important cultural, historic, and scenic values. The Desert Renewable Energy Conservation Plan in California and the Arizona BLM's Restoration Design Energy Project provide two examples of processes that employ many of these criteria and guidelines to identify potential zones for future solar energy development. These processes warrant further development and, perhaps, should be replicated in other western states.

**APPENDIX VIII. SURVEY OF BEST MANAGEMENT PRACTICES FOR RENEWABLE ENERGY DEVELOPMENT**

# BEST MANAGEMENT PRACTICES FOR SITING, DEVELOPING OPERATING, AND MONITORING RENEWABLE ENERGY IN THE WEST: A CONSERVATIONIST'S GUIDE

**April 2011**

Edited by:
Allison Jones and Jim Catlin, Wild Utah Project

Expert peer review provided by: Robert Adams: RedCo Energy, Alex Daue: The Wilderness Society, Robert Duboc: Western Resource Advocates Utah Office, Greg Erdman: OCAS, Inc., Jim Gazewood, Bureau of Land Management, Gary Graham: Western Resource Advocates National Office, Jason Groenewald: Duke Energy, Sophie Hayes: Utah Clean Energy, Arthur Morris: HEAL Utah, Jamo O'Reilly: Wasatch Wind, Sophie Osbourne: Wyoming Outdoor Council, Steve Slater: Hawkwatch International, Diana Whittington: U.S. Fish & Wildlife Service.

## Table of Contents

# Introduction

Development of renewable energy provides important benefits, enhancing our energy security and helping us shift away from climate-changing fossil fuels. Currently, the Department of the Interior is on track to permit more than 30 "fast track" wind and solar generation and transmission projects, and has committed to a performance goal of 9,000 megawatts of renewable energy by the end of 2011. In 2010, the Department of the Interior approved a dozen renewable energy projects on public lands, including nine commercial-scale solar energy initiatives that combined will create more than 7,000 construction and operational jobs and produce almost 4,000 megawatts of energy, enough to power 1.2 million American homes. So far eight of eleven western states have adopted Renewable Portfolio Standards requiring utilities to generate 15 to 25 percent of energy from renewable sources. It is likely that we will have 50,000 MW of new wind power online in the U.S by 2020.

Our early experiences with permitting and constructing wind and solar energy facilities has shown us that meaningful renewable energy development will only happen at the pace and scale needed to transition away from fossil fuels if we do it "smart from the start." That means establishing a proactive approach to siting and conservation strategies that protect wildlife and wildlands while allowing renewable energy deployment to ramp up. We here explore this approach and refer to it as a set of Best Management Practices (BMPs) for renewable energy siting and development.

These Best Management Practices for renewable energy siting and development and the justification for them draw on scientific, peer-reviewed research. While primarily written for conservationists who are working to positively affect renewable energy development in the West, this manual can also help to better inform wind and solar energy developers, stakeholders and decision-makers about the link between wind and solar energy development and responses by wildlife and the functions of their habitat. The goal is to enable developers, wildlife agencies, conservationists and other stakeholders to work with a consistent knowledge base and set of appropriate technical questions and well-established guidance to assess a given project location and develop wind and solar energy in a way that is smart from the start for wildlife and their habitats.

These BMPs were designed to guide conservationists to positively affect renewable energy siting and development outside of the built environment. The potential of distributed small-scale generation, such as rooftop solar, to meet Western energy needs is strong. Yet, there are literally hundreds of proposed wind and solar projects – outside of the built environment – on the books for the coming decades, and we must work to ensure that these developments are done right with regard to wildlife and their habitats. While decreasing energy demand in our cities through efficiency and other demand-side measures can reduce the need for large scale renewable energy facilities to be built outside of our cities, this strategy is not addressed in this document.

Similarly, this document does not address geothermal development. Instead, we refer readers working on geothermal plant siting and environmental issues to a number of other useful publications, including the Bureau of Land Management's and U.S Forest Service's Programmatic Environmental Impact Statement for geothermal leasing in the Western U.S (BLM and USFS 2008a and b), the Wilderness Society's publication on geothermal development on public lands (TWS 2010), the Geothermal Energy Association's *A Guide to Geothermal Energy and the Environment* (GEA 2007), and the U.S. Department of Energy's *Geothermal Power Plants – Minimizing Land Use and Impact* (USDOE 2008).

The guidelines and BMPs are not designed to address transmission beyond the point of connection to the transmission system. The national grid and proposed smart grid system are beyond the scope of this document. For wildlife and habitat related issues regarding transmission impacts and transmission planning, we refer readers to *Smart Lines: Transmission for the Renewable Energy Economy* (Resource Media and WRA 2008) the Western Electric Coordinating Council's Environmental Data Task Force's *Preliminary Environmental Recommendations for the Transmission Planning Process* (WECC 2011), and the Avian Power Line Interaction Committee's *Suggested Practices for Avian Protection on Power Lines* (APLIC 2006).

Use of these BMPs and this guidance document by the conservation community and others should help ensure that potentially adverse impacts to most species of concern and their habitats present at renewable energy project sites would be reduced. These BMP's and this manual will evolve over time as additional experience, monitoring and research becomes available on how to best minimize wildlife and habitat impacts from wind and solar energy projects. As such, we plan to continue work with industry, developers, the conservation community and other stakeholders and states to evaluate, revise and update these BMPs and guidance document on a periodic basis.

# Laws and Regulations for Renewable Energy Development

Numerous laws, federal regulations, state ordinances, and Executive Orders either directly or indirectly provide management, regulatory and policy guidance for siting, zoning for, and permitting large scale solar and wind energy development on both private and public lands. We give an overview here sufficient to help conservationists have a general understanding of these processes. Much more detailed guidance on these topics has been published by the National Wind Coordinating Collaborative (2002), American Wind Energy Association (2008) and Stoel Rives, LLP (2010). While these guidelines for understanding zoning, siting, regulatory, and permitting process are primarily focused on wind energy and wind energy developers and utilities, they are still useful for conservationists trying to affect these processes for both solar and wind development.

**Executive and (Interior) Secretarial Orders relating to energy development**

On May 18, 2001, President George W. Bush issued Executive Order (E.O.) 13212, "Actions to Expedite Energy-Related Projects," which established a policy that federal agencies should take appropriate actions, to the extent consistent with applicable law, to expedite projects to increase the production, transmission, or conservation of energy.

In 2009, the Secretary of the Department of the Interior Ken Slazar issued Secretarial Order Number 3285, which acknowledged the need to identify suitable areas for both wind and solar development on Interior Lands. This was a great stride toward creating a policy framework capable of tackling the challenge inherited by the Obama administration, when it inherited an Interior bureaucracy focused on oil and gas development, and faced with hundreds of wind and solar permits languishing in a queue dating back to 2002. This Secretarial Order was clarified in 2010 by Secretarial Order 3285A1 which ordered the Department of the Interior to identify and prioritize locations best suited for solar development.

## Inter-agency MOUs

Also in May of 2001, the President's National Energy Policy Development Group (NEPDG) recommended to the President, as part of National Energy Policy, that the Departments of the Interior, Energy, Agriculture, and Defense work together to increase renewable energy production (NEPDG 2001). In July 2001, the Departments created an interagency task force to address the issues associated with increasing renewable energy production on federal lands (USDOE and USDOI 2002). The task force developed a Memorandum of Understanding (MOU) among the U.S. Department of Energy, U.S. Department of the Interior, U.S. Department of Agriculture, U.S. Environmental Protection Agency, Council on Environmental Quality and the members of the Western Governors' Association to establish a framework for cooperation between western states and the federal government to address energy problems facing the West and to facilitate renewable energy production.

## Energy Legislation

On August 8, 2005, the President signed into law the Energy Policy Act of 2005 (P.L. 109-58). Section 211 of the Act states, "It is the sense of the Congress that the Secretary of the Interior should, before the end of the 10-year period beginning on the date of enactment of this Act, seek to have approved non-

hydropower renewable energy projects located on the public lands with a generation capacity of at least 10,000 megawatts of electricity."

**Renewable Energy on Tribal Lands**
Tribal lands are not federal public lands or part of the public domain, but are rather retained by Tribes or set aside for tribal use pursuant to treaties, statutes, court orders, executive orders, judicial decisions, or agreements. Thus, Tribal lands are not subject to the controls or restrictions set forth in federal public land laws. Tribes manage Indian lands in accordance with tribal goals and objectives, within the framework of applicable laws. Tribal coordination is important not only in federal discussions about renewable energy. Many tribal traditional lands and tribal rights extend outside federal lands onto state regulated lands. In addition, tribal interests can also be impacted in private land developments. A discussion of tribal input to all proposed solar and wind projects is important.

**Bureau of Land Management**
We chose to focus chiefly on the Bureau of Land Management (BLM) for this guidance document because the majority of permitted solar and wind facilities on public lands thus far have been on BLM lands. The American Wind Energy Association's Wind Energy Siting handbook (2008) addresses wind energy development on lands administered by other federal agencies, such as Bureau of Reclamation, Bureau of Indian Affairs, U.S. Forest Service, and U.S. Department of Defense. While this handbook primarily addresses siting, zoning, permitting, and regulatory issues surrounding development of wind projects, there is also applicability to solar energy development in terms of these issues and processes on a variety of federal lands.

***BLM Wind PEIS and permitting***. In 2005 the Bureau of Land Management (BLM) issued a Record Of Decision on the implementation of a wind energy development program and how this would affect 52 land use plans in nine states (basically by amendment). The decision (BLM 2005a) established policies and Best Management Practices for the administration of wind energy development activities and established minimum requirements for mitigation measures. The policies and BMPs were evaluated in the Final Wind Energy Programmatic Environmental Impact Statement, or PEIS (BLM 2005b). The amendments to the 52 land-use plans were to include (1) adoption of the BLM's Wind Energy Development Program policies and best management practices (BMPs), and (2) identification of specific areas where wind energy development will not be allowed.

The Record Of Decision (ROD) for the Wind PEIS explains how site-specific concerns, and the development of additional mitigation measures, will be addressed in project-level reviews, including NEPA analyses, as required. It also requires that at this site-specific level, natural resource issues and concerns must be addressed by project-specific plans, programs, and stipulations during each phase of wind energy development, and that mitigation measures protecting these resources will be required to be incorporated into project Plans Of Development. This will include incorporation of specific programmatic BMPs as well as the incorporation of additional mitigation measures contained in other, existing and relevant BLM guidance, or developed to address site-specific or species-specific concerns.

The ROD also outlines how the BLM will initiate consultation early in the process of wind development on BLM lands with the following, as appropriate and required by law: Indian Tribal governments, U.S Department of Defense, the U.S. Fish and Wildlife Service, and the State Historic Preservation Office. It goes on to say that the level of environmental analysis to be

required under NEPA for individual wind power projects will be determined at the Field Office level, will incorporate public involvement, and will include analyses of project site configuration and micrositing considerations, monitoring program requirements, and appropriate mitigation measures. The BLM also requires financial bonds for all wind energy development projects on BLM-administered public lands to ensure compliance with the terms and conditions of the rights-of-way authorization and the requirements of applicable regulatory requirements, including reclamation costs.

With the decision to implement the Wind Energy Development Program, the BLM Interim Wind Energy Policy (BLM 2002) was replaced by a new policy in 2006 (Wind Energy Development Policy IM 2006-16) that incorporates the programmatic policies and BMPs evaluated in the PEIS. That framework was carried forward and supplemented by BLM's revised Wind Energy Development Policy IM 2009-043, issued in 2008. One major revision in the 2008 IM compared to the 2006 IM allows wind energy development in an Area of Critical Environmental Concern (ACEC) to the extent that it would be consistent with the management prescriptions of that individual ACEC.

On BLM lands, wind project development usually proceeds in two phases: (1) a site testing and monitoring phase and (2), if the wind resource is viable, a project construction and operation phase. BLM permits all wind facilities, whether for testing and monitoring or for project construction and operation, through use of Right of Way (ROW) grants authorized by the Federal Land Policy and Management Act ("FLPMA"), 43 U.S.C. §§ 1701-1784. BLM offers three types of BLM wind energy ROWs: a Site Specific Grant for Testing and Monitoring ("Site-Specific Grant"), a Project Area Grant for Testing and Monitoring ("Project Area Grant"), and a Development Grant for project construction and operation.

***BLM Solar PEIS and permitting***. In 2007, the BLM developed and issued a Solar Energy Development Policy (BLM Instruction Memorandum 2007-097*)* to establish procedures for processing Right of Way applications. This policy was updated in 2010 by two more detailed policies (BLM Instruction Memorandums 2010-141 and 2011-003). In accordance with these policies, the BLM currently evaluates solar energy ROW applications on a project-specific basis. In 2010 the BLM issued a Draft Programmatic Environmental Impact Statement (PEIS) (BLM 2010a) in order to develop a new Solar Energy Program. The PEIS will support utility scale solar energy development on BLM-administered lands that would be applicable to all pending and future solar energy development applications upon execution of the Record of Decision (ROD) and implementation of this decision through amendment of relevant BLM land use plans in six western states.

The Solar PEIS evaluated the potential effects of establishing the solar energy program elements and strategies across the six-state study area (California, Nevada, Utah, Arizona, Colorado and New Mexico). The analysis informed BLM's decision to identify 24 Solar Energy Zones within the six-state study area. The BLM decided that these 24 locations are best-suited for utility-scale solar energy development (i.e., high resource value and low [or limited] resource and/or environmental conflicts). In addition to presenting general design features to best develop solar resources, the Solar PEIS identified specific design features for projects developed within individual Solar Energy Zones. However, the PEIS also explains that the BLM's proposed solar energy program would require that site-specific and species-specific issues be addressed during individual project reviews. These evaluations would tier to the programmatic analyses in the Solar PEIS and the decisions implemented in the resultant ROD.

***BLM regulations pertaining to both solar and wind energy***. In the case of either wind or solar development on BLM lands, BLM Manual 6840 "Special Status Species Management" (BLM 2001) would require that appropriate survey, avoidance, and mitigation measures would need to be identified and implemented prior to any construction activities to avoid impacting any sensitive species or the

habitats on which they rely. Also, in areas that experience ground disturbing activity, it is important to remember that the BLM Standards and Guidelines for Healthy Rangelands (CITE), still apply to those lands. This is particularly important to consider when, for example, wind turbines are erected in an active grazing allotment.

Also, in February 2011 the BLM issued three related Instruction Memoranda (IM 2011-59, 2011-60 and 2011-61) to reiterate and clarify existing BLM National Environmental Policy Act (NEPA) policy to assist offices that are analyzing externally-generated, utility-scale renewable energy right-of-way applications. It includes examples and guidance applicable to renewable energy right-of-way applications that supplement information in the BLM's NEPA Handbook (H-1790-1). Utility-scale renewable energy projects are distinct from many other types of land and realty actions due to their size and potential for significant resource conflicts, as well as the priority that has been placed on them by the Department of the Interior.

***Special section – amending BLM land use plans in light of Solar and Wind Programmatic Environmental Impact Statements***

Land use plans are important in siting renewable energy facilities. Such a planning process provides a means to comprehensively address the diverse topics described in this best management practice guide. In most settings, compliance with approved land use plans is a legal requirement for a large project on public lands. This section summarizes the theoretical basis for land use, and describes planning practices using BLM lands as an example.

*Theoretical Basis for Land Use*

The American Planning Association (AMP) defines a land use plan as "an adopted statement of policy, in the form of text, maps, and graphics, used to guide public and private actions that affect the future. A plan provides decision makers with the information they need to make informed decisions affecting the long-range social, economic, and physical growth of a community" (AMP 2006). Given goals or end results that are desired, planners determine the best means for achieving them.

According to BLM's Land Use Planning Handbook 1610-1 (BLM 2005c), BLM's land use plans are created within a process that follows the model for rationality described in planning theory. Planning theory views rationality as a central rule in planning methodology (Faludi 1973). In this context, rationality means the power of reason as opposed to faith and values to define a central fact (Teitz 1985). Rationality in planning is the standard used to measure decisions (Faludi 1985) and provides political legitimacy to the process (Weaver et al. 1985). Plans must guide and result in action otherwise they are outside the realm of testable rationality (Johnson 1985). Perhaps more than other fields, land use planning has embraced rationality as a core concept (Teitz 1985). Rationality in planning involves standard technical processes for management, control of specialist information, and a clear system of rules, monitoring, and analysis (Weber 1947).

In the field of planning, ethics play a role in evaluating the objectivity and legitimacy of any completed plan. The American Planning Association (2009) has developed a code of ethics that should be followed in land use planning:

- A planner must provide full, clear and accurate information to citizens and decision makers.
- A planner must exercise independent professional judgment on behalf of the clients, employers, and public.
- A planner must report any actual, apparent or reasonably foreseeable conflict between the planner and the client or employer.

*Planning Practices on BLM Lands*
Since more of the future renewable energy proposed for the West will occur on BLM lands than on any other government agency's land, this section will focus on the application of land use planning by BLM.

BLM's land use planning process is guided by BLM Handbook 1601-1 (BLM 2005c). Required by an act of Congress (FLPMA, 43 U.S. C. 1711-1712), BLM land use plans are called Resource Management Plans (RMPs). BLM's handbook directs land use plans to establish goals and objectives for resource management (desired outcomes) and measures to achieve these goal and objectives (management actions and allowable uses). Such RMPs are to make decisions that guide future land management actions and site specific implementation (BLM 2005).

Three types of land use plan decisions are described in BLM's planning handbook – desired outcomes, allowable uses, and management actions. These can be defined as follows:

- **Desired outcomes** are "expressed in terms of specific goals and objectives." Goals are "broad statements of desired outcomes (e.g. maintain ecosystem health and productivity, . . .)." Where possible, objectives are quantifiable and measurable within an established timeframe for achievement.

- **Allowable use** identifies the type of use and where it is allowed or prohibited. The resulting plan then defines which areas allow, prohibit, or put limitations on actions or uses.

- **Management actions** include restoration or administrative designations for areas such as Areas of Critical Environmental Concern or Research Natural Areas. For example, where undesired habitat conditions may not correct themselves on their own, management actions may be necessary to restore habitat to land use plan objectives. Any action that BLM takes must by law conform with an approved land use plan. Conformance means that the action is consistent with the terms, conditions, and decision of the plan (43 CFR 1601.0-5(b). For example, a decision to permit a drilling operation in an area where the approved RMP prohibits surface activity would be considered not to conform with the plan. If the plan does not mention the action, then it is assumed to be in conformance. This legal requirement creates an incentive in BLM to limit the number of acres where management actions are prohibited.

In practice, BLM has defined planning more narrowly than its handbook describes. Many of BLM's RMPs focus primarily on one of the three types of decisions: allowed actions. For example, BLM's RMP for the Kemmerer area in southwest Wyoming has excellent potential for renewable energy facilities, especially wind power. The Kemmerer RMP outlines land use decisions of the allowed use type; therefore, to describe "allowed uses" for wind energy production, this plan presents preferred wind power development sites and exclusion areas. In considering renewable energy, most BLM land use plans provide "avoidance areas" and "exclusion areas" for wind energy. These avoidance areas are areas with important or sensitive resource values and thus will be excluded or avoided (BLM 2005).

In 2008, the state of Wyoming developed a sage grouse management plan that identified sage grouse core areas based on best available information on sage grouse use. These core areas are designated so as to prohibit surface disturbing activities, including the installation of renewable energy facilities (Fruedenthal 2009). Endorsed by the U.S. Fish and Wildlife Service, this planning alternative recommends no new surface disturbance in these areas. BLM's state director found it appropriate for BLM to "base our

management strategy on these core areas" (Simpson 2008). But in the Kemmerer RMP issued in 2010, BLM did not designate these core areas as development avoidance or prohibition areas. Instead this plan allows, in fact encourages in some sage grouse core areas, surface disturbing development. The Kemmerer RMP's preferred areas for renewable energy overlap about half of the sage grouse leks identified in the planning process. 154,396 acres are excluded from wind power which is 5% of all lands BLM manages in this area. BLM promised to address sage grouse issues on a case by case basis but not in the land use plan.

Neither the draft nor approved plan explains the decision process that lead to the final land use decision issued in the Kemmerer RMP. The justification for the plan's preferred areas for renewable energy remains hidden to the public and no rational basis for this decision is given. When a decision seems to conflict with the objective rational basis presented in the plan, political power hidden from view is a likely factor. Where power relations are unbalanced, negotiations tend to lead to co-option of the weaker party where no mediated negotiations occur (Forester1989). In the case of the Kemmerer RMP, it would seem that some power had more influence than either the BLM state director or the Governor in planning where to promote renewable energy.

**Other Applicable Federal Laws**

For all solar and wind projects on federally managed lands, issuance of land use permits and right-of-way authorizations by the relevant federal agency does not relieve the applicant of obtaining any and all other permits and authorizations that may be required for the proposed project, and abiding by various federal laws and acts, many of which also apply on private lands. A multitude of laws have sections that are applicable to the siting, development, permitting, and operation of large scale wind and solar energy, and therefore also provide a foundation for the Best Management Practices described in this document. Below is a list of the most important of these laws, with a brief description of how each may apply.

- *The National Environmental Policy Act (NEPA)* (42 U.S.C. §§ 4321-4370f). NEPA will be triggered by the developer's need for a federal permit or approval, siting of the project on federal lands, accessing a federally owned transmission line, or being eligible for federal grants for the project. Depending on the type of actions and the potential for impacts, the federal agency involved at the development site may have to prepare an Environmental Assessment or Environmental Impact Statement for the project before it can act. The NEPA process requires public involvement in identifying issues to be considered and in commenting on the agency's analysis. Also, under NEPA various alternatives for the project must be assessed before carrying out an action that may significantly affect the integrity of the land and its uses. And, potential cumulative impacts must be assessed[77]. The reviewing agency may use the results of the NEPA review (a Record of Decision or a Finding of No Significant Impact or a Categorical Exclusion) to clarify requirements for mitigation and monitoring to address the project's environmental impacts.

- *The Endangered Species Act (ESA)* (16 U.S.C. § 1536(a)(2) requires that agencies insure that permitting large scale solar and wind development "is not likely to jeopardize the continued

[77] Cumulative impact analysis should include determining which species of concern or their habitats within the landscape are most at risk of significant adverse impacts from renewable development in conjunction with other reasonably foreseeable significant adverse impacts. The magnitude and extent of the impact on a resource depends on whether the cumulative impacts exceed the capacity for resource sustainability and productivity. (USFWS 2010a).

existence of any endangered species or threatened species or result in the destruction or adverse modification" of critical habitat of such species. The U.S Fish and Wildlife Service has primary responsibility for terrestrial and freshwater organisms protected under the Act. To insure that there is no harm to federally listed species, the developer will need to consult with the USFWS under section 7 of the Act. To be in compliance with the ESA, the developer or relevant agency might have to write a Biological Assessment if there are any predicted impacts of the project to a federally listed species, and the U.S. Fish and Wildlife Service, which typically administers the ESA, would then write a Biological Opinion is response to the Biological Assessment. Unlike NEPA, the ESA has the authority to actually stop a project based on a potential taking of endangered species or habitat (while NEPA only requires analysis of impacts).

- *Federal Noxious Weed Act* -- Public Law 93-629 (7 U.S.C. 2801 et seq.; 88 Stat. 2148), enacted in 1975, established a Federal program to control the spread of noxious weeds.

- *The Federal Land Policy and Management Act* (FLPMA) as amended (43 U.S.C. 1701 et seq.) recognizes the value of public lands and provides a framework in which they can be managed in perpetuity for the benefit of present and future generations. FLPMA defined BLM's mission as one of multiple use. Under FLPMA, the BLM is authorized to grant Right of Ways on BLM land for solar and wind installations.

- *The Migratory Bird Treaty Act,* as amended (16 USC 703-712), implements a variety of treaties and conventions among the United States, Canada, Mexico, Japan, and Russia. This treaty makes the take, killing, or possession of migratory birds, their eggs, or nests unlawful, except as authorized under a valid permit. Most of the bird species reported from the 11 western states are classified as migratory under this act. The USFWS maintains a list of migratory birds protected by the MBTA. In addition, Under E.O. 13186, each federal agency that is taking an action that has or is likely to have negative impacts on migratory bird populations must work with the USFWS to develop an agreement to conserve those birds. The protocols developed by this consultation are intended to guide future agency regulatory actions and policy decisions.

- *The Bald and Golden Eagle Protection Act* (16 USC 668-668d) provides for the protection of both bald and golden eagles by prohibiting take unless allowed by permit.

- *The Clean Water Act* (33 USC 1251-1387) governs impacts to water resources. The Clean Water Act has a broad goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Among other things, the Act establishes the basic structure for regulating discharges of pollutants into the waters of the United States and managing polluted runoff. In particular, wind energy projects may be subject to Water Quality Certification under Section 401 of the CWA and permit requirements under Sections 402 and 404 of the CWA.

**State Permitting, Siting and Regulation of Renewable Energy**

Extensive discussions have been taking place around the country on the issue of siting wind and solar energy facilities. A number of states – both those new to renewable power development and those already familiar with it – have expressed strong interest in the approaches that other states use when considering the siting of wind and solar power plants. Federal, state and local governments have long governed siting and permitting of energy facilities in the United States. Now, states have begun to develop siting guidelines, model ordinances, statutes, and checklists that address specific issues that are frequently raised in siting and permitting solar and wind energy facilities.

Jurisdiction over siting energy facilities varies from state to state. In some states, siting authority rests with a local branch of government. In these cases, county commissions, planning and zoning boards, or other local government departments are responsible for conditioning and approving wind farms and other energy facilities. Other states retain primary siting authority at the state level. Often other state regulatory agencies are involved in permitting processes. For example, when wildlife or other environmental issues arise, a state environmental protection agency may become involved.

Most state guidelines dealing with specific siting issues make reference to post-construction monitoring to ensure that no threatened or endangered species, nor their habitats, are affected by development of wind or solar energy. In most cases, state guidelines call for applicable authorities to consult with agencies charged with implementing the Endangered Species Act and other habitat protection requirements. Not all state approaches call for consideration of non-wildlife environmental issues, such as visual, noise, and construction-related effects. Others set clear limits on allowable levels of state influence in these areas. In most cases, granting of stormwater management permits for construction activities will be issued by a state's environmental quality department. Still other permits such as conditional use permits, building permits, and encroachment permits are handled at the County level, usually with a county planning and zoning department, but we will not go into detail on that level of planning in this guidance document.

In summary, the regulatory process for siting and permitting wind or solar energy projects varies widely from state to state. Both the American Wind Energy Association's Wind Energy Siting Handbook (2008), and the National Wind Coordinating Collaborative State Siting and Permitting of Energy Facilities Fact Sheet (2006) discuss the typical state-level and local regulatory frameworks that a wind developer is likely to encounter, and go into more detail on these state-level processes than we can go into here. "The Law of Wind" (Stoel Rives 2010) similarly gives good guidance on siting and permitting wind facilities on the state and local level. And "Lex helius: The law of solar energy" (Stoel Rives 2009) does the same for solar facility permitting. A particularly helpful guidance document for wind and solar projects on BLM lands was released by the BLM in November 2010 (BLM 2010c). This document, "Best Management Practices and guidance manual: Desert renewable energy projects", is an excellent source for developers wading through the federal regulatory process for siting on public lands, for both the pre-application and post-application periods.

**Typical Steps in Wind and Solar Permitting Process**

***Pre-application***. During the pre-application phase, project developers often meet with nearby landowners, community leaders, environmental groups, and other potentially affected interests. This acquaints the developer with their initial concerns and allows the developer to respond to questions regarding the project. In some jurisdictions, the project developer is required to hold public meetings or submit a public notice regarding the project during this phase. At this stage, pre-NEPA preliminary environmental screening analysis is a good idea, since this pre-NEPA analysis is often reviewed by potential investors as they evaluate the feasibility and risks associated with a proposed project and how much capital may be required.

***Application review***. For most agencies, the application review begins when the project developer files a permit application. Any NEPA-related environmental assessment and review would occur during this stage. The public has an opportunity to participate in this stage, through public scoping and comments periods associated with the preparation and publication of any NEPA documents such as Environmental Assessments and Environmental Impact Statements.

***Decision-making***. In its decision-making, the relevant federal agency not only determines whether or not to allow a proposed wind or solar facility to be constructed and operated (based on the application review

phase, above), but also whether environmental mitigation and other construction, operation, or decommissioning requirements are needed. This phase frequently includes one or more public hearings.

***Administrative Appeals and Judicial Review.*** Appeals of all or a portion of a final decision are considered during the administrative and judicial review phase. The public (such as a conservation group) can be an appellant but first needs to make sure they have standing. The first avenue of appeal is directed to the decision-maker. Only after all administrative appeals have been exhausted are challenges to the decision reviewed by the courts. Appeals to the courts most frequently are directed at determining whether the permitting process was executed fairly and in accordance with the review requirements.

***Permit Compliance.*** The permit compliance phase extends throughout a solar or wind project's lifetime, and may include inspection or monitoring to ensure that the project is constructed, operated, and decommissioned in compliance with the terms and conditions of its permit and all applicable laws.

# Best Management Practices for Wildlife and Habitat for Solar and Wind Development on Western Lands

These Best Management Practices are broken up into six sections according to the species or resource affected: (i.e. raptors, or vegetation/hydrology). Each section provides recommendations for those species and resources and, afterwards, reviews research on solar and wind energy production and its impacts to lowlands and desert systems in the West using the best available science. The BMPs below are separated into "Siting BMPs", "Planning and pre-construction BMPs", "Construction/Operation BMPs", and "Monitoring BMPs." This breakdown reflects the different decision-making processes that land managers often encounter. There is an additional, seventh, section on how to address renewable energy development within the land-use planning context. These BMP's do not cover decommissioning of a site.

## 1.0 Siting - General

Not all lands are suitable for renewable energy development, and difficult choices will be required to minimize the environmental impacts of significantly expanded renewable energy. The following screening suggestions are an amalgamation of screening recommendations of thirteen different sources[78]. There was considerable overlap with the screening recommendations of all of these sources. We note that screening recommendations from the BLM for both wind (BLM 2005b) and solar (BLM 2010a)

[78] Sources include BLM 2005b, Clean Energy States Alliance 2006, National Wind Coordinating Collaborative 2007, Audubon 2008, Molvar 2008, Oregon Natural Desert Association 2009, BLM 2010a, The Wilderness Society (TWS) 2010, TWS et al. 2010, US Fish and Wildlife Service 2010a, Wyoming Game and Fish 2010, Wyoming Outdoor Council 2010, American Bird Conservancy 2011.

were also incorporated into this list and these specific guidances are indicated by an asterisk.[79] Based on this comprehensive collection of all other renewable screening guidances we could locate, categories of land that should be prioritized for wind and solar development include:

- Lands identified by the BLM in the 2010 Solar Programmatic Environmental Impact Statement (PEIS) as Solar Energy Zones* (BLM 2010a). By guiding projects to zones that have already been analyzed in the PEIS, BLM will be able to rely on some of the environmental analysis already conducted, making project-specific environmental evaluation and development of any needed mitigation measures faster. Further, because the zones have been selected for their low conflicts with other resources and uses, opposition to projects that leads to extended conflicts will be reduced. By reducing the time required to approve projects and the conflicts with stakeholders, project approvals will cost less if they are built in the already identified Solar Energy Zones. In addition, because projects are likely to be located closer to existing roads and transmission lines, there will be fewer costs associated with constructing new supporting infrastructure. Further, because these projects are in areas that have fewer conflicts with natural and cultural resources, there should be fewer costs associated with design adjustments and mitigation measures to address potential damage to other values (TWS 2010).
- Lands that have been previously degraded or disturbed, such as fallow or abandoned agricultural fields, landfills, reclaimed mine sites or any tract of land that has resulted in "type-conversion" from native vegetation through plowing, bulldozing or other mechanical impact.
- Private lands of comparatively low resource value, or public lands of comparatively low resource value located adjacent to degraded and impacted private lands, which would allow for the expansion of renewable energy development onto private lands.[80]
- Brownfields and contaminated or previously-contaminated sites, including abandoned mines.[81]
- Oil, gas and coalbed methane fields.
- Privately owned feedlots and lands currently in agricultural production[82]
- Locations adjacent to urbanized areas. This can also provide jobs for local residents often in underserved communities, while also minimizing workforce commute and associated greenhouse gas emissions.
- Locations that minimize the need to build new roads.*
- Locations that could be served by existing substations.

[79] BLM's Wind energy Programmatic Environmental Impact Statement (BLM 2005b) also states that "additional areas of land may be excluded from wind energy development on the basis of findings of resource impacts that cannot be mitigated and/or conflict with existing and planned multiple use activities or land use plans."

[80] Private lands development offers tax benefits to local government. Also, in a Netherlands study, van den Berg (2008) found that respondents with direct economic benefits (such as private land owners siting wind farms on their properties) were more accepting of wind turbines from visual and noise perspectives. This suggests that siting turbines on private lands may entail greater acceptance as landowners realize direct benefits while the public does not perceive direct compensation for the development of utility-scale wind projects on public lands.

[81] This can also revitalize idle or underutilized industrialized sites.

[82] The National Wind Coordinating Collaborative (2002) considers agriculture as "a wind-compatible resource." Because wind developments typically take less that 2% of the land out of agricultural production and yield additional sources of revenue, they may be especially attractive to private agricultural landowners (Molvar 2008). In addition, crop fields support a monoculture of non-native vegetation and tend to provide ecologically impoverished fauna and low biodiversity. In general, bird fatalities at sites located in agricultural croplands have been at the lower end of the spectrum (Erickson et al. 2003, Molvar 2008).

- Locations proximate to load centers.
- Locations with adequate access to transmission lines.*

Categories of land to be prioritized for avoidance include:

- Units of the National Landscape Conservation System, including National Parks, National Monuments, National Wildlife Refuges, Wild and Scenic Rivers, National Conservation Areas, and designated Wilderness areas.*
- Special federal land management designations, such as Areas of Critical Environmental Concern (ACECs),* Desert Wildlife Management Areas (DWMAs);* Research Natural Areas (RNAs),* Outstanding Natural Areas (ONAs), and other areas that have been identified by a federal agency for the protection of important wildlife resources, ecological features, and significant historical, paleontological, and archeological resources.
- Wilderness Study Areas* and other wilderness quality lands, including USFS Inventoried Roadless Areas, areas where there is an applicable land use plan decision to protect lands with wilderness characteristics,* and other inventoried roadless areas documented by environmental groups.
- Lands that support federally threatened/endangered and candidate species, including federally designated and proposed critical habitat*, and other lands that provide important habitat for federal T/E/Candidate species, such as greater sage grouse core breeding areas (called "Sage Grouse Core Areas").*
- "Important Bird Areas" identified by the Audubon Society
- Wild and Scenic rivers, wetlands, riparian areas and ecologically significant intermittent washes.
- All areas where the applicable land use plan designates no surface occupancy, or Right of Way Exclusion or Avoidance Areas.*
- Landscape level biological linkages, including lands in wildlife corridors, such Big Game Migratory Corridors identified in land use plans.*
- Big Game Winter Ranges identified in applicable land use plans.*
- Historic Property/National Register lands*, and cultural sites eligible for National Register* or areas with a high density of cultural resources requiring inventory and consultation.
- Lands purchased or acquired by exchange for conservation purposes including lands conveyed to the BLM.
- State wildlife management areas and state parks
- Important wildlife habitat as identified in State Wildlife Action Plans. A good example are the "Wildlife Action Plan Focus Areas" outlined in the Utah's State Wildlife Action Plan
- Lands identified as portfolio sites in Nature Conservancy Ecoregional Plans or as "core areas" in regional Conservation Area Designs or Wildlands Network Designs.

# 2.0 BMPs for Siting, Constructing, Operating and Monitoring Wind and Solar Development on Western Lands

All Best Management Plans outlines below apply to both large scale wind and solar developments, unless specifically stated that it applies to one or the other.

### 2.1 BEST MANAGEMENT PRACTICES FOR WILDLIFE – GENERAL

The Siting, Planning/Pre-construction, Construction/Operation, and Monitoring BMPs for wildlife, below, are an amalgamation of BMP's gathered from numerous different sources.[83]

**2.1.1** ***Siting BMPs for Wildlife***

- For wind facilities, place turbines in such a way to minimize fragmentation of large contiguous tracts of wildlife habitat, and to avoid wildlife migratory pathways and known travel corridors.
- For both wind and solar installations, avoid development in big game winter and parturition ranges.
- For both wind and solar installations, avoid development in core areas, linkages and portfolio sites identified in Nature Conservancy Ecoregional plans or other conservation areas designs or reserve designs.
- For both wind and solar installations, avoid siting in important, sensitive, or unique habitats in the vicinity of the project (i.e., away from riparian habitats, streams, wetlands, drainages, or other critical wildlife habitats). See below on surveys that may be needed to identify these important wildlife areas.

***Planning and Pre-construction BMPs for Wildlife*** should include pre-construction evaluation conducted at a potential solar and wind energy sites, which can help indicate whether a renewable power development is likely to cause wildlife impacts at levels of concern, help determine sites to avoid, and help to design a less impactful project. The pre-construction surveys should use scientifically sound, peer reviewed research protocols to determine how wildlife use a proposed project area. The estimation of displacement risk requires an understanding of animal behavior in response to a project and its infrastructure, and a pre-construction estimate of presence/absence of species whose behavior would cause them to avoid areas in proximity to turbines, roads and other components of the project. Adjust siting and facility design based on the results of these studies to reduce potential impacts to the animals. Following are our recommended preconstruction and operation BMPs:

- Consult with the state fish and game agency to determine locations of species of concern other special-status species identified by the agency in past surveys.
- Conduct surveys for federally listed and state-protected animal and plant species, as well as for other species of concern such as other special-status species identified by the state fish and game agency. Submit survey protocols to the USFWS and appropriate lead State Fish and game agency agencies for review, comment, and approval. Most listed species have required protocols for detection (e.g., the black-footed ferret).
- Relate wildlife use to site characteristics. This requires that samples of wildlife use also measure site characteristics thought to influence use (i.e., covariates such as vegetation and topography) in relation to the location of use. The statistical relationship of wildlife use to these covariates can be used to predict occurrence in unsurveyed areas during the survey period and for the same areas in the future.
- Consult with the state fish and game agency to determine the locations of crucial ungulate habitats and migration corridors.[84]
- Pre-construction studies should be sufficiently detailed in order to create maps of special status species habitats (e.g. wetlands or riparian habitat, and large, contiguous tracts of undisturbed

[83] Sources include BLM 2005a, BLM 2005b, Clean Energy States Alliance 2006, California Energy Commission 2007, BLM 2008, Molvar 2008, ONDA 2009, Wyoming Outdoor Council 2009, Arizona Game & Fish Dept. 2010, BLM 2010a, U.S Fish & Wildlife Service 2010a, Wyoming Game and Fish 2010.

[84] Studies are needed to determine whether the presence of wind turbines on crucial seasonal ranges will adversely affect big game. Big game crucial ranges should be avoided when siting wind plants, but if crucial ranges are implicated we recommend that wind companies monitor radio-collared animals for at least two years pre and post-construction.

wildlife habitat) as well as other local species movement corridors (e.g., deer, elk, pronghorn) that are used daily, seasonally, or year-round.

### *2.1.3* Construction and Operation BMPs for Wildlife

- Minimize project disturbance area (footprint) as much as possible.
- If lights on auxiliary buildings are deemed necessary, they should be motion-activated and downcast (avoid side-casting light) to reduce light pollution and to prevent disturbing or attracting wildlife.
- Minimize roads and other infrastructure. Use existing roads whenever possible. If new access roads and ways are needed, avoid gravel roads if possible and instead rely on dirt tracks and jeep trails constructed by cross country travel. Use road surfacing, road sealant, soil bonding, and stabilizing agents if needed on non-paved surfaces that are non-toxic to wildlife.
- Avoid constructing energy infrastructure during critical wildlife seasons such as breeding, nesting, and parturition seasons.[85] Within 2 miles of crucial migration corridors, wind power facility construction activities should occur outside their period of use by wildlife.
- Minimize construction and operation related noise levels to minimize impacts to wildlife. All equipment should have sound-control devices no less effective than those provided on the original equipment. All construction equipment used should be adequately muffled and maintained.
- Avoid the use of fencing. A 6-ft chain-link fence with 2 strands of barbed wire on the top, or a woven wire/high tensile electric/barbed wire combination exclusion fence can be used around central operations and maintenance buildings. If other fencing away from central operations must be used, use a smooth bottom wire at least 18 inches off the ground to facilitate pronghorn movements. Use a smooth top wire or top rail to facilitate elk and deer movements, and to reduce avian fatalities. Spacing between the two top wires should be 12 inches to avoid entangling deer. Fences should be no higher than 40-42 inches. Minimize the length of temporary fencing.
- Use of evaporation ponds should be avoided where the water would be considered toxic to birds and other wildlife. If evaporation ponds are absolutely necessary, they should be fenced and netted, where feasible, to prevent use by wildlife. The lower 18 in. (46 cm) of the fencing should be a solid barrier that would exclude entrance by amphibians and other small animals.
- Instruct project and maintenance personnel to drive at appropriate speeds, be alert for wildlife, and to avoid harassing and/or disturbing wildlife.
- For wind energy, portions of the wind energy facility inside crucial winter ranges or migration corridors should be closed to vehicle use (and human presence must be minimized) during their period of use by wildlife.
- For wind energy, remove wind turbines when they are no longer cost effective to use or retrofit so they cannot present a collision hazard to birds and bats.

### **2.1.4** ***Monitoring BMPs for Wildlife***

- Conduct post construction surveys for same wildlife species of concern that pre-construction surveys were conducted for, using the same survey methods. Compare post-construction survey data to pre-construction surveys.
- Relate post-construction wildlife use to site characteristics. This requires that samples of wildlife use also measure site characteristics thought to influence wildlife use (i.e., covariates such as

[85] The Wyoming Game and Fish (2010) states that if siting within big game winter ranges cannot be avoided, suspend construction activities from November 15 – April 30, and if siting within big game parturition areas cannot be avoided, suspend construction activities from May 1 – June 15.

vegetation and topography) in relation to the location of use. Compare post-construction survey data to pre-construction surveys.

- Compare post construction survey data with post construction survey data. Manage adaptively through changes in site operation (i.e operation of turbines) if monitoring indicates that wildlife populations are no longer meeting pre-set goals for wildlife. A technical advisory committee should be established to review monitoring results and make suggestions regarding the need to adjust site operations or mitigation and monitoring requirements.

***A note about designing wildlife monitoring and post-construction studies***

It is important that the outcomes of monitoring tie into specific plans of action, based on whether management goals and objectives are being met. Each management objective should be essentially "tested" through monitoring methods that have been scientifically validated. Post-construction studies and wildlife monitoring that is conducted while the wind or solar project is operational need to be tied to answering basic questions about the impact of the project, or a well-defined research question. To use one example, with fatality studies at wind developments, the basic questions to answer might include (the following is summarized from USFWS 2010a):

**1. What are the bird and bat fatality rates for the project?** The primary objective of fatality searches is to determine the overall estimated fatality rates for birds and bats for the project. Several metrics are available for expressing fatality rates. Early studies reported fatality rates per turbine. However, this metric is somewhat misleading as turbine sizes and their risks to birds vary significantly (NRC 2007). Fatalities are frequently reported per unit capacity (i.e. MW), a metric that is easily calculated and better for comparing fatality rates among different sized turbines. Analysis of fatality data of birds and bats can also allow calculating fatality rates per turbine of all species of concern at a site when sample sizes are sufficient to do so.

**2. How do the estimated fatality rates compare to the predicted fatality rates?** There are a several ways that predictions can be assigned and later evaluated with actual fatality data. During the planning stages for the project, predicted fatalities may be based on existing data at similar facilities in similar landscapes used by similar species. In this case, the assumption is that use is similar, and therefore that fatalities may be similar at the proposed facility. Alternatively, metrics derived from pre-construction assessments for an individual species or group of species – usually an index of activity or abundance at a proposed project – could be used in conjunction with use and fatality estimates from existing projects to develop a model for predicting fatalities at the proposed project site.

**3. How do the fatality rates compare to the fatality rates from existing facilities in similar landscapes with similar species composition and use?** Comparing fatality rates among facilities with similar characteristics is useful to determine patterns and broader landscape relationships, and to provide insight into whether a project has relatively high, moderate or low fatalities. Fatality rates should be expressed on a per MW or some other standardized metric basis for comparison with other projects.

**4. Do bird and bat fatalities vary within the project site in relation to site characteristics?** Turbine-specific fatality rates may be related to site characteristics such as proximity to water, forest edge, staging and roosting sites, known stop-over sites, or other key resources, and this relationship may be estimated using regression analysis. This information is particularly useful for evaluating micro-siting options when planning a future facility or, on a broader scale, in determining the location of the entire project.

**5. What is the composition of fatalities in relation to migrating and resident birds and bats at the site?** The simplest way to address this question is to separate fatalities per turbine of known resident species (e.g., big brown bat, prairie horned lark) and those known to migrate long distances (e.g. hoary bat, red-eyed vireo). These data are useful in determining patterns of species composition of fatalities and possible mitigation measures directed at residents, migrants, or perhaps both, and can be used in assessing potential population effects.

The above example is just one way that a post-construction monitoring study can be designed, in this case focused on fatality of birds and bats at a wind facility. The underlying thread with all post-construction wildlife studies and monitoring is to set post-construction goals for wildlife, based on knowledge of general patterns of wildlife population abundance and distribution health prior to the project commencing. Measurements made and monitoring conducted post construction need to be able to tell wildlife biologists whether they are on track with ensuring that post-construction wildlife population abundances and distribution are meeting the pre-set goals. If the post-construction data collection indicates that there are impacts to a local wildlife population, an adaptive management plan needs to be developed to mitigate these impacts.

### 2.1.5 JUSTIFICATION FOR WILDLIFE BMPS

***Solar installations and wildlife***. On solar power installations, the site is typically cleared of all vegetation to allow access to the installed equipment and to prevent fires. Herbicides may be sprayed or vegetation mowed to maintain cleared zones under and around the solar fields. These facilities typically include numerous graded access roads, construction of new or expansion of existing substations, new transmission lines, and a surrounding security fence that prevents movement of wildlife through the site (Arizona Game and Fish Department 2010, Randall et al. 2010). Proposed solar projects can range in size from 100 to over 5,000 acres (Arizona Game and Fish Department 2010).

These large scale clearing and grading activities can result in the direct injury or death of wildlife that are not mobile enough to avoid construction operations (e.g., reptiles, small mammals, and young), that utilize burrows (e.g., ground squirrels and burrowing owls), or that are defending nest sites (such as ground-nesting birds). Although more mobile species of wildlife, such as deer and adult birds, may avoid the initial clearing activity by moving into habitats in adjacent areas (Hagan et al. 1996), adjacent habitats are often at carrying capacity for the species that live there and often cannot support additional biota from the construction areas (BLM 2010a). The subsequent competition for resources in adjacent habitats would likely preclude the incorporation of the displaced individual into the resident populations (BLM 2005b).

Light and noise pollution associated with solar power plants can also be problematic for wildlife. Polarized light pollution from PV panels can attract aquatic insects and other species that mistake he panels for bodies of water, potentially leading to population decline or even local extinction of some organisms (Horvath et al. 2010). Nighttime lighting for security or other reasons may negatively impact a variety of local species, many of which have developed nocturnal behavior to escape the daytime heat of the desert. In addition, solar thermal plants that employ dry cooling generate noise pollution through the use of large fans (Randall et al. 2010), which may affect local wildlife.

Some solar facilities, which use water for cooling or cleaning solar array mirrors, will have evaporation ponds on the site. Open water sources in the desert provide water subsidies to ravens and other predators that may feed on special status species (e.g., desert tortoise). In addition,

these water sources may attract wildlife to them but may also have elevated levels of harmful contaminants (e.g., TDS and selenium) that can harm many species of wildlife (BLM 2010a).

***Wind installations and wildlife***. On big game winter ranges, where wind farms are most likely to be sited (as opposed to higher elevation summer ranges), elk and other big game are highly susceptible to disturbance. Disturbance during this time of year can be particularly costly, since the metabolic costs of locomotion are up to five times as great when snows are deep (Parker et al.1984). To the degree that wind power facilities involve human presence in crucial ranges during the most sensitive time periods, these developments may tend to displace elk from their preferred habitats into marginal ranges, where habitat conditions may be poor or where they may be forced to compete with resident animals already at or near their carrying capacity. Several studies have shown that elk abandon calving and winter ranges in response to oilfield development (e.g. Johnson and Lockman 1979, Johnson and Wollrab 1987, Van Dyke and Klein 1996), with potential implications for utility-scale wind power development. For mule deer, Sawyer et al. (2005) found that in the Pinedale area, wellfield development caused abandonment of mule deer crucial winter ranges for years at a time, and ultimately resulted in a 46% decline in mule deer populations, while herds in undeveloped areas showed a much smaller decline over the same period; the affected population has yet to recover to predisturbance levels (Molvar 2008). Other researchers have posited that overcrowding of species such as mule deer in sub-optimal winter ranges after they have been pushed out of optimal ranges could cause density-dependent effects, such as increased fawn mortality (Sawyer et al. 2006).

Wind farms may disrupt wildlife movements, particularly during migrations. For example, herd animals such as elk, deer and pronghorn can be affected if rows of turbines are placed along migration paths between winter and summer ranges or in calving areas (NWCC (2002). One lesson learned from oil and gas development in the Piney Front elk study in Wyoming demonstrated that oil and gas development could pose a barrier to elk migration, denying herds access to crucial winter ranges (Molvar 2008). Other researchers have posited that loss of habitat continuity along migration routes would severely restrict the seasonal movements necessary to maintain healthy big game populations (Sawyer and Lindzey 2001; Thomson et al. 2005). That said, the National Wind Coordinating Collaborative (2002) points out that because wind farms affect a relatively small proportion of the land they occupy, these sorts of effects on wildlife should be minor in most cases.

***Impacts to wildlife common to solar and wind installations***. Both solar and wind installations have the potential to impact a variety of wildlife species through a number of means. These include direct loss of habitat from construction activities; habitat alteration as a result of soil erosion and/or introduction of non-native vegetation; construction of obstacles to migration; and indirect habitat loss as a result of increased human presence and noise. In particular, increased traffic, noise, night lighting, and other human activities can temporarily discourage wildlife from using areas around energy facilities while these projects are being constructed (NWCC 2002).

Both large scale wind and solar installations can serve to fragment wildlife habitat (BLM 2005b, BLM 2010a). Habitat fragmentation is defined as the separation of a block of habitat for a species into segments, such that the genetic or demographic viability of the populations surviving in the remaining habitat segments is reduced (e.g. Dobson et al. 1999, Willyard et al. 2004, Dixon et al. 2007). Site clearing, access roads, transmission lines and turbine tower arrays remove habitat and displace some species of wildlife, and may fragment continuous habitat areas into smaller, isolated tracts (USFWS 2010a). Habitat fragmentation is of particular concern when species require large expanses of habitat for activities such as breeding and foraging. Consequences of isolating local populations of some species include decreased reproductive success, reduced genetic diversity, and increased susceptibility to chance events (e.g. disease and natural disasters), which may lead to extirpation or local extinctions (Noss 1983, Harris 1984, Dobson et al. 1999). In addition to displacement, development of wind and especially solar

energy infrastructure may result in additional loss of habitat for some species due to "edge effects" resulting from the break-up of continuous stands of similar vegetation resulting in an interface (edge) between two or more types of vegetation (USFWS 2010a). The extent of edge effects will vary by species and may result in adverse impacts from such effects as a greater susceptibility to colonization by invasive species, increased risk of predation, and competing species favoring landscapes with a mosaic of vegetation (Harper et al. 2005).

Sometimes renewable energy installations require the use of fencing. Fencing may disrupt wildlife movements, entangle wildlife, and increase bird fatalities (WOC 2009, ADGF 2010).
Both wind and solar installations have the potential, during construction activities, to see increases in exotic plant species such as cheatgrass, which is known to do well with ground disturbance (BLM 2010a). The establishment of invasive vegetation could reduce habitat quality for wildlife and locally affect wildlife occurrence and abundance (BLM 2005b).

Lastly, many new solar and wind facilities in previously undisturbed, open areas will require a new network of roads to access them. A number of studies have shown that wildlife such as elk avoid roads (e.g. Grover and Thompson 1986, Rowland et al. 2000, in part because increased motorized access results in decreased elk habitat and security (Lyon 1983, Hayes et al. 2002, Rowland et al. 2005). Even songbirds are sensitive to road impacts; Ingelfinger and Anderson (2004) reported that population densities of sagebrush obligates, particularly Brewer's sparrow and sage sparrow, were reduced by 40% to 60% within a 330-ft (100-m) buffer around dirt roads at their sagebrush study sites. And with new roads can come many new problems for wildlife that can occur when there is increased access to lands that previously had limited access. These impacts can include wildlife harassment and poaching, (PBS&J 2002), and unauthorized OHV use off of these roads (BLM 2005b) (and exotic plant seeds that can hitch a ride on the knobby tires (BLM 2010a, and citations within). Even if all vehicles stay on the roads, roads are often considered to facilitate the dispersal of invasive plant species by altering existing habitat conditions, stressing or removing native plant species, and allowing easier movement by wildlife or human vectors that can unknowingly carry seeds (Trombulak and Frissell 2000).

## 2.2 BEST MANAGEMENT PRACTICES FOR SAGE GROUSE

The Siting, Planning/Pre-construction, Construction/Operation, and Monitoring BMPs for sage grouse, below, are an amalgamation of BMP's gathered from numerous different sources.[86]

### 2.2.1 *Siting BMPs for Sage Grouse for Wind Installations*

- Wind Turbines should not be located within designated Sage Grouse Core Areas.
- Wind turbines and met towers should not be sited within 5 miles of an active sage grouse lek.
- Wind turbines should not be sited within sage-grouse nesting and brood-rearing habitat, and should be sited away from other high-use sage grouse areas identified in preconstruction surveys (see below).

### *2.2.2 Planning and Pre-construction BMPs for Sage Grouse*

- Consult with the state fish and game agency to determine locations of greater sage-grouse leks, nesting and brood-rearing habitat, and wintering areas based on past surveys.
- Use scientifically sound, peer reviewed research protocols to determine how sage grouse use a proposed project area. Be sure to determine whether the site has a resident or migratory

[86] Sources include Manville 2004, Molvar 2008, ONDA 2009, Wyoming Outdoor Council 2009, U.S Fish & Wildlife Service 2010a.

population. Adjust siting and facility design based on the results of these studies to reduce potential impacts to sage grouse.

- Populations of sage grouse at the site should be assessed by either lek counts (a count of the maximum number of males attending a lek) or lek surveys (classification of known leks as active or inactive) during the breeding season (e.g., Connelly et al. 2000). Methods for lek counts require repeated visits to known sites and a systematic search of all suitable habitat for leks, followed by repeated visits to active leks to estimate the number of grouse using them (USFWS 2010a).
- Monitor radio-tagged sage-grouse on the proposed development site for at least two years preconstruction **outside** core sage-grouse areas.
- Suitable nesting and brood rearing habitat at the site should be mapped.

## *2.2.3* Construction and Operation BMPs for Sage Grouse

- All transmission lines (including high-voltage DC lines) sited within 5 miles of a grouse lek should be buried
- As practicable, do not conduct surface-use activities within crucial sage-grouse wintering areas from December 1 through March 15.

### 2.2.4 *Monitoring BMPs for Sage Grouse*

- Post construction populations of sage grouse at the site should be assessed by either lek counts or lek surveys during the breeding season (e.g., Connelly et al. 2000).
- Monitor radio-tagged sage-grouse on the site for five years post-construction in proposed sites **outside** core sage-grouse areas.

### 2.2.5 JUSTIFICATION FOR SAGE GROUSE BMPS

The area within five miles of a sage grouse lek is crucial to both the breeding activities and nesting success of local sage grouse populations (Manville 2004, Molvar 2008, USFWS 2010a). Hulet et al. (1986) found that 10 of 13 hens nested within two miles of the lek site during the first year of their southern Idaho study, and 100% of hens nested within two miles of the lek site during the second year of this study. Because lek sites are used traditionally year after year and represent selection for optimal breeding and nesting habitat, it is crucially important to protect the area surrounding lek sites from impacts.

Sage-grouse have an innate aversion to vertical structures because predators such as raptors can perch and hunt from these structures (Utah Department of Natural Resources 2010). Thus, sage grouse are through to be negatively impacted by wind energy development, not so much from the standpoint of direct mortality from collisions but from displacement from favored habitats due to behavioral avoidance of tall structures like met towers and turbines. For example at the Cotterel Mountain wind project site in Idaho, there were nine known sage grouse leks on Cotterel Mountain prior to the placement of eight meteorological towers erected to measure wind velocity for a commercial wind power feasibility study (Reynolds 2004). Overall sage grouse population estimates were 59 to 72 individuals in 2004 and 2005 (Reynolds and Hinckley 2005).

In spring 2006, after the Met towers were built, the population of sage grouse on Cotterel Mountain had declined to an estimated 16 individuals and seven of nine leks were unoccupied, while sage grouse populations elsewhere in the county exhibited steady population trends in 2004 and 2005 and only a very slight dip in 2006 (Collins and Reynolds 2006). It is instructive that the Cotterel Mountain sage grouse

population crashed following installation of anemometer towers across the crest of Cotterel Mountain. With relevance for solar installations as well, transmission towers for power lines also serve as perches for hunting raptors so can also cause abandonment of sage grouse habitats through behavioral avoidance (Molvar 2008). An unpublished study found that sage grouse habitat use increased with distance (up to 600 meters) from powerlines (Braun, unpublished data, reported in Strickland 2004).

Much of what is known about the tolerance of sage grouse to industrial development derives from studies on oil, gas, and coalbed methane development. To the extent that both wind power and solar power development also involves habitat fragmentation and loss from new construction and development, road construction and subsequent vehicle traffic, human activity and noise associated with maintenance, some of the impacts recorded in the context of oil and gas development may apply to varying degrees to wind and solar power developments (Molvar 2008). For example in a study near Pinedale, Wyoming, sage grouse from disturbed leks where gas development occurred within 3 miles of the lek site showed lower nesting rates (and hence lower reproduction), traveled farther to nest, and selected greater shrub cover than grouse from undisturbed leks (Lyon 2000). Walker et al. (2007) found that coalbed methane development within two miles of a sage grouse lek had negative effects on lek attendance. Holloran (2005) found that active drilling within 3 miles of a lek reduced breeding populations, while wells already constructed and drilled within 2 miles of the lek reduced breeding populations. Both Holloran (2005) and Walker et al. (2007) documented the extirpation of breeding populations at active leks as a result of oil and gas development in the Upper Green River Valley and Powder River Basin, respectively. Lyon and Anderson (2003) found that in habitats fragmented by natural gas development, only 26 % of hens captured on disturbed leks nested within 2 miles of the lek of capture, whereas 91 % of hens from undisturbed areas nested within the same area. Based on this evidence from the oil and gas development literature, USFWS (2010a) stated, "Based primarily on data documenting reduced fecundity (a combination of nesting, clutch size, nest success, juvenile survival, and other factors) in sage grouse populations near roads, transmissions lines, and areas of oil and gas development/production (Holloran 2005, Connelly et al. 2000), development within three to five miles (or more) of active sage grouse leks may have significant adverse impacts on the affected grouse population."

The US Fish and Wildlife Service generally agrees with the prediction of wind power impacts on sage grouse, similar to those made in the reviews and studies above, stating in its recent 12-month finding of whether to list the sage grouse under the ESA, "wind power typically require[s] many of the same features for construction and operation as do nonrenewable energy resources.
Therefore, we anticipate that potential impacts from direct habitat losses, habitat fragmentation through roads and powerlines, noise, and increased human presence…will generally be similar to those …for nonrenewable energy development" (USFWS 2010b).

## 2.3 BEST MANAGEMENT PRACTICES FOR RAPTORS

The Siting, Planning/Pre-construction, Construction/Operation, and Monitoring BMPs for raptors, below, are an amalgamation of BMP's gathered from numerous different sources.[87] Many of the BMPs in the section following this one, "Best Management Practices for All Other Birds," also include many BMPs that are also relevant to raptors. BMP's that overlap both categories are thus included in the Birds BMP section, not this one, to avoid redundancy.

### 2.3 1 *Siting BMPs for Raptors for Wind Installations*

[87] Sources include the Kansas Renewable Energy Working Group 2003, BLM 2005a, BLM 2005b, The Clean Energy States Alliance (2006) , California Energy Commission 2007, Molvar 2008, Oregon Natural Desert Association 2009, U.S Fish & Wildlife Service 2010a, Wyoming Outdoor Council 2010.

- Avoid placement of turbines in raptor nesting concentration areas, and also downwind of raptor nesting sites (where strong winds can carry fledglings with underdeveloped flight skills straight into turbines)
- Configure turbines so as to avoid landscape features known to attract raptors, such as cliff and rim edges, canyons, and passes in ridgelines. Turbines should be set at least 100 m. back from cliff and rim edges.
- Turbines should be clustered rather than widely spaced, and rows should be oriented parallel to known bird movements rather than perpendicular to them.
- Sites that potentially have high concentrations of prey such as prairie dog towns should be avoided, as well as high-use raptor areas identified in preconstruction surveys (see below).
- Minimize soil disturbance in areas between turbines

**2.3.2.** ***Planning and Pre-construction BMPs for Raptors***

- Consult with state fish and game agency to determine active raptor nesting locations, flight pathways, foraging areas, and concentration areas based on past surveys in the area.
- Pre-construction raptor surveys should follow science based, peer-reviewed protocols and comply with BLM, USFWS,[88] and state Game and Fish guidelines. For wind projects, the USFWS (2010a) guidelines recommend that raptor surveys should be done using point counts (e.g. Reynolds et al. 1980). These surveys should also collect vertical as well as horizontal data (such as flight height) to identify levels of activity within the rotor-swept zone.
- If potential impacts to breeding raptors are a concern on a project, raptor nest searches during the breeding season within the project site and within one mile of the project site are also recommended. These surveys provide information to predict risk to the local breeding population of raptors, and for micro-siting decisions.
- Nests of raptors located during surveys should have non-disturbance buffer zones delineated around them.

## *2.3.3* Construction and Operation BMPs for Raptors for Wind Power

- Use state-of-the art tubular, non-latticed turbines, to reduce the ability of raptors to perch on turbines.
- Avoid placing external ladders and platforms on tubular towers that can be used by birds as perches or nest sites.

**2.3.4** ***Monitoring BMPs for Raptors***

- Post-construction raptor surveys[7] should be done using point counts (e.g. Reynolds et al. 1980). These surveys should also collect vertical as well as horizontal data (such as flight height) to identify levels of activity within the rotor-swept zone.
- Survey for active raptor nests within one mile of the project area. Compare with pre-construction baseline data to allow for estimation impacts and determining mitigation requirements.
- Compare post construction survey data with post construction survey data. Manage adaptively through changes in site operation (i.e operation of turbines, cut-in speeds of turbines) if monitoring indicates that raptor populations are no longer meeting pre-set goals. A technical advisory committee should be established to review monitoring results

[88] We refer readers to the USFWS (2010a) Wind Turbine Guidelines Advisory Committee Policy Recommendations and Guidelines for further guidance on designing and implementing pre and post wind facility construction monitoring plans and surveys for raptors.

and make suggestions regarding the need to adjust site operations or mitigation and monitoring requirements.

### 2.3.5 JUSTIFICATION FOR RAPTOR BMPS

There are indications that raptors are sensitive to wind turbines, partly because they tend to fly at heights within the blade sweep area (Kingsley and Whittam). At Tehachapi Pass in California, Anderson et al. (2004) found that red-tailed hawks, American kestrels, and great horned owls showed the greatest risk of collision of all bird species, and Osborn et al. (2008) concluded that raptors, along with waterflowl, were found to have the highest risk of turbine collision in Minnesota. Moreover, it does not appear that raptors make behavioral adjustments to wind power facilities that reduce fatality rates over time. Indeed, Smallwood and Thelander (2005) found that per-capita risk of raptor fatalities for individual birds actually increased over 15 years of study at Altamont Pass in California, even as raptor densities decreased.

Siting turbines in canyons and passes increases the risk of fatalities for migrating raptors. In Montana, Harmata et al. (2000) found that more migrating raptors passed over valleys and swales than over high points; while migrating birds tended to avoid passing over high points during headwinds, low passes received greatest use by migrating raptors overall. In general, raptors are known to concentrate along ridge tops, upwind sides of slopes, and canyons to take advantage of wind currents that are favorable for hunting and traveling, as well as for migratory flights (Barrios and Rodriguez 2004, Hoover and Morrison 2005, Manville 2009). Smallwood and Thelander (2005) found that golden eagles at the Altamont Pass facility were killed disproportionately by turbines sited in canyons. At Altamont Pass, Hoover (2002) noted that golden eagles preferred to use narrow corridors that transect large hills. Also at Altamont pass, Hoover and Morrisson (2005) reported that raptor kiting behavior was most frequently observed on steep windward slopes, and selected for the tallest peaked slopes; slopes where this behavior occurred had a disproportionate amount of red-tailed hawk mortality. In the context of the Foote Creek Rim project in Wyoming, Johnson et al. (2000) also reported higher than expected raptor use of rim edge habitats. And the same was noted for raptor use at the Columbia Wind Farm #1 in Washington state (Erickson and Johnson 1999).

There is more to doing wind energy smart from the start for raptors than just siting the wind turbines properly. It is also important to ensure that ground disturbance between turbines is minimized A disturbed ground surface can be more suitable for burrowing animals, many of which are attractive prey for raptors and other predators (NWCC 2002). It is thus possible that disturbed soils on a site can lead to luring more raptors towards the turbines than would happen otherwise.

The Altamont pass wind site in California has been intensely studied (e.g. Smallwood Thelander 2005 & 2008) and is often cited as an example of how wind turbines cause direct mortality to a variety of birds, especially raptors. However, since this wind facility was built (in the 1980's) it has largely been dismissed as a good example of how projects should be sited and built, due to its location (right in the middle of avian migratory pathways), and the types of wind turbines in operation (fast-moving blades, lattice towers, etc). Since the days of Altamont, studies in other wind resource areas have shown that bird collisions are not a critical problem at most wind development areas (NWCC 2002) and have led researchers to conclude that fatalities at the level seen at Altamont Pass may be unique (see studies by Thelander and Rugge 2000, and Anderson et al. 2002). A 2010 summary of the research on wind turbine interactions with birds (NWCC 2010) underscores this in the statement, "Studies have indicated that relatively low raptor (e.g., hawks, eagles) fatality rates exist at most wind energy developments with the exception of some facilities in parts of California."

## *2.3* BEST MANAGEMENT PRACTICES FOR ALL OTHER BIRDS

The Siting, Planning/Pre-construction, Construction/Operation, and Monitoring BMPs for all birds, below, are an amalgamation of BMP's gathered from numerous different sources.[89]

### 2.4 1 *Siting BMPs for Birds*

- Avoid known avian concentration areas such as wetlands, riparian areas, roosts, nesting colonies, staging areas, and known daily movement flyways (e.g., between feeding and resting or breeding areas), as well as away from high-use areas identified in pre-construction surveys (see below).
- Avoid siting turbines in areas prone to fog, mist, low visibility, or low cloud ceilings.

### 2.4.2. *Planning and Pre-construction BMPs for Birds.*

- Gather information from the Natural Heritage Program database or comparable State Game and Fish database with past location information on sensitive bird species. Consultations should occur with the state fish and game agency to determine sensitive bird species nesting locations, foraging areas, and concentration areas.
- Field surveys should follow science-based, peer-reviewed protocols and comply with BLM, USFWS,[90] and state Game and Fish guidelines. Surveys should occur, if possible, in conjunction with the state fish and game agency. Sampling should either be distributed randomly or systematically throughout the area of interest.
- For wind developments, daytime and nighttime avian surveys[91] during the spring and fall migration season should be conducted to determine use of the proposed project area, and daytime avian surveys during the breeding season for at least two years prior to construction.
- For wind developments, the USFWS (2010a) recommends that avian surveys include surveys that can be assumed to give indices of abundance in the area, such as weekly point-counts (e.g. Reynolds et al. 1980) or transect surveys[92] (similar to Schaffer and Johnson, 2008). These methods are most useful for pre- and post-construction studies to quantify avian use of the project site by habitat, determine the presence of species of concern, and to provide a baseline for assessing displacement effects and habitat loss (USFWS 2010a). Standardized protocols for estimating avian abundance from these survey methods are well-established and should be consulted (e.g., Dettmers et al. 1999).
- Nests of special status bird species located during surveys should have non-disturbance buffer zones delineated around them.

---

[89] Sources include National Wind Coordinating Collaborative 2002, the Kansas Renewable Energy Working Group 2003, BLM 2005a, BLM 2005b, Canadian Wildlife Service 2006, the Clean Energy States Alliance (2006), California Energy Commission and California Dept of Fish and Game 2007, BLM 2008, ONDA 2009, Arizona Game and Fish Department 2010, U.S Fish & Wildlife Service 2007 and 2010a, WOC 2010, American Bird Conservancy 2011.

[90] We refer readers to the USFWS (2010a) Wind Turbine Guidelines Advisory Committee Policy Recommendations and Guidelines for further guidance on designing and implementing pre and post wind facility construction monitoring plans and surveys for birds.

[91] An index of migration activity can often be obtained by diurnal counts of a nocturnal migrating species during their daily stop-over (CESA 2006).

[92] The Clean Energy States Alliance (2006) posits that in grasslands and shrub-steppe where passerines are the primary target, belt transects may be most appropriate for estimating species occurrence and relative abundance.

### *2.4.3* Construction and Operation BMPs for Birds

- Avoid construction activities during mating and nesting seasons, and within (buffered) areas of active nests identified during pre-construction surveys.
- Design lighting to prevent skyward projection of lighting that may disorient night migrating birds. Sodium vapor lights, widely used for streetlights and security lighting, should never be used at energy facilities because they have been shown to attract night-flying birds.
- Bury electrical collector lines in a manner that minimizes additional surface disturbance (e.g., along roads or other paths of surface disturbance). Overhead lines can be considered in cases where burying lines would result in disturbance of significant habitat, but must be balanced with the concern for creation of additional bird perching opportunities.[93]
- Ensure that all above-ground low and medium voltage lines, transformers, or conductors comply with Avian Power Line Interaction Committee (APLIC) standards (APLIC 2006), including the use of deterrents.
- There should be no permanently installed high intensity lighting at the facility. Site lighting should be "off" unless needed for specific tasks.
- For wind facilities, place and configure meteorological towers to minimize impacts on birds. Sonic detection and ranging should be used instead of meteorological towers if possible. If met towers are used, un-guyed met towers are preferable. Un-guyed towers should be tubular, not latticed (latticed towers attract perching and nesting birds). If un-guyed met towers cannot be used (such as on temporary met towers), guy-wires should be fitted with recommended bird-deterrent devices, such bird flight diverters, or other high visibility marking devices.
- For wind facilities, for turbines that require lights for aviation safety, use a minimal number of simultaneously flashing white or red lights, unless otherwise requested by the FAA. Lights with short flash durations that emit no light during the "off phase" should be used—those that have the minimum number of flashes per minute and the briefest flash duration allowable.
- For wind facilities, make sure that wind turbine arrays are built with the tops of blades positioned lower than nearby ridgetops. Birds usually maintain altitude after crossing ridgetops (Mabee et al. 2006), suggesting that ensuring that arrays are lower than ridgetops could result in lower rates of mortality for migratory birds.
- For wind facilities, use tubular, non-latticed turbines to reduce the ability birds to perch on turbines.
- For wind facilities, spacing between turbines should be greater than 200 meters.

### **2.4.4** ***Monitoring BMPs for Birds for Wind Facilities***

- For wind facilities, conduct surveys[94] to determine fatality rates of birds, including carcass searches and associated scavenger removal trials (to determine how many dead birds are removed from the site by scavengers) and searcher efficiency trials (to determine the proportion of dead birds actually found by searchers). These trials are important for adjusting fatality estimates.
- For wind facilities, surveys should be conducted during the spring and fall migration periods and during the breeding season for at least two to three years post-construction.
- Compare post construction survey data with post construction survey data. Manage adaptively through changes in site operation (i.e operation of turbines, cut-in speeds of turbines) if monitoring indicates that bird populations are no longer meeting pre-set

[93] The USFWS (2010a) states that "Overhead lines may be acceptable if sited away from high bird crossing locations…such as between roosting and feeding areas or between lakes, rivers, prairie grouse and sage grouse leks, and nesting habitats. Overhead lines may be used when the lines parallel tree lines, employ bird flight diverters, or are otherwise screened so that collision risk is reduced.

[94] Another good source for designing scientifically rigorous post construction avian monitoring studies is "Studying wind energy/bird interactions: a guidance document" (NWCC 1999).

goals. A technical advisory committee should be established to review monitoring results and make suggestions regarding the need to adjust site operations or mitigation and monitoring requirements.

### 2.4.5 JUSTIFICATION FOR BIRD BMPS

Both solar and wind installations have the potential to impact a variety of avian species through a number of means. These include direct mortality from collisions, loss of habitat from construction activities; habitat alteration as a result of soil erosion and/or introduction of non-native vegetation; destruction of the nests of ground-nesting birds; increased predation by providing additional perches for raptors; and indirect effects as a result of increased human presence, noise, or motion of operating wind turbines (NWCC 2010). Some of these habitat alteration effects and other indirect effects can lead to avoidance or abandonment of certain habitats, reduced nesting/breeding density, loss of refugia, habitat unsuitability, and behavioral effects (Stewart et al. 2004, 2007). There are some cases where the impacts of habitat disturbance at a wind farm may actually be more egregious than the impacts of the turbine blades, such as the case of the Stateline Wind Resource Area, where impacts on grassland nesting passerines may have been largely due to the direct reduction of habitat from turbine pads and roads and the temporary disturbance of habitat between turbines and road shoulders, rather than due to collisions with turbines (Erickson et al. 2003b).

Principal sources of noise during construction activities for large scale solar and wind facilities includes truck traffic, operation of heavy machinery, and occasionally blasting (i.e. to level or place foundations). The most adverse impacts associated with construction noise could occur if critical avian life-cycle activities are disrupted (e.g., mating and nesting, NWCC 2002). If birds are disturbed sufficiently during the nesting season to cause displacement, then nest or brood abandonment might occur, and the eggs and young of displaced birds would be more susceptible to cold or predators (BLM 2005b). Much of the research on wildlife-related noise effects has focused on birds, and has shown that noise may affect territory selection, territorial defense, dispersal, foraging success, fledging success, and song learning (e.g., Reijnen and Foppen 1994; Foppen and Reijnen 1994; Larkin 1996).

Wind turbine arrays have the potential to be major sources of bird mortality. [95] The National Wind Coordinating Collaborative estimated that on average, a typical wind turbine kills about two birds per year (NWCC 2002). Erickson et al. (2001) reported than in a California study, 78% of mortalities were songbirds protected by the Migratory Bird Treaty Act, while only 3.3% of bird mortalities were unprotected, such as non-native species like pigeons or starlings. At Wyoming's Foote Creek Rim wind facility, 92% of bird mortality between 1998 and 2002 was comprised of passerines, as opposed to raptors or waterfowl (Young et al. 2003).

[95] The Altamont pass wind site in California has been intensely studied (e.g. Smallwood Thelander 2005 & 2008) and is often cited as an example of how wind turbines cause direct mortality to a variety of birds. However, since this wind facility was built (in the 1980's) it has largely been dismissed as a good example of how projects should be sited, due to its location (right in the middle of avian migratory pathways), and the types of wind turbines in operation (fast-moving blades, lattice towers, etc). Since the days of Altamont, studies in other wind resource areas have shown that bird collisions are not a critical problem at most wind development areas (NWCC 2002) and have led researchers to conclude that fatalities at the level seen at Altamont Pass may be unique (see studies by Thelander and Rugge 2000, and Anderson et al. 2002, NWC 2010).

Fatality rates for birds due to direct impact with turbines vary. Birds have relatively poor hearing. To make a comparison, human ears can detect wind turbines at roughly twice the distance as birds can (Dooling 2002). Both resident and migratory birds are involved in collisions, although resident birds may have a higher probability of colliding with turbines than migrants, given that residents tend to fly lower and spend more time in an area than migrants (Janss 2000). Birds typically migrate at altitudes of 500 to 2,500 feet, well above the top of turbine blades in most locations (NWCC 2002, NWCC 2010). Therefore, collisions with wind turbines during actual migratory flights should be, and appear in actuality to be, rare. However, studies have shown that songbirds are vulnerable to colliding with wind turbines during poor weather conditions that force them to lower altitudes (Erickson et al. 2001; Johnson et al. 2002; Manville 2009). And, Osbourne et al. (1998) noted that 75% of the bird mortality at the Buffalo Ridge Wind Resource Area occurs during migration periods.

The USFWS (2010a) points out that collision risk to individual birds at a particular wind energy facility may be the result of complex interactions among species distribution, relative abundance, behavior, weather conditions (e.g., wind, temperature) and site characteristics. Put simply, the relative abundance of a bird species does not predict the relative frequency of fatalities per species (Thelander and Rugge 2000). For example, collision risk for an individual may be low regardless of abundance if its behavior does not place it within the rotor-swept zone. If individuals frequently occupy the rotor-swept zone but effectively avoid collisions, they are also at low risk of collision with a turbine (e.g. ravens). Alternatively, if the behavior of individuals frequently places them in the rotor-swept zone, and they do not actively avoid turbine blade strikes, they are at higher risk of collisions with turbines regardless of abundance. For a given species, increased abundance increases the likelihood that individuals will be killed by turbine strikes, although the risk to individuals will remain about the same. The risk to a population increases as the proportion of individuals in the population at risk to collision increases (USFWS 2010a). However, to date, the only known concern regarding population effects of wind energy on birds has arisen in the Altamont Pass wind development project, where poor siting of turbines resulted in greater than normal fatality of birds (NWCC 2002, NWCC 2010). It is also noteworthy that the number of birds killed in wind developments is substantially lower relative to estimated annual bird casualty rates from a variety of other anthropogenic factors including vehicles, buildings and windows, power transmission lines, communication towers, toxic chemicals including pesticides, and feral and domestic cats (Erickson et al. 2001; NAS 2007; Manville 2009).

Lattice rather than tubular turbine designs has been shown to be detrimental to birds, because Lattice support towers offer many more perching sites for raptors than do monopole towers, and hence may encourage high raptor occupancy in the immediate vicinity, or rotor swept area, of wind turbines (Orloff and Flannery 1992; NAS 2007). At Altamont pass, lattice turbine types were associated with a higher mortality rate than all other turbine types combined (Orloff and Flannery 1992). These same findings at multiple sites have led many researchers to call for tubular rather than latticed designs for turbines at wind farms.

Reduced visibility because of fog, clouds, rain, and darkness may be a contributing factor in collisions of birds with wind turbines. For example as many as 51 of the 55 collision fatalities (93%) in a study at the Buffalo Ridge Wind Resource Area (WRA) may have occurred in association with inclement weather such as thunderstorms, fog, and gusty winds (Johnson et al. 2002). Sometimes birds experience reduced ability to detect moving blades because of motion smear. Howell et al. (1991) found that increasing turbine blade visibility (alternating patterns of red and white) appeared to reduce the number of avian collisions.

Interestingly, birds are also susceptible to collisions with mirrored heliostats at solar generation facilities. At the 10-MW Solar One pilot power tower facility located in the Mojave Desert, 70 bird fatalities involving 26 species were documented during a 40-week study. 81% of the birds died from colliding

with mirrored heliostats, while the rest died from burns received by flying through standby points. The rate of mortality was estimated to be 1.9 to 2.2 birds per week. It was estimated that this represented 0.6 to 0.7% of the local population present at any given time. While this loss was considered minimal, it was concluded that larger facilities could produce nonlinear increases in the rate of avian mortality and, when coupled with the removal of large tracts of land from biological production, could be of concern with regard to the ecological effects of a solar energy project (McCrary et al. 1986).

In terms of meteorological towers, studies have shown guy-wired towers can cause four times more bird mortality than towers without guy wires (Young et al. 2003), and in fact guyed towers may be more dangerous to birds than wind turbines (BLM 2005b, Wyoming Outdoor Council 2010). The Nine Canyon wind project in Washington used an unguyed meteorological tower, which resulted in no recorded bird or bat fatalities (Erickson et al. 2003a).

Often individual turbine lights span an entire wind farm. While recent studies have concluded that there is no difference in avian mortality rates between a wind farm with flashing lights vs. no lights, the International Dark Sky Association still feels that there could be an issue with nocturnal environment disruption. Non-flashing red lights have been shown to attract night-migrating birds (BLM 2005b). Quickly flashing white strobes appear to be less attractive to birds (Ugoretz 2001). The presence of lighting on some turbines might attract birds to the area and increase the potential for collision mortality at both the lit and unlit turbines (Johnson et al. 2002).

Overall, impacts of wind facilities to bats are one of the more well-studied aspects of wind energy. Reviews on the topic have been written by Erickson et al. (2001), Kunz et al. (2007a) and the National Wind Coordinating Collaborative (2010).

## 2.5 BEST MANAGEMENT PRACTICES FOR BATS

The Siting, Planning/Pre-construction, Construction/Operation, and Monitoring BMPs for bats, below, are an amalgamation of BMP's gathered from numerous different sources.[96]

### 2.5.1 *Siting BMPs for Bats for Wind Projects*

- Avoid siting turbines near bat hibernacula, breeding colonies and maternity roosts.
- Avoid siting turbines within migration corridors and flight paths among and between colonies and feeding areas
- Site turbines away from wetlands, riparian areas, and woodlands to reduce potential bat collisions
- Site turbines away from high-use bat areas identified in pre-construction surveys (see below).

### *2.5.2. Planning and Pre-construction BMPs for Bats for wind projects*

- Conduct daytime and nighttime bat surveys during the spring and fall migration season to determine use of the proposed project area, and conduct nighttime bat surveys during the breeding season.

[96] Sources include Kuenzi and Morrison 1998, O'Farrell et al. 1999, BLM 2005a, BLM 2005b, CESA 2006, BLM 2008, Molvar 2008, ONDA 2009, Arizona Game and Fish Department 2010, NWCC 2010, U.S Fish & Wildlife Service 2010a, WOC 2010.

- Surveys should follow science-based, peer-reviewed protocols,[97] and can include acoustic, radar, and/or thermal imaging surveys to determine relative abundances and occupied habitats for bats in and near the project area prior to site selection, and foraging habitats and migration pathways used by these species.
- If acoustic surveys are done, the USFWS (2010a) recommends placing acoustic detectors on existing met towers, approximately every two kilometers across the site where turbines are expected to be sited. The Clean Energy States Alliance also recommends that this be done for one season (late summer-early fall) with acoustic detectors mounted on existing met towers at varying heights, with an attempt made to mount detectors within the proposed rotor swept area.
- Monitoring for a full year is recommended in areas where there is year round bat activity.
- Data on environmental variables such as temperature and wind speed should be collected concurrently with acoustic monitoring so these weather data can be used in the analysis of bat activity levels.
- Mistnetting is best used in combination with acoustic monitoring to inventory the species of bats present at a site, especially to detect the presence of threatened or endangered species. Efforts should concentrate on potential commuting, foraging, drinking, and roosting sites.
- Pre-construction survey efforts may be recommended to determine whether known or likely bat roosts in mines, caves, bridges, buildings, or other potential roost sites occur within the project vicinity, and to confirm whether known or likely bat roosts are occupied by bats.

### *2.5.3* Construction and Operation BMPs for Bats for Wind facilities

- Use no lighting on turbines unless required by Federal Aviation Administration regulations.
- For turbines that require lights for aviation safety consider "on-demand" lighting systems for turbines and met towers, such as those which use radar-based technology to allow the FAA strobe lights on wind farms to remain off at all times - unless an aircraft is detected. Alternatively, use a minimal number of simultaneously flashing white or red lights, unless otherwise requested by the FAA.
- For lighting for operation and maintenance facilities and substations, lights should be hooded downward and directed to minimize horizontal and skyward illumination. Minimize use of high-intensity lighting, steady-burning, or bright lights such as sodium vapor, quartz, halogen, or other bright spotlights
- If turbines are sited across migration routes or between roosting and feeding areas, then these turbines should have seasonal shutdowns during the migration season(s) or periods.
- Turbines should be set to have a minimum ‘cut-in’ speed of 6 meters per second to avoid the increased mortality risk to bats at slow turbine speeds.
- Focus most construction activities in either summer or winter, if possible.
- Because some studies have demonstrated that bat fatalities occur primarily on nights with low wind speed and typically increase immediately before and after the passage of storm fronts, consider shutting down some turbines during these weather conditions.

### **2.5.4** ***Monitoring BMPs for Bats for Wind Facilities***

[97] We refer readers to the USFWS (2010a) Wind Turbine Guidelines Advisory Committee Policy Recommendations and Guidelines for further guidance on designing and implementing pre and post wind facility construction monitoring plans and surveys for bats.

- For wind facilities, conduct weekly surveys to determine fatality rates of bats.[98] Fatality studies should also conduct carcass removal and searcher efficiency trials using accepted methods (Anderson 1999, Morrison et al. 2001, Kunz et al. 2007a, Arnett et al. 2007, NRC 2007).
- For wind facilities, bat surveys should be conducted during the spring and fall migration periods and during the breeding season for at least two to three years post-construction.
- Compare post construction survey data with post construction survey data. Manage adaptively through changes in site operation (i.e cut-in speeds of turbines, operation of turbines during low wind nights when it is predicted to have higher bat mortality) if monitoring indicates that bat populations are no longer meeting pre-set goals. A technical advisory committee should be established to review monitoring results and make suggestions regarding the need to adjust site operations or mitigation and monitoring requirements.

### 2.5.5 JUSTIFICATION FOR BAT BMPS

Bats sustain potentially fatal injuries not only from turbine strikes but also from potentially deadly decompression associated with air pressure gradients cased by spinning turbines (Arnett et al. 2008, Baerwald et al. 2008). Kunz et al. (2007a) reported that bat fatalities at wind power facilities ranged from 0.8 to 53.3 bats per megawatt per year, with the highest mortality rates in forested areas. At some projects, bat fatalities are higher than bird fatalities, but the exposure risk of bats at these facilities is not fully understood (National Research Council 2007). In their literature review on patterns of bat facilities at wind energy facilities in North America, Arnett et al. 2008 noted that none of the studies they reviewed reported bat fatalities associated with meteorological towers. These findings support the contention that bats collide with spinning turbine blades and that they do not strike stationary blades or towers (Arnett 2005). Across North America, taller towers with greater rotor-swept area induce greater bat mortality rates than smaller and shorter wind turbines (Arnett et al. 2008). As the trend within the industry is toward taller wind turbines with larger propellers, it is expected that risk to bats will increase further over time.

Almost 75% of all bats killed by wind turbines nationwide are made up of three species[99] of tree-roosting, migratory Lasiurids: the foliage-roosting eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), and tree cavity-dwelling silver-haired bat (*Lasionycteris noctivagans*) (NAS 2007, Kunz et al. 2007b, Arnett et al. 2008). All three of these species have spring and fall migration periods (NatureServe 2011). Many researchers have concluded that migrating bats are at most risk of turbine collision and that resident, breeding, or foraging bats have a lower risk of collision mortality (Erickson et al. 2003, Johnson et al. 2003, Johnson and Strickland 2004, Johnson et al. 2004). The National Wind Coordinating Collaborative (2010) stated that, "all studies of bat impacts have demonstrated that fatalities peak in late summer and early fall, coinciding with the migration of many species (referencing Johnson 2005; Kunz et al. 2007a;
Arnett et al. 2008).

Jain et al. (2007) suggested that turbines located closer to wetlands may kill more bats. One thing that has been found by many researchers is that wind projects planned in or near woodlands have a greater

[98] Alternatively, Arnett (2005) recommends daily carcass searches rotating through a subset of the turbines, so that there are some carcass data coming in each day. Also, the Clean Energy States Alliance (2006) posits that initial post-construction bat mortality surveys can be done at a modest level of intensity (e.g., weekly or biweekly at a sample of turbines during the migration period) to determine a general level of bat mortality. However, if the monitoring indicates larger than expected bat fatalities, additional monitoring will be needed

[99] Arnett et al. (2008) and Miller (2008) report that the Brazilian Free-tailed Bat comprised a large proportion (41–86%) of the bats killed at developments within this species' range.

likelihood of high bat mortality rates. Some of the highest levels of bat mortality have been recorded at the Mountaineer wind power facility in the forested mountains of West Virginia, where an estimated 21 bats per night were struck (Horn et al. 2008). Fiedler (2004) reported that bat fatalities in 2004 at a wind power facility in mixed hardwood forest in eastern Tennessee were an order of magnitude greater than at 8 other facilities in the region, and blamed siting on a prominent ridgeline surrounded by forests with rocky outcrops for the higher bat mortality at this site and the Mountaineer wind farm. Johnson et al. (2004) found that turbines located near woodlands also experienced higher levels of bat activity at the Buffalo Ridge facility in southwestern Minnesota. Arnett et al. (2005) found that forested ridges pose especially high fatality risks to bats at wind facilities. In their literature review on patterns of bat facilities at wind energy facilities in North America, Arnett et al. 2008 noted that estimates of bat fatalities were highest at wind energy facilities in the eastern United States (which are often located on forested ridges), and lowest in the Rocky Mountain and Pacific Northwest regions.

Bats may be more vulnerable to mortality at wind power facilities than birds because bats seem to be attracted to operating turbines. It is possible that migrating tree-roosting species perceive turbines as possible roost trees and investigate them upon encounter (Arnett 2005, Kunz et al. 2007b, Horn et al. 2008). Others (Cryan and Brown 2007) have put forth the "mating hypothesis" in which bats will be generally attracted to the tallest prominent features in a landscape where they can meet along their migratory routes and breed. This also might explain why so many bats are killed by bars in the fall, due to these aggregation type of mating behaviors (Arnett et al. 2008). Arnett (2005) hypothesized that hoary bats may confuse turbine movements for flying insects and be drawn toward operating turbine blades. The attraction of bats to wind turbines during feeding was validated experimentally by Horn et al. (2008), who videoed foraging bats approaching and pursuing moving turbine blades and then being trapped by their vortices of air. Horn et al. hypothesized that bats investigate moving blades simply out of curiosity, because movement is mistaken as evidence of prey, or because of attractive sounds. Similarly, Kunz et al. (2007b) produced thermal images of bats attempting to land or actually landing on stationary blades. Other researchers have also noted that many turbines are located on ridge top sites where there are often elevated numbers of insect prey (Horn et al. 2008).

Some studies demonstrate that bat fatalities occur primarily on nights with low wind speed and typically increase immediately before and after the passage of storm fronts. Weather patterns therefore may be a predictor of bat activity and fatalities, and mitigation efforts that focus on these high risk periods may reduce bat fatalities substantially (Arnett etal. 2008). Scientists have hypothesized that bat fatalities could be lowered substantially by reducing the amount of turbine operating hours during low wind periods when bats are most active. This can be done by increasing the minimum wind speed, known as the "cut-in" speed, at which the turbine's blades begin rotating to produce electricity. Some researchers (Arnett et al. 2009, Baerwald et al. 2009) have tested whether or not increasing the minimum turbine cut-in speed reduces bat fatalities, and demonstrated that bat fatalities were reduced by 50 to 87%.

Overall, impacts of wind facilities to bats are one of the more well-studied aspects of wind energy. Reviews on the topic have been written by Johnson (2005), Kunz et al. (2007a), Arnett et al. (2008), and the National Wind Coordinating Collaborative (2010).

**2.6 BEST MANAGEMENT PRACTICES FOR SITE HYDROLOGY (INCLUDING SOILS AND VEGETATION)**

The Siting, Planning/Pre-construction, Construction/Operation, and Monitoring BMPs below are an amalgamation of BMP's gathered from numerous different sources.[100]

### 2.6.1 *Siting BMPs for Soils, Vegetation and Hydrology*

- If location is on BLM lands, note that BLM will prohibit the disturbance of any population of federally listed plant species.
- All structures related to the solar or wind energy facility should be sited in locations that minimize impacts on surface water bodies, ephemeral washes, playas, and natural drainage areas (including groundwater recharge areas). Siting within 100-year floodplains should be avoided
- For solar installations, ensure that there are adequate and readily available local water supplies needed for cooling. In particular, wet-cooling technology is not recommended because of the large amounts of water that is required.
- For wind facilities, locate turbines in an area that does not disrupt sand transport processes nor removes some or all of a sand source relative to nearby sand dune systems harboring listed or otherwise sensitive plant species. Projects should not armor sand sources for nearby dune systems.

### *2.6.2 Planning and pre-construction BMPs for Soils, Vegetation and Hydrology*

- Natural Heritage Program data should be consulted to identify rare plants of state (S1, S2), and global (G1, G2, G3) rankings known to or suspected to occur on the site.
- Surveys should be done for threatened and endangered plants suspected to be at the site.
- Provide a complete site grading plan, and drainage, erosion, and sediment control plan with applications to applicable lead agencies.
- For solar facilities, conduct soil surveys to identify soil types and the typical silt content of soils in many locations, to estimate soil erosion hazard.
- For solar facilities, project developers should conduct a preliminary hydrologic study of the project area in order to identify surface watersheds and groundwater basins potentially directly affected and connected to the location of the project site. The study should include the relationship of the project site hydrologic basin to the other basins in the region; identification of all surface water bodies (including ephemeral washes/drainages, playas and floodplains); identification of all applicable groundwater aquifers; the connectivity of surface water and groundwater, and the regional climate (seasonal and long term).
- For solar facilities, project developers should plan to implement water conservation measures related to solar energy technology water needs in order to reduce project water requirements. Developers should minimize the consumptive use of fresh water for power plant cooling by, for example, using dry cooling, using recycled or impaired water, or selecting solar energy technologies that do not require cooling water.
- The capability of local surface water or groundwater supplies to provide adequate water for the operation of proposed solar facilities should be considered early in the project siting and design.

### *2.6.3* Construction and Operation BMPs for Soils, Vegetation and Hydrology

- Minimize project disturbance area as much as possible, including minimizing lay-down areas and borrow areas.
- Build wind and solar facilities and access routes away from steep slopes (greater than 20 degrees).

[100] Sources include BLM 2005a, BLM 2005b, , California Energy Commission 2007, NWCC 2007, BLM 2008, Molvar 2008, The Nature Conservancy 2008, ONDA 2009, Arizona Game and Fish Department 2010, BLM 2010a U.S Fish & Wildlife Service 2010a, WOC 2010.

- Do not build facilities on unstable slopes, alluvial fans or areas with high erosion potential. Identify local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, slope angles, and geologic structure).
- Ensure that all temporary use areas during construction are restored. Reclaim areas disturbed during construction by spreading excess excavated soil to match surrounding topography, and reclaim as soon as possible with native seedings/vegetation and locally sourced topsoil.
- If new access roads and ways are needed, avoid gravel roads if possible and instead rely on dirt tracks and jeep trails constructed by cross country travel.
- If a paved road is absolutely necessary use standard BLM road construction BMPs (such as outlined in BLM Manual 9113) for all road construction.
- Make sure that any access roads that are built avoid stream crossings, wetlands and drainages. Where access roads must cross a dry wash, the road gradient should be 0% to avoid diverting surface waters from the channel.
- Minimize natural vegetation removal and considering cutting or mowing vegetation rather than total removal whenever possible.
- Take actions to prevent spread of weeds. Thoroughly wash all surfaces and undercarriages of vehicles and equipment before moving to the project site to remove any noxious or non-native plant seeds. Use certified weed-free straw or hay bales for sediment barrier installations, and certified weed-free mulch if mulching is needed on the site.
- If a weed problem persists on the site during construction, limit herbicide use to non-persistent, immobile herbicides. All herbicides should be applied in accordance with guidance provided in the Final PEIS on vegetation treatments using herbicides (BLM 2007).
- Avoid using fresh ground or surface water for solar power plant cooling. Instead, employ air-cooled technology or recycled/impaired water. If groundwater must be used, a comprehensive analysis of the groundwater basin must be conducted and any potential impacts thoroughly evaluated.
- Develop and follow a dust abatement plan for the site. This should include the use of dust abatement techniques on unpaved, unvegetated surfaces to minimize airborne dust; 25 mph speed limits on, and to and from, the site; covered construction materials and stockpiled soils; and dust abatement techniques that are used before and during surface clearing, excavation, or blasting activities.
- For solar facilities, minimize the amount of area of impervious surfaces, and consider the use of permeable pavement for areas that must be paved.

#### *2.6.4. Monitoring BMPs for Soils, Vegetation and Hydrology*

- Develop and abide by a storm water management plan to ensure compliance with state and federal regulations and prevent off-site migration of contaminated storm water or increased soil erosion.
- Monitor for the spread of invasive plant species post construction, and take action to prevent further spread of invasive weeds away from the site.[101]
- Regularly monitor rights-of-way (ROWs), access roads, and other project areas for indications of erosion.

[101] The BLM (2010a) recommends that integrated pest management, including biological controls, should be used to prevent the spread of invasive species, per the "Vegetation Treatments Using Herbicides on BLM Lands in 17 Western States", and the National Invasive Species Management Plan, 2009.

- For revegetation and reclamation sites, keep livestock out of reclaimed areas until vegetation cover resembles the Potential Natural Community described in the NRCS Range Site Type description or Ecological Site Description.
- For solar facilities using groundwater and surface water for cooling operations, they should develop and implement a Water Resources Monitoring and Mitigation Plan, which includes monitoring the effects of groundwater and surface water withdrawal for project uses. The use of water should not contribute to the significant long-term decline of groundwater levels or surface water flows and volumes.

### 2.6.5 JUSTIFICATION FOR SOIL, VEGETATION AND HYDROLOGY BMPS

In terms of siting issues, development in areas of actively migrating sand dunes has the potential to slow or alter wind patterns, resulting in the conversion of open dune habitats to dunes stabilized by vegetation. Keith et al. (2004) reported that large amounts of wind power can extract kinetic energy and alter turbulent transport in the atmospheric boundary layer, with the result of slower wind speeds and greater turbulence near the surface. Roy et al. (2004) modeled the effects of wind farms in the Great Plains region and found that wind farms can significantly slow down the wind at the turbine hub-height level, and that turbulence generated by rotors creates eddies downwind of turbine arrays. In order to ensure that a reduction in wind velocity does not result in the stabilization of actively migrating dunes and the loss of open dune habitats, wind power projects should not be sited in or immediately upwind of areas of actively migrating dunes.

A number of construction-associated activities may adversely impact vegetation at a renewable energy development site. These activities include the clearing and grading of vegetated areas, and the introduction of invasive vegetation into disturbed areas of the immediate project site, and possibly into surrounding areas (BLM 2005b, BLM 2010a). Additional impacts on vegetation communities could occur from soil compaction (which can have even worse impacts in very arid environments such as salt desert, BLM 2008), loss of topsoil, and removal of or reductions in the seed bank during site clearing activities. Fugitive dust during construction activities can also potentially impact the plant community by coating the leaves of plants and potentially reducing photosynthesis rates (Thompson et al. 1984, Hirano et al. 1995), and increasing water loss (Eveling and Bataille 1984). These sorts of impacts that result from basic land clearing exercises are more common for solar facilities (than for wind farms), where current, typical rates are about nine acres of land cleared per megawatt of solar power generated (BLM 2010a).

A solar parabolic trough installation or solar power tower site requires flat land, and grading is the industry norm. The site is typically cleared of all vegetation to allow access to the installed equipment and to prevent fires. Herbicides may be sprayed or vegetation mowed to maintain cleared zones under and around the solar fields. Because some native plant species in our western deserts and arid landscapes may take decades or even centuries to recolonize after disturbance, development of this type has long-term consequences that cannot be undone, even if all of the installed equipment is removed and restoration attempts are made (Randall et al. 2010). The disturbance to fragile soil biological crusts can destabilize soils (Belnap and Herrick 2006), leading to increased particulate air pollution as soils are displaced by strong desert winds. In total, the surface disturbance at a solar facility is similar in intensity to large-scale commercial facilities, with an additional downside: the great expanse of exposed, disturbed soils found onsite and on associated roads is susceptible to invasion by non-native invasive plants which are known to thrive in areas of surface disturbance, and can serve as a reservoir of invasive species, furthering their dispersal into nearby natural lands which could result in long-term impacts to the native plant community (BLM 2010a, Randall et al. 2010).

When either solar or wind developments create large areas of disturbance, soil and groundwater and surface water resources can be impacted. In particular, the large, cleared, impervious surface areas created can block or reroute surface flows (Arizona Game and Fish Department 2010). This in turn can lead to and exacerbate soil erosion, weathering of newly exposed soils leading to leaching and oxidation which release chemicals into groundwater, discharges of waste or sanitary water, presence of dissolved salts from untreated groundwater used to control dust, and herbicide or pesticide applications (AGFD 2010, BLM 2010a). Soil erosion at a site can be particularly problematic as it can remove soil, decrease its productivity and damage biological resources. Further, if uncontrolled runoff from construction sites causes short-term increases in turbidity in nearby watercourses, this can exacerbate flooding and also lead to increases in sedimentation and siltation which degrades water quality (AGFD 2010).

Most solar facilities need relatively small amounts of water for periodic cleaning of their mirrors, but some solar-thermal facilities also require large amounts of water for cooling. Depending on how much water is needed at a given solar generation site, there can be a locally large impact on water resources (Randall et al. 2010), with possible concomitant effects on local springs and seeps (Patten et al. 2008). While photovoltaic installations require no water to generate electricity, water is required to wash panels. Solar power companies have indicated that between two and 10 acre-feet of water per 100 megawatt (MW) per year might be needed for this purpose (TNC 2008). Parabolic trough and solar technologies heat a transfer fluid that is in turn used to heat water to create stream and turn the turbines to generate electricity. Water is also required for the steam circuit and washing mirrors. In addition, if a plant uses wet-cooling of the exhaust steam from its turbines, industry standards indicate that up to 600 acre-feet of water per 100 MW per year may be required.[102] Often, the proposed sources of water for many currently proposed solar facilities are unclear. The BLM's recent Draft Programmatic Environmental Impact Statement for solar development stated that in most areas where solar projects are proposed, groundwater would likely be withdrawn from local aquifers to meet the project's water needs (BLM 2010a). Other options include water purchased through a water district and pumped to the site (Randall et al. 2010), though this is not usually an economically viable activity out in remote locations in our western deserts where most large scale solar facilities are planned.

**2.7. SPECIAL BMP SECTION ON ADDRESSING LAND USE PLANNING AND RENEWABLES**

The following Best Management Practices ensure that the basic, guiding principles of planning are followed in a land use plan's consideration for renewable energy. These should be followed by the land management agency that is amending a land use plan to incorporate renewable energy development. These BMPs should thus be solid guidance for those commenting on a land use plan that is being amended in an area that will incorporate new renewable energy:

- Describe planning issues in a way such that a remedy can clearly be seen to address the issue.
- Design the land use plan around goals and measurable objectives that capture important ecological factors.
- Design monitoring to measure ecological factors.
- Based on habitat and wildlife population conditions, establish ecological objectives for the renewable energy site and surrounding watershed that lead to restoration where needed for maintenance of healthy habitat.

[102] For more information on how to reduce water consumption with CSP technologies, please refer to the U.S. Department of Energy report entitled, "Concentrating Solar Power Commercial Application Study: Reducing Water Consumption of Concentrating Solar Power Electricity Generation" http://www.nrel.gov/csp/publications.html.

- For areas within the project site that need restoration or wildlife recovery, develop in the land use plan (or amendment) the actions needed to achieve wildlife and/or habitat recovery.
- Threats or stressors that either have led to degraded conditions in the planning area or threaten habitat in the future should be identified and the means to address those stressors developed.
- The plan should present the required sequence of actions that are needed for the siting and construction of renewable energy facilities that lead to achieving ecological objectives for the planning area. Construction and operation approval for renewable energy needs to be contingent on reaching and maintaining these goals.
- The land use plan should describe the resources available to implement the plan and assesses whether they are adequate in order to achieve ecological objectives.
- Monitoring should begin well in advance of construction. Background information on ecological goals is required in order to have a starting place to assess the impacts of the renewable energy site. Ecological reference areas should be established for comparison and long term monitoring.
- The land use plan should present how adaptive management will be used to incorporate renewable energy in the planning area. Adaptive management based on ecological goals uses monitoring data to determine whether renewable energy facility construction and operation are meeting goals, and this triggers responses in management to ensure goals are met.

## 2.8 IMPORTANCE OF ADAPTIVE MANAGEMENT AND BMPS

One important component of responsible and environmentally sustainable planning for and operation of large scale renewable energy sites is adaptive management. While we do not specifically link the guidances and suggested BMPs in this document to specific recommendations for adaptive management, this should be a part of all renewable energy monitoring. For the purposes of these BMPs, adaptive management can be thought of as a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs (Nyberg 1998).

With ecological adaptive management, ecological goals are expressed in terms of measurable objectives that can be determined through monitoring. Monitoring, in turn, assesses indicators of wildlife viability and habitat function as well as human use. This monitoring is then linked to analysis that determines whether the occurring human use (in this case, renewable energy production) is consistent or not with the ecological goals for the site. This analysis in turn has thresholds that, when reached, call for management changes that will lead to meeting ecological objectives. Post construction monitoring efforts at wind and solar facilities should always be designed and carried out with an eye to adaptive management at the facility.

BLM Wind Programmatic Environmental Impact Statement Record of Decision has this to say about the use of adaptive management:

*"The BLM's Wind Energy Development Program will incorporate adaptive management strategies to ensure that potential adverse impacts of wind energy development are avoided (if possible), minimized, or mitigated to acceptable levels. The programmatic policies and BMPs will be updated and revised as new data regarding the impacts of wind power projects become available. At the project-level, operators will be required to develop monitoring programs to evaluate the environmental conditions at the site through all phases of development, to establish*

*metrics against which monitoring observations can be measured, to identify potential mitigation measures, and to establish protocols for incorporating monitoring observations and additional mitigation measures into standard operating procedures and project-specific stipulations. The BLM has the right to reassess mitigation measures if monitoring shows they are not succeeding/achieved or if new science supports the use of different or additional mitigation measures."*

All wind facilities should incorporate this type of adaptive management into their site operation plans. If post-construction surveys indicate unacceptable levels of avian or bat fatalities, actions to mitigate these impacts should be taken. For example, wind facilities can be shut down temporarily at night during peak migration periods to reduce collisions. Alternatively, individual turbines that appear to be particularly dangerous to birds and bats can be shut down temporarily. To avoid bat fatalities, wind turbines also may be programmed to begin operating at higher minimum wind speeds during bat migration periods. Research has shown that temporarily stopping wind turbines during low-wind conditions can dramatically reduce the number of bats killed at wind plants with a minimum loss of power output.

## 3.0 Research Needs

We have found very few studies that investigate the impacts of wind energy development on big game. There is some anecdotal information that pronghorn and even elk may continue to use the Foote Creek Rim wind power site in Wyoming, but this area has not been subjected to rigorous scientific study (Molvar 2008). As such, we would recommend that the first wind projects to be constructed within big game crucial ranges or migration corridors should be accompanied by rigorous scientific studies to determine the level of tolerance of big game for wind power facilities. These studies should describe the area of avoidance if displacement occurs; test the same hypothesis for operation activities as is tested for development; determine population levels effects, if any; and determine how long it takes for animals to resume using the wind power facility site. Such studies should use Before-After-Control formats for maximum scientific rigor. If these studies indicate that displacement of big game by wind power development from a type of sensitive range or migration corridor is negligible, then other wind power projects should be free to proceed in that type of range or migration corridor.

In terms of needed avian research, further research is needed to determine whether wind turbines adversely affect local sage-grouse populations. Also, it is unclear whether a high density of wind turbines increases or decreases raptor mortalities (Anderson et al. 2004, Smallwood and Thelander 2005). More study is needed to determine whether advantages can be gained by altering the density of turbine arrays.

Kunz et al, 2007b, Horn et al. (2008) and Cryan (2008) hypothesize that bats are attracted to turbines, which, if true, would further complicate estimation of exposure. Reasons for apparent attraction may include sounds produced by turbines, a concentration of insects near turbines, and bats attempting to find roost locations (NWCC 2010). Further research is required to determine if bats are attracted to turbines and if so, whether this increased individual risk translates into higher population-level impacts for bats. Also on the bat research front, there is a need to better relate bat fatalities among wind facilities to landscape characteristics (e.g., geology, topography, habitat types, proximity of facilities to features such as mountain ranges or riparian systems). Relating fatalities to features within the immediate area of a turbine (e.g., proximity to water or forest edge) will help with designing future facilities and locating

turbines to avoid higher risk areas within a site. (Kunz et al. 2007b; Kuvlesky et al. 2007; NAS 2007; Arnett et al. 2008). In their literature review on patterns of bat facilities at wind energy facilities in North America, Arnett et al. (2008) also noted that more research is needed to elucidating patterns of fatality associated with weather conditions (e.g., wind speed, barometric pressure) and technical parameters (e.g., turbine size and ht, linear array of turbines vs. scattered individual turbine locations) of different facilities.

Arnett et al. (2008) also go on to say that since a large proportion of bat fatalities occur during fall migration, particularly on nights with low winds and relatively low levels of power production, curtailment of operations during predictable nights or periods of high bat kills could reduce fatalities considerably, potentially with modest reduction in power production (referencing Kunz et al. 2007). Thus, Arnet at al. propose that manipulative experiments be implemented at wind facilities across different regions to test various curtailment treatments with regard to the effect on reducing bat fatalities and economic costs of those treatments.

## 4.0 Conclusion

This peer-reviewed document has presented a set of BMPs, which, if followed, should help ensure that potentially adverse impacts to most species of concern and their habitats present at renewable energy project sites would be reduced. However, we stress that, like all other science-informed management directions, the use and implementation of these BMPs must include adaptive management.

These BMP's and guidance document will evolve over time as additional experience, monitoring and research becomes available on how to best minimize wildlife and habitat impacts from wind and solar energy projects. As such, we plan to continue work with industry, developers, the conservation community and other stakeholders and states to evaluate, revise and update these BMPs and guidance document on a periodic basis.

## 5.0 Literature Cited

American Planning Association (APA). 2006. Planning and urban design standards. John Wiley & Sons, New Jersey.

American Planning Association. 2009. American Institute of Certified Planners code of ethics and professional conduct. http://www.planning.org/ethics/ethicscode.htm

American Bird Conservancy. 2011. American Bird Conservancy's Policy Statement on Wind Energy. http://www.abcbirds.org/abcprograms/policy/collisions/wind_policy.html

American Wind Energy Association (AWEA). 2008. Wind Energy Siting Handbook. Document Prepared for AWEA by Tetra Tech EC, Inc. and Nixon Peabody LLP. Copyright 2008 by American Wind Energy Association, Washington, D.C. http://www.awea.org/sitinghandbook/

Anderson, R., M. Morrison, K. Sinclair, and D. Strickland. 1999. Studying Wind Energy/Bird Interactions: A Guidance Document. Metrics and Methods for Determining or Monitoring Potential Impacts on Birds at Existing and Proposed Wind Energy Sites. National Wind Coordinating Committee/RESOLVE. Washington, D.C., USA.

Anderson, R., N. Neumann , W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2004. Avian Monitoring and Risk Assessment at the Tehachapi Pass Wind Resource Area, Period of Performance: October 2, 1996 - May 27, 1998. NREL Report NREL/SR-500-36416, 90 pp. Available online at http://www.nrel.gov/wind/pdfs/36416.pdf.

Arizona Game and Fish Department (AGFD). 2010. Guidelines for solar development in Arizona. www.azgfd.gov/hgis/documents/FinalSolarGuidelines03122010.pdf.

Arnett, E.B. (Ed). 2005. Relationships between bats and wiarch protocols, patterns of fatality, and behavioral interactions with wind turbines. A final report submitted to the Bats and Wind Energy Cooperative. Austin, TX: Bat Conservation International. Available online at www.batcon.org/wind/BWEC2004finalreport.pdf.

Arnett, E. B., editor. 2005. Relationships between bats and wind turbines in Pennsylvania and West Virginia: an assessment of bat fatality search protocols, patterns of fatality, and behavioral interactions with wind turbines. A final report submitted to the Bats and Wind Energy Cooperative. Bat Conservation International, Austin, Texas, USA. http://www.batcon.org/windliterature.. Accessed 1 Sep 2007.

Arnett, E.B., D.B. Inkley, D.H. Johnson, R.P. Larkin, S. Manes, A.M. Manville, R. Mason, M. Morrison, M.D. Strickland, and R. Thresher. 2007. Impacts of Wind Energy Facilities on Wildlife and Wildlife Habitat. Issue 2007-2. The Wildlife Society, Bethesda, Maryland, USA.

Arnett, E.B., W.K. Brown, W.P. Erickson, J.K. Fiedler, B.L. Hamilton, T.H. Henry, A. Jain, G.D. Johnson, J. Kerns, R.P. Koford, C.P. Nicholson, T.J. O'Connell, M.D. Piorkowski, and R.D. Tankersley, Jr. 2008. Patterns of Bat Fatalities at Wind Energy Facilities in North America. J. Wildl. Manage. 72: 61-78.

Audubon. 2008. Audubon's Position on Wind Power. http://policy.audubon.org/wind-power-overview-0

Avian Powerline Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006. Edison Electric Institute, APLIC, and the California Energy Commission. Washington D.C. and Sacramento, CA. http://www.aplic.org/SuggestedPractices2006(LR-2watermark).pdf.

Baerwald, E. F., J. Edworthy, M. Holder, and R. M. R. Barclay. 2009. A large-scale mitigation experiment to reduce bat mortalities at wind energy facilities. Journal of Wildlife Management. 73: 1077-1081.

Barrios, L. and A. Rodríguez. 2004. Behavioural and environmental correlates of soaring-bird mortality at on-shore wind turbines. *Journal of Applied Ecology*. 41: 72-81.

Belnap, J., and J. Herrick. 2006. Recovery Time of Soil and Vegetation from Historical Geophysical Exploration in Southeastern Utah. Report prepared for the U.S. Department of Energy and Bureau of Land Management.

Bureau of Land Management (BLM). 2001. Manual 6840 □ □Special Status Species Management. Release No. 6-121, U.S. Department of the Interior.

Bureau of Land Management (BLM). 2002. "Instruction Memorandum No. 2003-020, Interim Wind Energy Development Policy," issued by the Director of the BLM, Washington, D.C., Oct. 16.

Bureau of Land Management (BLM). 2005a. Record of decision: implementation of a wind energy development program and associated land use plan amendments.

Bureau of Land Management (BLM). 2005b. Wind Energy Development Programmatic EIS. U.S. Department of the Interior, Washington, D.C.

Bureau of Land Management (BLM). 2005c. H-1601-1 Public Land Use Planning Handbook. BLM Manual release 1-1693 11th March 2005.

Bureau of Land Management (BLM). 2007. Final Programmatic Environmental Impact Statement, Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States. FES 07-21, U.S. Department of the Interior, Washington, D.C., June 29. Available at http://www.blm.gov/15 wo/st/en/prog/more/veg_eis.html.

Bureau of Land Management (BLM). 2008. Environmental Assessment (EA) for Milford Wind Corridor Project, Millard and Beaver Counties, Utah. EA UT-040-07-20. UTU-82972 and UTU 82973. October 15, 2008. BLM Cedar City and Fillmore Field Offices, UT.

Bureau of Land Management (BLM). 2010a. Programmatic Environmental Impact Statement for Solar Energy Development on BLM Lands.

Bureau of Land Management (BLM). 2010b. Record of decision and approved Kemmerer Resource Management Plan. May 2010 Kemmerer, Wyoming.

Bureau of Land Management (BLM) and U.S Forest Service (USFS). 2008a. Final Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States, Volume I: Programmatic Analysis, October 2008.

Bureau of Land Management (BLM). 2010c. Best Management Practices and guidance manual: Desert renewable energy projects. Renewable energy action team report. November 2010.

Bureau of Land Management (BLM) and U.S Forest Service (USFS). 2008b. Record of Decision and Resource Management Plan Amendments for Geothermal Leasing in the Western United States. December 2008.

California Energy Commission (CEC) 2007. Best Management Practices and Guidance Manual: Desert Renewable Energy Projects. Report # CEC-700-2009-016-SD.

California Energy Commission and California Department of Fish and Game. 2007. California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development. Commission Final Report. California Energy Commission, Renewables Committee, and Energy Facilities Siting Division, and California Department of Fish and Game, Resources Management and Policy Division. CEC-700-2007-008-CMF.

Canadian Wildlife Service. 2006. Wind Turbines and Birds: A Guidance Document for Environmental Assessment. Environment Canada / Canadian Wildlife Service/Service. Gatineau, Quebec. http://www.fws.gov/midwest/wind/guidance/CanadianEAguidelines.pdf

Clean Energy States Alliance (CESA). 2006. Model state guidance document governing avian and bat impacts from wind facilities. October, 2006

Collins, C.P., and T.D. Reynolds. 2006. Greater sage-grouse lek surveys and lek counts on Cotterel Mountain, 2006 Results. Ribgy, ID: TREC, Inc.

Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage grouse population and their habitats. Wildlife Society Bulletin 28(4):967-85.

Cryan, P.M. 2008. Mating Behavior as a Possible Cause of Bat Fatalities at Wind Turbines. Journal of Wildlife Management 72(3): 845-49.

Dettmers, R., D.A. Buehler, J.G. Bartlett, and N.A. Klaus. 1999. Influence of Point Count Length and Repeated Visits on Habitat Model Performance. Journal of Wildlife Management 63(3): 815-23.

Dixon, J.D., et al. 2007. Genetic Consequences of Habitat Fragmentation and Loss: The Case 41 of the Florida Black Bear (*Ursus americanus floridanus*). Conservation Genetics 8(2):455–464.

Dobson, A., Ralls, K., Foster, M., Soule′, M.E., Simberloff, D., Doak, D., Estes, J., Mills, S., Mattson, D., Dirzo, R., Arita, H., Ryan, S., Norse, E., Noss, R., and D. Johns. 1999. Regional and Continental Restoration. In: (Soulé, M.E. and J. Terborgh, editors) Continental Conservation: Scientific Foundations of Regional Reserve Networks. Island Press, Washington, DC.

Dooling, R. 2002. Avian Hearing and the Avoidance of Wind Turbines. NREL Report NREL/TP-500-30844, 83 pp. Available online at http://www.nrel.gov/wind/pdfs/30844.pdf.

Erickson, W. P., G. D. Johnson, et al. (1999). Baseline Avian Use and Behavior at the CARES Wind Plant Site, Klickitat County, Washington. Prepared for the National Renewable Energy Laboratory**:** 1-75.

Erickson, W.P., G. D. Johnson, M. D. Strickland, D. P. Young, Jr., K. J. Sernka, and R.E. Good. 2001. Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States. National Wind Coordinating Committee, 62 pp. Available online at http://www.west-inc.com/reports/avian_collisions.pdf.

Erickson, W.P., et al. 2002. Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments, prepared by Western EcoSystems Technology, Inc., Cheyenne, Wyo., for Bonneville Power Administration, Portland, Ore., Dec.

Erickson, W.P., B. Gritski, and K. Kronner, 2003a. Nine Canyon Wind Power Project Avian and Bat Monitoring Report, September 2002 – August 2003. Technical report submitted to Energy Northwest and the Nine Canyon Technical Advisory Committee. Available online at http://www.westinc.com/reports/nine_canyon_monitoring_final.pdf.

Erickson, W.P., et al., 2003b. Stateline Wind Project Wildlife Monitoring Final Report, Results for the Period July 2001–December 2003. Prepared by Western EcoSystems Technology, Inc., Cheyenne, Wyo., and Walla Walla, Wash., for FPL Energy, Oregon Office of Energy, and Stateline Technical Advisory Committee. May 2003.

Eveling, D.W., and A. Bataille, 1984. The Effect of Deposits of Small Particles on the Resistance of Leaves and Petals to Water Loss. Environmental Pollution. Series A 36:229–238.

Faludi A. 1973. Planning Theory. Peramon Press, Oxford.

Faludi, A. 1985. The return of rationality. Chapter 3 in rationality in planning, critical essays on the role of rationality in urban and regional planning. M. Breheny and A. Hooper editors. Page Bros Limited. London.

Fiedler, J.K. 2004. Assessment of bat mortality and activity at Buffalo Mountain Windfarm, eastern Tennessee. MS Thesis, Univ. of Tennessee Knoxville, 165 pp. Available online at http://www.wind-watch.org/documents/wpcontent/uploads/fiedler2004-bat_mortality_bmw.pdf .

Foppen, R., and R. Reijnen, 1994. The Effects of Car Traffic on Breeding Bird Populations in Woodland. II. Breeding Dispersal of Male Willow Warblers (*Phylloscopus trochilus*) in Relation to the Proximity of a Highway. Journal of Applied Ecology 32:95□101.

Forester, John. 1989. Planning in the face of power. University of California Press, Berkeley.

Fruedenthal, Dave. 2010. State of Wyoming executive order 2010-4, greater sage-grouse core area protection. Cheyenne, Wyoming.

Geothermal Energy Association. 2007. A Guide to Geothermal Energy and the Environment. April, 2007. http://www.geo-energy.org/publications/reports/Environmental%20Guide.pdf

Grover, K.E., and M.J. Thompson, 1986. Factors influencing spring feeding site selection by elk (*Cervus elaphus*) in the Elkhorn Mountains, Montana. J. Wildl. Manage. 50(3):466-470.

Hagan, J.M., et al. 1996. The Early Development of Forest Fragmentation—Effects on Birds. Conservation Biology 10(1):188□-202.

Harmata, A.R., K.M. Podruzny, J.R. Zelenak, and M.L. Morrisson. 2000. Passage rates and timing of bird migration in Montana. Am. Midl. Nat. 143: 30-40.

Harper, K.A., et al. 2005. Edge Influence on Forest Structure and Composition in Fragmented Landscapes. Conservation Biology 19(3):768□-782.

Harris, L.D. 1984. The fragmented forest: island biogeography theory and the preservation of biotic diversity. University of Chicago Press, Chicago.

Hayes, S.G., D.J. Leptich, and P. Zager. 2002. Proximate factors affecting male elk hunting

mortality in northern Idaho. Journal of Wildlife Management 66(2): 491-499.

Hirano, T. et al. 1995. Physical Effects of Dust on Leaf Physiology of Cucumber and Kidney Bean Plants. Environmental Pollution 89(3):255□261.

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

Horn, J.W., E.B. Arnett and T.H Kunz. 2008. Behavioral responses of bats to operating wind turbines. Journal of Wildlife Management 72(1):123-32.

Hoover, S. (2002). The Response of Red-tailed Hawks and Golden Eagles to Topographical Features, Weather and Abundance of a Dominant Prey Species at the Altamont Pass Wind Resource Area, California. Prepared for the National Renewable Energy Laboratory: 1-64.

Hoover, S.L., and M.L. Morrisson. 2005. Behavior of red-tailed hawks in a wind turbine development. J. Wildl. Manage. 69: 150-159.

Horn, J.W., E.B. Arnett, and T.H. Kunz. 2008. Behavioral Responses of Bats to Operating Wind Turbines. J. Wildl. Manage. 72:123-132.

Horváth, G., M. Blahó, A. Egri, G. Kriska, I. Seres, and B. Robertson. 2010. Reducing the maladaptive attractiveness of solar panels to polarotactic insects. Conservation Biology. DOI: 10.1111/j.1523-1739.2010.01518.x

Jain, A., P. Kerlinger, R. Curry, and L. Slobodnik. 2007. Annual report for the Maple Ridge wind power project post-construction bird and bat fatality study–2006. Annual report prepared for PPM Energy and Horizon Energy, Curry and Kerlinger LLC, Cape May Point, New Jersey, USA. ,http://www.batcon.org/windliterature.

Janss, G. 2000. Bird Behavior in and near a Wind Farm at Tarifa, Spain: Management Considerations. In: Proceedings of NWCC National Avian-Wind Power Planning Meeting III, San Diego, Calif., May 1998. Available at http://www.nationalwind.org/pubs/avian98/ default.htm.

Johnson, B.K., and D. Lockman. 1979. Response of elk during calving to oil/gas drilling activity in Snider Basin, Wyoming. WDGF report, 14 pp.

Johnson, B.K, and L. Wollrab. 1987. Response of elk to development of a natural gas field in western Wyoming 1979-1987. WDGF Report, 28 pp.

Johnson, G.D. 2005. A review of bat mortality at wind-energy developments in the United States. *Bat Research News*. 46: 45-49.

Johnson, G. D., W. P. Erickson, M. D. Strickland, M. F. Shepherd, D. A. Shepherd, and S. A. Sarappo. 2002. Collision mortality of local and migrant birds at a large-scale wind-power development on Buffalo Ridge, Minnesota. Wildlife Society Bulletin. 30: 879-887.

Johnson, G.D., and M.D. Strickland. 2004. An Assessment of Potential Collision Mortality of Migrating Indiana Bats (Myotis sodalis) and Virginia Big-eared Bats (Corynorhinus townsendii virginianus) Traveling between Caves, supplement to Biological Assessment for the Federally

Endangered Indiana Bat (Myotis sodalis) and Virginia Big-eared Bat (Corynorhinus townsendii virginianus). Prepared by Western Ecosystems Technology, Inc., Cheyenne, Wyo., for NedPower Mount Storm LLC, Chantilly, Va., April 14.

Johnson, G.D., M.K. Perlik, W.P. Erickson, and M.D. Strickland. 2004. Bat activity, composition, and collision mortality at a large wind plant in Minnesota. Wildl. Soc. Bull. 32: 1278-1288.

Johnson, G.D., E.P. Wallace, M.D. Strickland., M.F. Shepherd, D.A. Shepherd and S.A. Sarappo. 2002. Collision Mortality of Local and Migrant Birds at a Large-scale Wind-power Development on Buffalo Ridge, Minnesota. Wildlife Society Bulletin 30(3):879–987.

Johnson, G.D., E.P. Wallace, M.D. Strickland., M.F. Shepherd, D.A. Shepherd and S.A. Sarappo. 2003. Mortality of Bats at a Large-scale Wind Power Development at Buffalo Ridge, Minnesota. American Midland Naturalist 150:332–342.

Johnson, G. D., D. P. Young, Jr., W. P. Erickson, C. E. Derby, M. D. Strickland, and R. E. Good. 2000. Wildlife monitoring studies for the SeaWest windpower project, Carbon County, Wyoming 1995-1999, Final Report. WEST, Inc., 195 pp. Available online at http://www.west-inc.com/reports/fcr_final_baseline.pdf.

The Kansas Renewable Energy Working Group.2003. Siting Guidelines for Windpower Projects in Kansas. Recommendations of the Kansas Renewable Energy Working Group Environmental and Siting Committee. Approved by the Executive Committee of the Kansas Renewable Energy Working Group February 26, 2003. http://www.kansasenergy.org/documents/KREWGSitingGuidelines.pdf

Kerlinger, P., and J. Kerns. 2004. A Study of Bird and Bat Collision Fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: Annual Repo for 2003. Prepared for FPL Energy and Mountaineer Wind Energy Center Technical Review Committee**:** 1-39.

Kingsley, A., and B. Whittam. 2003. Wind Turbines and Birds. A Guidance Document for Environmental Assessment. Phase III (Draft) Report, Canadian Wildlife Service, Environment Canada, Gatineau, Quebec, Canada, Dec. Available at http://www.canwea.ca/downloads/en/PDFS/BirdStudiesDraft_May_04.pdf.

Kuenzi, A.J. and M.L. Morrison. 1998. Detection of Bats by Mist-Nets and Ultrasonic Sensors. Wildlife Society Bulletin 26(2): 307-11.

Kunz, T. H., E. B. Arnett, B. M. Cooper, W. P. Erickson, R. P Larkin, T. Mabee, M. L. Morrison, M. D. Strickland, and J. M. Szewczak. 2007a. Assessing impacts of wind-energy development on nocturnally active birds and bats: A guidance document. J. Wildl. Manage. 71: 2449-2486. Available online at http://www.wind-watch.org/documents/wp-content/uploads/wild-71-08- 45.pdf.

Kunz, T.H., E. B. Arnett, W. P. Erickson, A. R. Hoar, G. D. Johnson, R. P. Larkin, M. D. Strickland, R. W. Thresher, and M. D. Tuttle. 2007b. Ecological impacts of wind energy development on bats: questions, research needs, and hypotheses. Front. Ecol. Environ. 5(6): 315–324. Available online at http://www.windaction.org/?module=uploads&func=download&fileID=1293.

Kuvlesky, W. P., L. A. Brennan, M. L. Morrison, K. K. Boydston, B. M. Ballard, F. C. Bryant. 2007. Wind energy development and wildlife conservation: Challenges and opportunities. Journal of Wildlife Management. 71: 2487-2498.

Larkin, R.P. 1996. Effects of Military Noise on Wildlife: A Literature Review. Technical Report 96/21. U.S. Army Construction Engineering Research Laboratory, Champaign, Ill.

Lyon, L.J. 1983. Road density models describing habitat effectiveness for elk. Journal of Forestry 81: 592-595.

Manville, A.M., II. 2004. Prairie grouse leks and wind turbines: U.S. Fish and Wildlife Service justification for a 5-mile buffer from leks; additional grassland songbird recommendations. Division of Migratory Bird Management, USFWS, Arlington, VA, peer-reviewed briefing paper. 17 pp. Available online at http://www.environment.ok.gov/documents/OKWindEnergy/PrairieGrouseLeks WindTurbines.pdf.

Manville, A.M., II. 2009. Towers, turbines, power lines, and buildings – steps being taken by the U.S. Fish and Wildlife Service to avoid or minimize take of migratory birds at these structures. Pp. 262-272, In T.D. Rich, C. Arizmendi, D. Demarest, and C. Thompson (eds.). Tundra to Tropics: Connecting Habitats and People. Proceedings 4th International Partners in Flight Conference, 13-16 February 2008, McAllen, Texas. Partners in Flight.

McCrary, M.D., et al. 1986. Avian Mortality at a Solar Energy Power Plant. Journal of Field Ornithology. 57(2):1355-141.

Miller, A. 2008. Patterns of avian and bat mortality at a utility-scaled wind farm on the southern high plains. Thesis, Texas Tech University, Lubbock, Texas, USA.

Molvar, E.M. 2008. Wind power in Wyoming: Doing it Smart from the Start. Laramie, WY: Biodiversity Conservation Alliance, 55 pp. Available online at www.voiceforthewild.org/blm/pubs/WindPowerReport.pdf.

Morrison, M. L., W. M. Block, M. D. Strickland, and W. L. Kendell. 2001. Wildlife study design. Springer-Verlag, New York, New York, USA.

National Academy of Sciences (NAS). 2007. Environmental Impacts of Wind-Energy Projects. The National Academies Press, Washington, D.C., USA.

National Energy Policy Development (Group NEPDG). 2001. National Energy Policy, Reliable, Affordable, and Environmentally Sound Energy for America's Future. Washington, D.C., May.

National Research Council (NRC). 2007. Environmental Impacts of Wind-Energy Projects. National Academies Press. Washington, D.C., USA. www.nap.edu.

National Wind Coordinating Collaborative (NWCC). 1999. Studying wind energy/bird interactions: a guidance document. Prepared for the Avian Subcommittee and NWCC December 1999.

National Wind Coordinating Collaborative (NWCC). 2002. Permitting of Wind Energy Facilities: a handbook. Funded by the Midwest Research Institute, National Renewable Energy Laboratory under the Subcontract YAM-9-29210-01 and the Department of Energy under Prime Contract No. DE-AC 36-83CH10093. http://www.nationalwind.org/publications/siting.aspx

National Wind Coordinating Collaborative (NWCC). 2006. State Siting and Permitting of Energy facilities. Joint fact Sheet issued by NWCC and National Conference of State legislatures.

National Wind Coordinating Collaborative (NWCC). 2007. Mitigation Toolbox. Compiled by NWCC Mitigation Subgroup and Jennie Rectenwald. May 2007.

National Wind Coordinating Collaborative (NWCC). 2010. Wind Turbine Interactions with Birds, Bats, and their Habitats: A Summary of Research Results and Priority Questions. Fact Sheet: Third Edition. http://www.nationalwind.org/publications/bbfactsheet.aspx

NatureServe. 2011. http://www.natureserve.org/

Noss, R. F. 1983. A regional landscape approach to maintain diversity. BioScience. 33:700-706.

O'Farrell, M.J., B.W. Miller, and W.L. Gannon. 1999. Qualitative Identification of Free-Flying Bats Using the Anabat Detector. Journal of Mammalogy 80(1): 11-23.

Oregon Natural Desert Association (ONDA). 2009. Oregon's high desert and wind energy – opportunities and strategies for responsible development. Bend, OR. 81 pp. Available at www.onda.org.

Orloff, S., and A. Flannery. (1992). Wind Turbine Effects on Avian Activity, Habitat Use, and Mortality in Altamon Pass and Solano County Wind Resource Areas Tiburon, California. Prepared for the Planning Departments of Alameda, Contra Costa, and Solano Counties and the California Energy Commission.

Osborn, R.G., C.D. Dieter, K.F. Higgins, and R.E. Usgaard. 1998. Bird flight characteristics near wind turbines in Minnesota. Am. Midl. Nat. 139: 29-38.

Patten, D.T., et al. 2008. Isolated Spring Wetlands in the Great Basin and Mojave Deserts, USA: Potential Response of Vegetation to Groundwater Withdrawal. Environmental Management 41:398–413.

PBS&J. 2002. Final Environmental Impact Statement, Table Mountain Wind Generating Facility. BLM Case Nos. N-73726 and N-57100. Prepared by PBS&J, San Diego, Calif., for U.S. Bureau of Land Management, Las Vegas Field Office, Nev. July 2002.

Randall, J. M., S.S. Parker, J. Moore, B. Cohen, L. Crane, B. Christian, D. Cameron, J. MacKenzie, K. Klausmeyer and S. Morrison. 2010. Mojave Desert Ecoregional Assessment. Unpublished Report. The Nature Conservancy, San Francisco, California. 106 pages + appendices. Available at: http://conserveonline.org/workspaces/mojave/documents/mojave-desert-ecoregional-2010/@@view.html.

Reed, R.A., et al. 1996 Contribution of Roads to Forest Fragmentation in the Rocky 40 Mountains. Conservation Biology 10(4):1098–1106.

Reijnen, R., and R. Foppen. 1994. The Effects of Car Traffic on Breeding Bird Populations in Woodland. I. Evidence of Reduced Habitat Quality for Willow Warblers (*Phylloscopus trochilus*) Breeding Close to a Highway. Journal of Applied Ecology 32:85□94.

Resource Media and Western Resource Advocates. 2008. Smart Lines: Transmission for the renewable energy economy. Boulder, CO. Copyright 2008. http://www.westernresourceadvocates.org/energy/smartlines.php

Reynolds, T.D. 2004. Draft Greater sage-grouse lek surveys and lek counts in the Cotterel Mountains, 2003 Results, Draft Summanry Report. Rigby, ID: TREC, Inc.

Reynolds, T.D., and C.I. Hinckley. 2005. Greater sage-grouse lek surveys and lek counts on Cotterel Mountain. 2005 Results. Rigby, ID: TREC, Inc.

Reynolds R.T., J.M. Scott, R.A. Nussbaum. 1980. A variable circular-plot method for estimating bird numbers. Condor. 82(3):309–13.

Rowland, M.M., M.J. Wisdom, B.K. Johnson, and J.G. Kie. 2000. Elk distribution and modeling in relation to roads. Journal of Wildlife Management 64: 672- 684.

Rowland, M.M., M.J. Wisdom, B.K. Johnson, and M.A. Penninger. 2005. Effects of roads on elk: implications for management in forested ecosystems. Pages 42-52 in Wisdom, M.J., technical editor, The Starkey Project: a synthesis of long-term studies of elk and mule deer. Reprinted from the 2004 Transactions of the North American Wildlife and Natural Resources Conference, Alliance Communications Group, Lawrence, KS.

Sawyer, H., and F. Lindzey. 2001. Sublette Mule Deer Study, Final Report, Wyoming Cooperative Fish & Wildlife Research Unit, Laramie, Wyo., March. Available at http://www.uppergreen.org/library/docs/Muledeerstudy1.pdf .

Sawyer, H., et al. 2006 Winter Habitat Selection of Mule Deer before and during Development of a Natural Gas Field. Journal of Wildlife Management 70(2):396–403.

Simpson, Donald A. 2008. Letter from Simpson, acting BLM state director to Wyoming Governor Dave Freudenthal, June 12.

Smallwood, K.S., and C.G. Thelander. 2005. Bird Mortality at the Altamont Pass Wind Resource Area: March 1998 - September 2001. Subcontract Report NREL/SR-500-36973. Prepared for National Renewable Energy Laboratory, Golden, CO, by BioResource Consultants, Ojai, CA. August 2005. Available online at http://www.nrel.gov/docs/fy05osti/36973.pdf.

Smallwood, K.S. and C, Thelander. 2008. Bird Mortality in the Altamont Pass Wind Resource Area, California JWM 72: 215–223.

Stewart, G.B., A.S. Pullin, and C.F. Coles. 2004. Effects of wind turbines on bird abundance. Review Report. Centre for Evidence-based Conservation, Systematic Review No. 4, Univ. Birmingham, UK. 49 pp.

Stewart, G.B., A.S. Pullin, and C.F. Coles. 2007. Poor evidence-base for assessment of windfarm impacts on birds. Environmental Conservation. 34: 1-11.

Stoel Rives. 2009. Lex helius: The law of solar energy. Copyright 2009. Stoel Rives LLP. http://www.stoel.com/webfiles/lawofsolarenergy.pdf

Stoel Rives. 2010. The Law of Wind: A Guide to Business and Legal Issues. Copyright 2010 Stoel Rives LLP. http://www.stoel.com/showarticle.aspx?show=1185.

Strickland, D. 2004. Non-fatality and habitat impacts on birds from wind energy development. Overview of Non-Collision Related Impacts from Wind Projects. Proc. Wind Energy & Birds/Bats Workshop, Washington, D.C., May 18-19. 2004, pp. 34-38. Available online at http://www.awea.org/pubs/documents/WEBBProceedings9.14.04%5BFinal%5D.pdf .

Teitz, Michael. 1985. Rationality planning and the state. Chapter 9 in rationality in planning, critical essays on the role of rationality in urban and regional planning. M. Breheny and A. Hooper editors. Page Bros Limited. London.

Thelander, C.G., and L. Rugge. 2000. Avian Risk Behavior and Fatalities at the Altamont Wind Resource Area, March 1998 to February 1999. NREL Report NREL/SR-500-27545, 22 pp. Available online at http://www.nrel.gov/wind/pdfs/27545.pdf.

The Nature Conservancy. 2008. Renewable Energy in the South Coast and Deserts. The Nature Conservancy of California.

The Wilderness Society. 2008. Geothermal Development on Public Lands. http://wilderness.org/files/Website-Geothermal%20Development%20On%20Public%20Lands.pdf

The Wilderness Society. 2010. IN THE ZONE: Powering the Future and Protecting Wildlands with Guided Solar Development. http://wilderness.org/files/IN%20THE%20ZONE%20Guided%20Solar%20Development.pdf

The Wilderness Society (TWS), Natural Resources Defense Council, Defenders of Wildlife, Sierra Club, and National Wildlife Federation. 2010. Interim Guidance for Evaluating and Approving Renewable Energy Projects on Public Land. May 19, 2010 letter to Bob Abbey, Director, Bureau of Land Management.

Thompson, J.R., et al. 1984. The Effect of Dust on Photosynthesis and Its Significance for Roadside Plants. Environmental Pollution 34:171–190.

Thomson, J.L., et al. 2005. Wildlife at a Crossroads: Energy Development in Western Wyoming—Effects of Roads on Habitat in the Upper Green River Valley. The Wilderness Society, Washington, D.C. Available at http://www.uppergreen.org/library/docs/WildlifeAtCrossroads_report.pd

Trombulak, S.C., and C.A. Frissell. 2000. Review of Ecological Effects of Roads on Terrestrial and Aquatic Communities. Conservation Biology 14(1):18–30.

Ugoretz, S. 2001. Avian Mortalities at Tall Structures. In Proceedings of NWCC National Avian-Wind Power Planning Meeting IV, Carmel, Calif., May 16□17, 2000. Available at http://www.nationalwind.org/pubs/avian00/default.htm.

U.S. Department of Energy. 2008. Geothermal Power Plants – Minimizing Land Use and Impact. http://www1.eere.energy.gov/geothermal/geopower_landuse.html

U.S. Department of Energy and U.S. Department of the Interior (USDOE and DOI). 2002. White House Report in Response to the National Energy Policy Recommendations to Increase Renewable Energy Production on Federal Lands. Washington, D.C., Aug. 2002.

U.S. Fish and Wildlife Service (USFWS). 2007. Effects of Communication Towers on Migratory Birds. Comments of the U.S. Fish and Wildlife Service submitted electronically to the FCC on 47 CFR Parts 1 and 17, WT Docket No. 03-187, FCC 06-164, Notice of Proposed Rulemaking: 32, 12-18.

U.S. Fish and Wildlife Service (USFWS). 2010a. Wind Turbine Guidelines Advisory Committee Policy Recommendations and Guidelines. Submitted to the Secretary of the Interior, March 4, 2010.

U.S. Fish and Wildlife Service (USFWS). 2010b. 12-Month Findings for Petitions to List the Greater Sage- Grouse (*Centrocercus urophasianus*) as Threatened or Endangered. Federal Register / Vol. 75, No. 55 / Tuesday, March 23, 2010. Page 13910.

Utah Department of Natural Resources (UDNR) – Utah Wildlife in Need Program. 2010. Contemporary Knowledge and Research Needs Regarding the Potential Effects of Tall Structures on Sage-grouse (*Centrocercus urophasianus and C. minimus*). Published by the UWIN Cooperative and Rocky Mountain Power. September, 2010. Salt Lake City, UT.

Van den Berg, F., E. Pedersen, J. Bouma, and R. Bakker. 2008. Project WINDFARMperception: Visual and acoustic impact of wind turbine farms on residents, Final report. European Union FP6-2005-Science-and-Society-20, Specific Support Action, Project no. 044628, 87 pp. Available online at http://www.wind-watch.org/documents/wp-content/uploads/wfp-final-1.pdf.

Van Dyke, F., and W.C. Klein. 1996. Response of elk to installation of oil wells. J. Mamm. 77(4):1028-1041.

Weaver Clyde., J. Jessop, and V Das. 1985 Rationality in the public interest: notes toward a new synthesis. Chapter 10 in rationality in planning, critical essays on the role of rationality in urban and regional planning. M. Breheny and A. Hooper editors. Page Bros Limited. London.

Weber M. 1947. The theory of social and economic organizations. Translated by A. M. Henderson and T. Parsons. The Free Press, Glencoe, IL.

Western Electric Coordinating Council's (WECC)'s Environmental Data Task Force. 2011. DRAFT - Preliminary Environmental Recommendations for the Transmission Planning Process.

Willyard, C.J., et al.. 2004. Ecological Effects of Fragmentation Related to Transmission Line Rights-of-Way: A Review of the State of the Science. Report prepared by Resources Strategies, Inc., Madison, Wisc., for Wisconsin Focus on Energy, Environmental Research Program, Madison, Wisc. Available at http://www.rsinc.com/downloads/Ecological_Effects_of_Fragmentation_on_Rights-of-Way.pdf.

Wyoming Game and Fish Department. 2010. Wildlife Protection Recommendations for wind energy development in Wyoming. Approved by Wyoming Game Commission, April 23, 2010.

Wyoming Outdoor Council (WOC). 2010. Wind Energy: doing it right in Wyoming. Fact Sheet. Lander, WY.

Young, D.P, W. P. Erickson, R. E. Good, M. D. Strickland, and G,D. Johnson. 2003. Avian and bat mortality associated with the initial phase of the Foote Creek Rim windpower project, Carbon County,

Wyoming. Prepared by Western Ecosystems Technology, Inc. for Pacificorp, Inc., SeaWest Windpower Inc. & BLM Rawlins District Office. Cheyenne, Wyoming.

**California Desert & Renewable Energy Working Group**
c/o Resources Legacy Fund
555 Capitol Mall, Suite 675
Sacramento, CA 95814

December 22, 2010

The Honorable Ken Salazar
Secretary
United States Department of the Interior
1849 C Street, NW
Washington D.C. 20241

Dear Secretary Salazar:

Thank you for participating in our meeting in San Francisco this fall and for inviting us to submit the enclosed detailed recommendations on ways to improve planning and permitting for the next generation of solar energy projects on public lands in the California desert.

As you know, the California Desert & Renewable Energy Working Group (CDREWG)—a dialogue between representatives of the solar and wind energy industry, the electric utility sector, and the environmental community—seeks to protect ecosystems, landscapes, and species while supporting the timely development of renewable energy resources in the California desert.

The recommendations we offer herewith are based on our extensive experiences as renewable energy industry and environmental stakeholders in the fast track process, and are the result of hours of thoughtful discussion within our group about ways the planning and permitting process could be improved in 2011.

To facilitate coming to agreement on these recommendations, we focused our comments on ways to improve planning and permitting for large-scale solar energy projects on BLM lands here in California. That being said, we realize that many of these recommendations may also apply to other states and to other technologies, and encourage you and your team to think of them in a broader context.

As discussed with Steve Black and Janea Scott on October 13, and since, we would like an opportunity to discuss these recommendations with your senior team at their convenience, either in Washington or here in California. The recommendations represent a whole-hearted effort on our part to help you facilitate the permitting of well-planned and sited renewable energy projects in 2011—projects that will both help our nation reduce our greenhouse gas emissions and protect the unique ecosystems and places that define us as Americans.

Lucy Blake, the facilitator and coordinator of our group, will contact Steve Black and Janea Scott immediately to explore the best time and location for a follow-up meeting

with your senior team. We look forward to a very productive dialogue on these issues, as soon as it can be arranged.

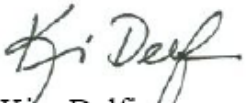
Sincerely,

Lisa Belenky
Center for Biological Diversity

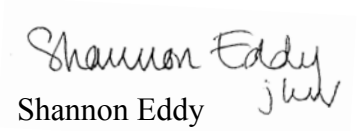
Darren Bouton
First Solar, Inc.

Barbara Boyle
Sierra Club

Laura Crane
The Nature Conservancy



Kim Delfino
Defenders of Wildlife



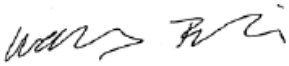
Shannon Eddy
Large-scale Solar Association

Sean Gallagher
Tessera Solar

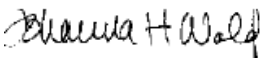
Arthur Haubenstock
BrightSource Energy

Rachel McMahon
Solar Millennium

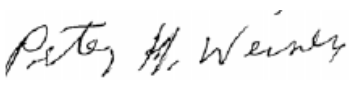
Michael Mantell, Chair
California Desert & Renewable
Energy Working Group



Wendy Pulling
Pacific Gas & Electric



Johanna Wald
National Resources Defense Council



Peter Weiner
Solar industry attorney

V. John White
Center for Energy Efficiency
& Renewable Technologies

Enclosure

cc: Tom Strickland
Steve Black
Janea Scott
Bob Abbey
Will Shafroth
Jim Abbott

# Recommendations to Secretary of the Interior Ken Salazar on Ways to Improve Planning and Permitting for the Next Generation of Solar Energy Projects on BLM Land in the California Desert

**California Desert & Renewable Energy Working Group**
**December 22, 2010**

## Signatories

**Lisa Belenky**, *Center for Biological Diversity*
**Darren Bouton**, *First Solar, Inc.*
**Barbara Boyle**, *Sierra Club*
**Laura Crane**, *The Nature Conservancy*
**Kim Delfino**, *Defenders of Wildlife*
**Shannon Eddy**, *Large-scale Solar Association*
**Sean Gallagher**, *Tessera Solar*
**Arthur Haubenstock**, *BrightSource Energy*
**Rachel McMahon**, *Solar Millennium*
**Michael Mantell**, *Chair, California Desert & Renewable Energy Working Group*
**Wendy Pulling**, *Pacific Gas & Electric*
**Johanna Wald**, *Natural Resources Defense Council*
**Peter Weiner**, *Solar industry attorney*
**V. John White**, *Center for Energy Efficiency & Renewable Technologies*

## Table of Contents



## I. Reduce Speculation in Solar ROW Applications[1]

**Issue:** The Bureau has made significant progress in reducing speculative applications for solar development in California. As a result of the Bureau's enforcement of its Plan of Development ("POD") policies in California, the total quantity of applications and acreage has declined substantially. The Bureau's adoption of enhanced guidance, such as the October 7, 2010, Instruction Memorandum (the "Oct. 2010 IM"),[2] promises further improvement. However, speculative applications remain, both in terms of applications that may not be technically and economically feasible, and in terms of the size of applications relative to the reasonably likely size of facilities (even accounting for additional acreage reserved to allow for reconfiguration, which we support).

**Solution:** To ensure that the most suitable lands for solar development are used appropriately, and that real solar development is not displaced from those lands onto other lands that may be less suitable, the Right-of-Way ("ROW") application process requires further reform. It will be particularly important to avoid unduly oversize ROW applications, relative to actual project size, in Solar Energy Study Areas/Zones, as these are intended to be the place for focused, large-scale, solar development. If areas in those zones are taken up with speculative applications, the purpose of the Solar Energy Study Areas/Zones will be frustrated, and real solar development will be diverted elsewhere.

To that end, the California BLM office should resume its enforcement of the existing POD policy, and other state BLM offices should follow California's example. In addition, the Bureau should build on the concepts in its Oct. 2010 IM, and on its existing regulations, to provide for earlier screening to eliminate speculative applications. This process should focus on objectively-determined assessments of site development progress.

---

[1] Although these recommendations are intended for implementation in California, the Bureau may wish to consider how they may apply to other states

[2] IM 2010-003 (Oct, 2010) , available at http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/2011/IM_2011-003.html

2011 Q1 Progress Assessments

The Bureau can act to focus its resources on the most viable 2011 projects, and reduce speculation, through assessments of the projects' progress in achieving the milestones discussed below. These milestones address aspects of financial and technical viability but do not address other aspects of project viability, including the appropriateness of the site for solar energy development, as discussed in Section II of these recommendations.

A. Enforcing Plan of Development Standards

As noted above, the California state office has made substantial progress in reducing speculative applications by requiring Plans of Development that meet the Bureau's standards. Resuming enforcement of this requirement will undoubtedly continue to provide good results. As part of this effort, the Bureau should ensure that the size of the applications is reasonably related to the size of the project described in the Plan of Development, with flexibility to allow for reconfiguration to avoid or minimize environmental, cultural or other impacts.

B. Applying Financial Viability Screens

The Oct. 2010 IM provides for assessment of financial viability, providing a presumption of viability for entities that have successfully owned, developed, or managed similarly-sized electric generation projects, and allowing individual demonstrations for others, which may be evaluated jointly with the Department of Energy. Projects proposed for potential approval in 2011 should be evaluated in the first quarter of 2011. To ease administrative burdens, avoid duplicative governmental efforts, and make use of reasonable market-based indicators of financial viability that can be objectively ascertained, the Bureau should expand its presumptions of financial viability to include projects that have (i) a conditional commitment for a DOE loan guarantee; (ii) a power purchase agreement that has been approved by the California Public Utilities Commission or municipal power authority; or (iii) an engineering, procurement and construction ("EPC") contract with an entity that has successfully constructed electric generation projects of similar capacity within the last five years. As provided in the Oct. 2010 IM, projects that do not meet these presumptive tests should be allowed to make individual demonstrations of financial viability to the Bureau.

C. Applying Technical Viability Screens

Technical viability should be presumed, similar to financial viability, if (i) the DOE has provided a conditional commitment for a loan guarantee; (ii) the basic technology to be deployed has been demonstrated for at least one year in a commercial or demonstration plant; or (iii) the key components of the technology have been demonstrated, and the applicant has supply contracts with credible third-party vendors for the manufacture and/or supply of those demonstrated, key components. These technical viability tests would not apply to demonstration projects.

D. Evaluating Site Development Progress

To ensure sites are being actively evaluated for approval and development, and not held speculatively, developers should demonstrate that they are undertaking the necessary assessments. For 2011 projects, site-specific technical assessments, including meteorological and geotechnical data collection and evaluation, as well as biological surveys, should either already have been completed or should be planned. All applicants should be required to provide a schedule for conducting remaining technical assessments needed to complete timely NEPA analyses, consistent with completing the permitting process in 2011. Applicants should be required to demonstrate diligent progress on the schedule through regular reports.

E. Assessing Permitting & Transmission Viability

All solar development projects require state and/or local government permitting for construction and operation, as well as approval to interconnect their facility with transmission. As with technical assessments, solar development applicants should provide the Bureau with a schedule for applying for all necessary permits, as well as for interconnection with transmission. The timetable should demonstrate that the necessary permits will be obtained to allow timely construction commencement and completion, consistent with the deadlines provided in the Oct. 2010 IM. The Bureau may wish to consult with the California ISO or other appropriate permitting or transmission oversight entities to determine whether proposed schedules are reasonable. Applicants should be required to demonstrate diligent progress on the schedule through regular reports.

## II. Apply Screening Criteria for California Desert Solar Projects on BLM Land

**Issue:** BLM has limited resources to apply to the review of proposed renewable energy projects in the California Desert in 2011. The agency should focus first on those projects with the greatest technical and financial viability and the fewest environmental conflicts.

**Solution:** BLM should adopt criteria to help ensure that it moves forward expeditiously to prioritize those projects that have the highest likelihood of permit approval by the end of 2011 – i.e., likely to be permitted and built with a minimum of time and controversy. Priority projects include those in low conflict areas and those with potentially resolvable conflicts where attention is paid to resolving the conflicts.

**Ground rules**: The criteria set out below are designed only for allocation of BLM resources in 2011 for solar projects on BLM land in the California desert.[3] Moreover, they are not comprehensive criteria for BLM: there are other important criteria such as cultural and historic criteria that are not addressed here, because our group does not include representatives of those interests

[3] To be clear, we did not develop these criteria for use outside of the California desert, by other agencies, other than in 2011, or for technologies other than solar.

The criteria should be applied on the basis of currently available data by multi-disciplinary teams that include biologists and botanists familiar with the California Desert. In addition, they should be applied to projects concurrently with the technical and financial viability screens that are also part of our suggested guidance. Projects should be placed in one of the three proposed categories if they meet some or all of the criteria provided for that category. The number of criteria for a given category that a project meets will be highly relevant. For example, in the case of the criteria designed to help identify "low conflict areas," the more of those criteria that a project appears to meet, the better.

Projects identified by DOI as potentially able to meet 2010 ARRA deadlines, and listed in Appendix A would be exempt from these screening criteria.[4]

**Recommended Guidance for use in prioritizing 2011 projects:**

**Low Conflict Areas: timely or expedited permitting/probable permit approval**
As indicated above, projects should be placed in this category if they fit some or all of the following criteria. In addition, they should be included here if it appears that they can be revised or modified relatively easily in order to address conflicts identified in the categories below. That being the case, it is entirely possible that once additional data are obtained from site-level surveys, BLM may find that sites that initially appear to meet these criteria may nonetheless present conflicts.

- Mechanically disturbed lands such as fallowed agricultural lands.[5]
- Brownfields, idle or underutilized industrial areas.
- Locations adjacent to urbanized areas[6] and/or load centers where edge effects[7] can be minimized.
- Locations that minimize the need to build new roads and that meet the one or more of the following transmission sub-criteria: transmission with existing capacity and substations is already available; minimal additional infrastructure

[4] However, even for those projects, these screening criteria may provide useful information regarding potential high conflict sites and, accordingly, the BLM should ensure that developers are aware of these criteria.

[5] This criterion covers lands that have been "type-converted" from native vegetation through plowing, bulldozing or other mechanical impact often in support of agriculture or other land cover change activities (mining, clearance for development, heavy off-road vehicle use). Some of these lands may be currently abandoned from those prior activities, allowing some natural vegetation to be sparsely re-established. However, because the desert is slow to heal, these lands do not support the high level of ecological functioning that undisturbed natural lands do.

[6] Urbanized areas include desert communities that welcome local industrial development but do not include communities that are dependent on tourism for the economic survival.

[7] The edge effect in ecology is the effect of the juxtaposition or placing side by side of contrasting environments on an ecosystem. This term is commonly used in conjunction with the boundary between natural habitats and disturbed or developed land. Edge effects are especially pronounced in small habitat fragments where they may extend throughout the patch. See Harris, Larry D., *"Edge Effects and Conservation of Biotic Diversity,"* Conservation Biology, Vol. 2, No. 4 (December 1988).

would be necessary, such as incremental transmission re-conductoring or upgrades, and development of substations; if a new line is needed, the line has already been permitted and is not the subject of pending litigation.

- Proposed Solar Zones that will be published in the BLM's draft Solar PEIS with the exception of the proposed Iron Mountain and Pisgah zones[8]
- Areas in the West Mojave that have been run through the criteria above and previously identified for BLM by environmental groups as potentially appropriate for development.[9]

**Areas with Potentially Resolvable Conflicts: more difficult permitting process unless conflicts are resolved**

- Wetlands, riparian areas, and areas required to protect the integrity of seeps, springs, washes, streams or wetlands that have been previously identified by the BLM, the Army Corps of Engineers, or other relevant state or federal agencies.[10]
- Lands that have been formally identified as including plant communities that are both unique and rare by the BLM, California Department of Fish and Game (CDFG) or USFWS, including areas containing or designated Unique Plant Assemblages (UPAs), Stands, or Vegetation Alliances that are limited in distribution or that support sensitive or endemic species.[11]
- Dunes and the sand transport systems and corridors that support them.[12]
- Locations within one mile of National or State Park units.
- Landscape-level biological linkage areas that have been identified in reports listed in Appendix C as key connectivity references for the desert; or by state or federal agencies as necessary and required for the continued functioning of biological and ecological processes (e.g., connectivity); and that have been mapped by, contracted for, or used in state or federal agency maps provided in land management plans and proposed plans. For these areas closer scrutiny of the broad-scale maps and reports will be necessary.

---

[8] This is not a consensus position of the CDREWG. However, the environmental organizations that are members of the group are on record stating that both the Iron Mountain and Pisgah Solar Energy Study Areas are inappropriate for development and should be deleted.

[9] A map of these areas is attached and explanatory material is included in Appendix B.

[10] These areas may include the upland habitat as well as groundwater resources that are proposed to be used. The extent of upland habitat that needs to be protected is sensitive to site-specific resources. For example: the NECO Amendment to the CDCA Plan protects streams within a 5-mile radius of Townsend big-eared bat maternity roosts. Aquatic and riparian species may be highly sensitive to changes in groundwater levels.

[11] These areas are identified in the California Desert Conservation Area Plan of 1980, in the California Department of Fish and Game's List of California vegetation alliances (2009), and in NatureServe's Community Heritage Program, which is internationally recognized as the Natural Communities Conservation Ranking system.

[12] The USGS document Muhs et al 2003 "Eolian sand transport pathways in the southwestern United States: importance of the Colorado River and local sources" will be helpful in identifying these areas.

**High Conflict Areas: very difficult permitting process**

Members of this group agree that the following areas are high conflict areas:

- Designated critical habitat for federally threatened and/or endangered species.
- Designated special management areas such as Areas of Critical Environmental Concern (ACECs), Desert Wildlife Management Areas and Wildlife Habitat Management Areas.[13]
- Lands that have been formally proposed by federal agencies for designation as wilderness, or proposed for a national monument or wilderness designation in S.2921 (111th Congress).
- Lands that were originally part of a renewable energy right of way application and were eliminated from a ROW application by BLM or the applicant due to resource conflicts.[14] For example, where the final project represents a smaller or different footprint to avoid wildlife habitat, rare vegetation or desert washes, the excluded portion of the right of way should no longer be available for development.[15]
- Lands that have conservation value and were purchased with federal, state or private funds, and donated or transferred to the BLM for conservation purposes.
- Lands purchased with federal, state or private funds, and donated or transferred to the BLM expressly as mitigation for project impacts.

The group also agrees that projects that propose to use wet cooling will likely face additional controversy in the permitting process.

The environmental groups signatory to this document believe that there are other factors that will be controversial within their community, as noted below.[16]

---

[13] ACECs include Desert Tortoise Desert Wildlife Management Areas (DWMAs). The California Desert Conservation Area Plan has designated specific Wildlife Habitat Management Areas (WHMAs) to conserve habitat for species such as the Mojave ground squirrel and bighorn sheep and to preserve connectivity. Some of these designated areas are subject to development caps which apply to renewable energy projects (as well as other activities).

[14] This category also includes the projects in the West Mojave that were rejected by BLM solely because they were located in areas subject to a 1% development cap. This group continues to believe that the agency should develop guidance regarding how that cap will be applied to subject areas, but development in these areas will likely remain controversial.

[15] We urge the BLM to develop and maintain a publicly accessible database of lands that have been eliminated from ROW applications due to resource conflicts.

[16] These factors include the following:

- Lands that have been designated or are undergoing a formal review process by Bureau of Land Management (BLM) or the U.S. Fish and Wildlife Service (USFWS) for designation for protection of federally-listed, state-listed or candidate species in any past or present recovery plan as of November 19, 2010, in any past or present critical habitat proposal or in any areas formerly designated as critical habitat as of November 19, 2010, or in any past or present ACEC proposal by BLM as of November 19, 2010. In addition, lands that have been formally identified by CDFG, BLM, or USFWS as critical to the survival and/or recovery of federal or state listed or candidate species as of November 19,

**III. Ensure early and ongoing input from stakeholders**

**Issue:** The public had little input into the selection of the initial BLM "fast-track" projects in 2009, and few opportunities to provide input into alternative project configurations or ROW footprints. Lack of early public input can result in significant investments of time and money by companies with little opportunity to obtain clear signals on potential conflicts and controversies associated with their proposals prior to committing resources.

**Solution:** Provide guidance to the BLM to establish a process to facilitate early and ongoing input and coordination with interested stakeholders, per the Oct. 2010 IM, including project developers, regulators, conservation groups and other members of the public, while ensuring a workable process:

- Provide opportunity for early input in connection with initial agency review of projects. This could include, for example, sponsoring preliminary public workshops prior to official scoping.

- Provide, and encourage developers to participate in, forum(s) where the public can interact with them, regulators and other interested parties, including tribes, to ensure early (i.e., prior to NEPA) as well as ongoing input into:
  - project configuration and potential modifications to minimize environmental impacts,
  - disclosure and analysis of likely mitigation requirements, and
  - identification of appropriate alternatives.

  Any project modifications made prior to NEPA review that reduce potential project impacts should be recognized in the agency's NEPA document.

- Ensure stakeholders can provide early and ongoing input to inter -governmental entities that are established to coordinate renewable energy development (such as those established under MOUs with states, like the REPG and REAT in California), and that applicants are made aware of the substance of suggested project modifications in a timely fashion.

---

2010 should be included in this category. Lastly, lands identified as "ecologically core" and "ecologically intact" by The Nature Conservancy in its October 2010 Mojave Desert report.

- Lands that have been: inventoried by trained citizen groups, conservationists and/or agency personnel using BLM protocols; found to meet Congress' definition of "wilderness characteristics;" and publicly identified as of November 19, 2010. Maps of these lands in California (and other western states) as of November 19, 2010 can be found at http://www.nrdc.org/land/sitingrenewables/default.asp.

- Ensure that all forums for public involvement, including workshops and public meetings, are, to the maximum extent possible, designed to provide effective and meaningful opportunities for interested stakeholders to provide their views about proposed projects. Examples include but are not limited to: group question and answer sessions following presentations, ways to submit questions both during presentations and online, site visits with agency and company representatives, etc.

**IV. Improve the quality and consistency of environmental reviews**

**Issue:** The environmental reviews for the first set of fast track projects have varied widely in quality and thoroughness across BLM districts and states.

**Solution:** Through specific, clear guidance to BLM managers, ensure that moving forward, NEPA reviews are internally consistent, thorough, and reflect strong data-based analysis of the likely impacts from proposed projects. The overall NEPA review process should also be designed to identify, and facilitate, modifications that will result in improved projects. Not only will this inspire public and stakeholder confidence in the Bureau's management of the new program, it will likely insulate well-sited, designed and analyzed projects from legal challenge.

The Interior Secretary should direct the BLM to issue guidance to project managers, supervisors, and state directors that clearly spells out the following elements of strong NEPA reviews and recommended practices:

- Provide opportunities for early public involvement in the process, before investments are irrevocably committed to a specific design within a right of way (ROW), to diminish unacceptable impacts of renewable energy projects, identify potential improvements, and increase public support.

.

- A consistent structure for environmental documents, to ease public review and help avoid missing elements.

- Purpose and need statements must include broader objectives, rather than solely responding to an application for a ROW; for example, the purpose and need statement should incorporate a phrase similar to the following: "To consider the proposed siting of a (large scale solar) project on public land consistent with national and state renewable energy and climate goals while protecting important natural values and environmental and cultural resources." This broader purpose and need objective would logically lead to a broader range of alternatives than project/no project.

- Analysis of a full range of alternatives is one of the most important aspects of NEPA. In the case of renewable energy projects, such a range may include, in addition to the proposed project and no action alternatives, alternative sites on public land as well as private land or "conjunctive use" involving both private and public land where appropriate, projects of reduced size and configuration, and

alternatives that include phasing the project based on successfully meeting specific benchmarks before proceeding from one phase to the next.

- A strong evaluation of impacts must be based on adequate site-specific data that stakeholders can fully evaluate, with specific requirements for data adequacy including appropriate protocol wildlife and plant surveys. Depending on the site and the likely species, this may require multiple surveys at different times of the year. Surveys of reasonable areas beyond the project footprint, should be conducted so that different configurations may be fully analyzed. Where surveys indicate changes in configuration would reduce impacts, BLM should expressly allow the applicant to expand or change the area(s) subject to the project application.

- A robust cumulative impacts analysis will ensure sufficient review of the project, focusing on quantitative assessments to the extent practicable, including all past, present and reasonably anticipated future projects within the relevant area, considering the resources at issue. In contrast, the direct and indirect impacts of connected actions (such as any additional transmission lines or substations that are required to serve a proposed project) should be fully evaluated as part of the proposed project, as well as reasonably anticipated additional projects within the relevant area, considering the resources at issue.

- The substance of important NEPA-related reports and plans (for example, a desert tortoise translocation plan, an avian protection plan, and mitigation plans) should be provided in time to allow for public review and comment in the Draft EIS. While we understand that it may be difficult to provide completed reports and plans at Draft EIS stage, any reports and plans that have been drafted or completed should be provided in the Final EIS and all final plans and reports should be issued at the time the ROD is released, along with the USFWS biological opinion.

- Project design changes that reduce environmental or other undesirable impacts are positive results of the NEPA process and such changes should not cause undue delays; however, major changes that have not been proposed or analyzed previously may require supplemental analysis.

- BLM should develop and apply consistent guidance to address issues that apply to several types of projects, and work with the U.S. FWS to develop such guidance in areas of their jurisdiction, such as desert tortoise translocation protocols. Such issues should be addressed in a standard manner across different projects, where practical, and where the standard approach is in the best interest of the impacted resources.

- Where project approval contemplates a plan amendment as well as issuance of a ROW, and information collected through the NEPA process suggests part of the ROW applied for is important for conservation and incompatible with

development, the plan amendment approved contemporaneously with the ROW should also designate the excluded areas within the original ROW application as unavailable for future such development.

- If a plan amendment is not contemplated as part of project approval, and areas within the ROW application have been identified as incompatible with development, BLM should initiate a separate plan amendment process to designate such areas as unavailable for future development.

**V. Standardize and clarify mitigation procedures**

**Issue:** While renewable energy at scale provides benefits for forestalling climate change impacts to species and habitat, large-scale solar projects also generally require large-scale mitigation. The current approach of project-by-project mitigation has resulted in a piece-meal and inefficient process for assessing and carrying-out mitigation, and fails to make the best use of mitigation resources to provide more comprehensive, coordinated benefits for affected species and their habitat.

**Solution:** Better defined, more uniform, and more coordinated approaches should be taken to address mitigation associated with these projects. The fast-track renewable projects have provided a number of important lessons in how to do mitigation, for the benefit of both the project proponents and the impacted natural resources. We believe that mitigation can be done with better coordination, greater efficiency, and strategic investment resulting in an improved conservation result on the ground, while retaining the beneficial aspects of large-scale solar projects.

We recommend that DOI adopt the following principles in directing its agencies on how to improve mitigation for renewable energy projects approved in 2011:

1. **Strategic & Effective Investment:** DOI and state agencies should develop a regional strategic mitigation process founded on habitat conservation planning principles that generates more robust and effective mitigation than can be achieved on a project-by-project basis. This effort can be informed by endangered species recovery plans and other long-term land and wildlife conservation plans. Strategic mitigation planning must address the following:
    a. Incorporation of biodiversity sustainability/viability indicators, including long term surface and groundwater supplies
    b. Designation of regions, based on biological integrity and ecosystem functions
    c. Designation of target mitigation acquisition lands and public land actions within each region that will maximize habitat, maintain and protect migration corridors, and maximize species survival and recovery.
    d. Allocation of pooled mitigation funds and activities for larger scale land acquisitions of designated property and mitigation measures.
    e. Long term stewardship and funding of stewardship of mitigation lands

f. Mechanisms to ensure mitigation investments are enduring and mitigation investment decisions are science-based

2. **Improved Coordination:** Mitigation measures should be formulated as a comprehensive package, in which all jurisdictional agencies coordinate their requirements and review, and in which other state, federal and local resource agencies with relevant expertise and information are consulted to the maximum extent possible. The comprehensive package for any individual project should, to the maximum extent possible, contribute along with measures taken for other projects to provide coordinated and increased benefits to impacted species, habitat and corridors. Federal and state agencies should also consult with local land agencies, land trusts, and other local experts.

3. **Consistency in Mitigation Approaches:** Project proponents and conservation NGOs believe that it is important to apply basic mitigation principles of how and when to assess mitigation in a uniform manner, so that all parties have a clear understanding of what is expected by the DOI agencies. The following are recommended mitigation principles to ensure consistency across projects:

   a. Mitigation Hierarchy: Mitigation must follow the hierarchy of avoid first, then minimize, then restore, then offset. The first step ("avoid") refers to measures taken (e.g., siting decisions) to preclude significant impacts from the outset, in order to completely eliminate such impacts on certain components of biodiversity or to meet specific conservation goals. The second step ("minimization") refers to changes (e.g., to project design or operations) that reduce site-specific impacts.

   b. Specific Mitigation Requirements: Mitigation measures for individual projects should be clearly justified, specific to the impact, and enduring. They should also be formulated to clearly link the impact to be mitigated to one or more specific mitigation measures. For example, tortoise fencing requirements should first explain how the tortoise fencing contributes to compensating for unavoidable harm, and should prescribe how many miles must be fenced, where the fencing is to be placed, and who will maintain it. Finally, specific alternative mitigation measures of equivalent mitigation value should be identified, in the event a specified mitigation measure proves to be infeasible or impracticable.

   c. Mitigate Appropriate Level and Scale of Impacts: Mitigation must be required for significant impacts resulting from the renewable project, whether direct, indirect or cumulative, including significant impacts resulting from the scale of the project. Mitigation of cumulative impacts should be developed for areas and resources impacted by multiple renewable energy projects and should address impacts to habitat quality (e.g., connectivity), ground and surface water resources, and air quality.

d. Address Climate Change Impacts: In determining appropriate mitigation, DOI agencies should consider changes in habitat, corridors, and species needs as the climate changes.

4. **Compensatory Mitigation Principles:** Compensatory mitigation for individual projects should include:
    a. As a first preference, acquisition, restoration and long-term management of private lands, providing replacement habitat of at least equivalent size and function ("compensation lands"), provided that:
        i. Compensation lands are managed as conservation lands. If compensation lands are to be transferred to agencies, they should be legally protected and held solely for conservation purposes. For example, any compensation lands transferred to BLM should be permanently segregated or withdrawn from all non-conservation use under the mining, grazing and other land use laws, using legally effective means (e.g., deed restrictions with enforcement rights held by third parties).
        ii. Mitigation value of compensation lands may be increased by enhancements and/or restoration to improve habitat value, in the same fashion as provided below with respect to public lands;

    b. As a second preference, enhanced conservation management and/or restoration of specified public lands that would not have otherwise been conducted by the agency using public funds. For example, lands should be permanently segregated or withdrawn from all non-conservation use under the mining, grazing and other land use laws, and BLM should consider mitigation mechanisms identified in the CDCA Plan as amended, including construction and maintenance of fencing near roads, buy-outs and retirement of grazing allotment permits, route closure, and re-vegetation of closed routes, etc.

    c. Compensation lands, whether owned or managed by public or private entities, must be accompanied by assurance of adequate long-term conservation management. For example, this assurance could be addressed through a committed, non-wasting fund adequate to provide long-term conservation management to enhance and maintain the required resource values, or other enduring measures.

**VI. Standardize requirements for scientific monitoring**

**Issue**: BLM's "use authorization" process does not currently have in place a standardized set of requirements for scientific monitoring. Thus, when BLM issues use authorizations, the requirements for scientific monitoring are inconsistent across BLM offices and personnel. This inconsistency wastes time and money, and interferes with the collection of information that could be used by the agencies, project developers and other

stakeholders to improve planning, review, management, and decision-making for renewable energy and other desert resources.

**Solution**: Building on the Instruction Memorandum guidance issued on October 7, 2010, BLM should identify a comprehensive set of monitoring requirements to be used in all future use authorizations. Clear and consistent criteria will have multiple benefits, including increased cost-effectiveness for BLM, taxpayers, and project developers, and the creation of a "level playing field" for solar project developers and the utility customers who buy the solar electricity. In addition, the adoption of clear, consistent monitoring criteria will help to improve scientific understanding of desert resources, including desert wildlife species, their habitats and their needs, and the effects of large scale projects, information which can be used to improve environmental reviews, design better mitigation plans, and support the development of projects with fewer impacts. Such information can also be used to inform larger scale analyses of eco-regions, species and other key indicators, and be shared with other agencies working to improve resource management.

BLM's guidance should establish clear and consistent criteria for gathering the biological and other resource data needed to establish the appropriate "baseline", and to monitor these resources over the life of the "use authorization" at both individual project sites and across multiple project sites. Such standardized criteria shall specify:

- The type of scientific data needed, including the identification of control sites;
- Responsibility for each kind of data collection and monitoring;
- The timing and frequency of data collection and monitoring;
- Protocols for collecting and modeling the data;
- Protocols for managing the data collected;
- Protocols for analyzing the data collected;
- Limits of acceptable change in resource conditions, and actions to be taken if those limits are exceeded;
- "Fallback" measures to be put into effect in the event that specified monitoring activities are not carried out;
- The need to make all monitoring data available for public review and evaluation; and
- The need to finalize a detailed monitoring plan, and commitment to fund the plan, prior to initiating project construction.

**VII. Improve coordination within and between agencies and departments**

**Issue:** Experience with the "fast-track" projects has shown that coordination within and between federal agencies, as well as with appropriate state agencies, is critical to a timely and efficient permitting process. The approach to federal-state coordination taken in California (where there is a separate state permitting process for solar thermal projects through the California Energy Commission) ultimately worked well. This approach may also be helpful in other states. However, coordination between federal agencies is in serious need of improvement.

**Solution:** In specific and clear guidance, adopt an improved process for coordination within and between federal agencies as outlined below. Such guidance should also capture the essence of the approach to federal-state coordination taken in California. In this way, the Department can ensure that key federal agencies work together efficiently and effectively, and that the benefits of the California approach can be exported to other states. We provide these recommendations to help facilitate a robust and timely permitting process for appropriately sited projects.

Guidance should be issued that directs the following:

1. At the national level:

- Establish a coordinating council within DOI that includes representatives of the Secretary's office, Assistant Secretary of the Interior for Lands and Minerals, BLM, FWS, NPS, the Solicitor's office and other relevant agencies (BIA) to review status of project reviews and related policy development, including the solar PEIS, and identify barriers to realization of the Administration's and the Secretary's goals. Council to meet at least monthly (preferably every 2 weeks).

- Convene an inter-agency group composed of relevant agencies outside of DOI – i.e., DOD, EPA, ACOE, FAA, Forest Service, and DOE – on a regular basis to discuss cross-cutting issues relating to planning and permitting.

- Designate a single lead official whose full-time job is to coordinate and facilitate project reviews over the next 18 months and to oversee the building of the framework for a more efficient, effective and coordinated "long-term" policy.

2. Establish a similar structure at the state level, led by each BLM state office, to identify issues, barriers and problems for resolution. These groups should meet every two weeks and should report on these issues etc. to the federal coordinator on a regular basis. Identify key contacts within all federal agencies from the top offices to the district level.

3. Encourage state governments to enter into MOUs with DOI that will create parallel structures in each state to interact with the federal representatives. The groups established in California, i.e., the REPG and REAT, have been instrumental in ensuring improved communication and coordination. Ensure all key contacts are identified as in #2 above and seek to identify effective ways to include counties as appropriate.

4. Establish a process, goals and timeline for project reviews during the "transition period" between the fast track projects and the Solar PEIS (i.e., next 18 months) and for completion of the long-term policy.

5. Require state teams and the federal government to establish goals and a workplan to achieve those goals that identifies resource needs and deficiencies.

6. Work through the above DOI processes to complete the solar PEIS and to review existing policies re: wind and geothermal development.

7. Use the above DOI processes to evaluate whether a dispute resolution-like process could assist in resolving conflicts earlier between agencies, developers and the public.

8. At the same time, encourage CEQ to provide a forum for interdepartmental coordination and cooperation between agencies (including FERC, Treasury and Energy) and tribal governments to discuss policy and other issues essential to achieve Administration's clean energy strategy/goals.

**Appendix A**
**List of Solar Fast Track Projects on Public Lands in CA as of October 16, 2009**

CA Tessera, Imperial Valley
Bright Source, Ivanpah
First Solar, Desert Sunlight
Solar Millennium, Palen
Solar Millennium, Blythe
Solar Millennium, Ridgecrest
Tessera, Calico
Nextera Genesis, Ford Dry Lake
Chevron, Lucerne Valley

**Appendix B**
**Additional Solar Energy Development Study Areas in the Western Mojave**
**Explanatory Narrative (8/18/2010)**

Background: Several prominent national environmental organizations[17] are actively participating in identifying issues and seeking appropriate opportunities for renewable energy development in the California Desert by developing recommended siting criteria that would potentially allow for development of projects in the an environmentally sustainable manner.

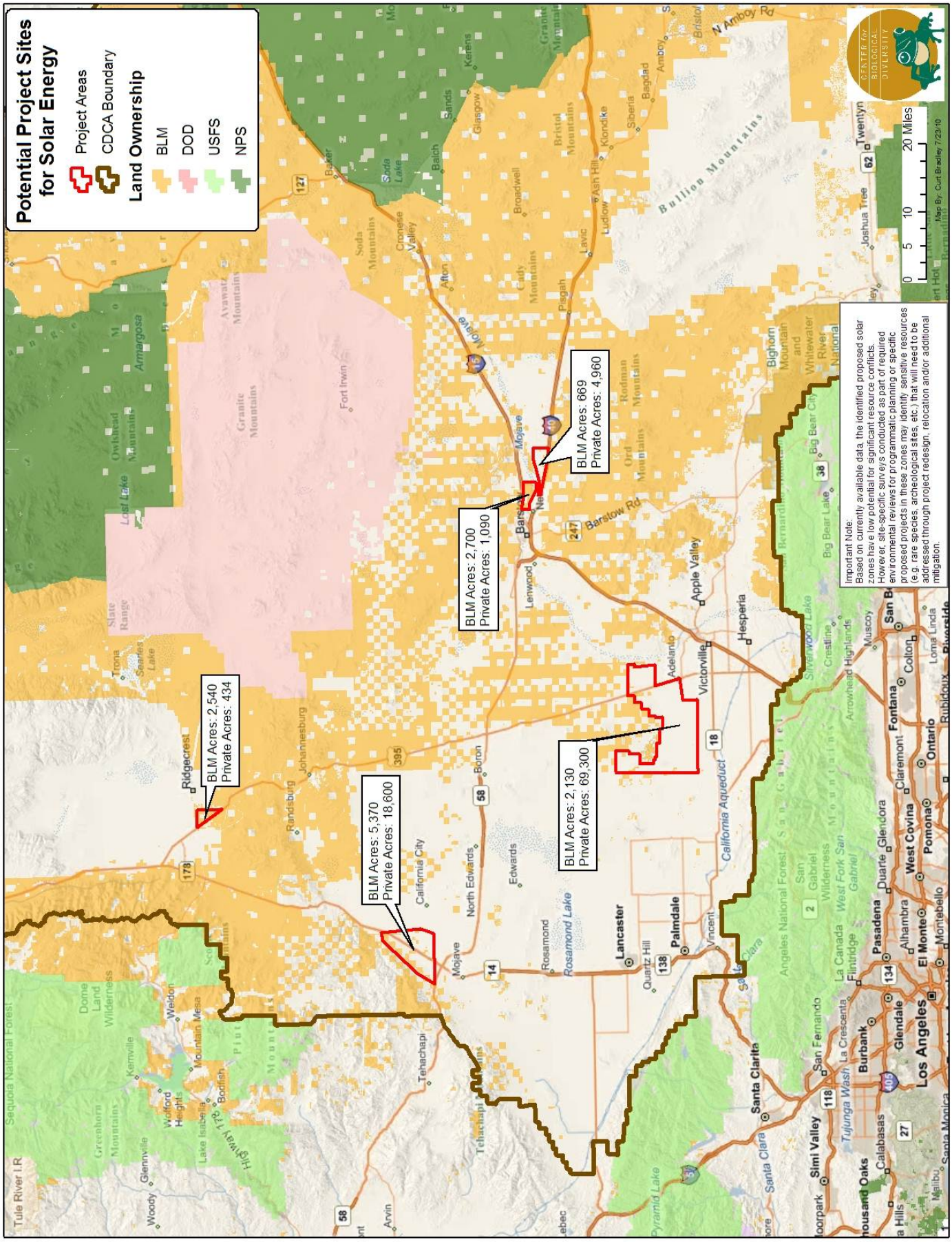
In April 2009 these organizations identified draft recommended solar energy development study areas consistent with their recommended siting criteria. These 2009 draft study areas were comprised of 53,400 acres of public land administered by the Bureau of Land Management and 242,200 acres of adjacent private lands. Subsequently these organizations sought to identify additional Western Mojave areas.

In recognition of the interest in the western Mojave region of California for solar energy development by industry, and the need to direct any such development to locations that are consistent with the siting criteria of the environmental organizations, additional potential solar study areas have been identified, as shown in the following table and on the attached map which consolidates the original study areas from 2009 with newly identified ones in the western Mojave desert.

| Area Name | Acres | | Total Acres | MW Potential[18] | |
|---|---|---|---|---|---|
| | Public (BLM) | Private | | Public | Private |
| Ridgecrest | 2,540 | 434 | 2,974 | 318 | 54 |
| Mojave | 5,370 | 18,600 | 23,970 | 671 | 2,325 |
| Yermo | 2,700 | 1,090 | 3,790 | 338 | 136 |
| Newberry | 669 | 4,960 | 5,629 | 84 | 6,200 |
| Adelanto | 2,130 | 69,300 | 71,430 | 266 | 8,662 |
| Total | 13,409 | 94,384 | 107,793 | 1,677 | 17,377 |

These potential study areas were selected based on a cursory analysis of slope, proximity to existing development and transmission infrastructure, and the same criteria used to select the original study areas in 2009. These additional locations are likely to have fewer biological values for conservation than other areas of the western Mojave desert due to existing disturbance, fragmentation of habitat and proximity to existing development. All of these areas include substantial private lands, because private lands tend to have sustained more disturbance and fragmentation as well as often being close to existing energy infrastructure

[17] Center for Biological Diversity, Defenders of Wildlife, Natural Resources Defense Council, Sierra Club, The Wilderness Society, Western Watersheds Project
[18] Assuming average of 8 acres/MW


Potential Project Sites for Solar Energy
Project Areas
CDCA Boundary
Land Ownership
BLM
DOD
USFS
NPS
BLM Acres: 2,540
Private Acres: 434
BLM Acres: 5,370
Private Acres: 18,600
BLM Acres: 2,700
Private Acres: 1,090
BLM Acres: 669
Private Acres: 4,960
BLM Acres: 2,130
Private Acres: 69,300
Important Note:
Based on currently available data, the identified proposed solar zones have low potential for significant resource conflicts. However, site-specific surveys conducted as part of required environmental reviews for programmatic planning or specific proposed projects in these zones may identify sensitive resources (e.g. rare species, archeological sites, etc.) that will need to be addressed through project redesign, relocation and/or additional mitigation.
0 5 10 20 Miles
Map By: Curt Bradley 7/23/10
CENTER for BIOLOGICAL DIVERSITY
Ridgecrest
Barstow
Victorville
Hesperia
Apple Valley
Lancaster
Palmdale
California City
Mojave
Tehachapi
Los Angeles
Santa Clarita
Simi Valley
Pasadena
Glendale
Burbank
Fontana
Ontario
Pomona
Colton
Riverside
Joshua Tree
Twentynine Palms
Bullion Mountains
Fort Irwin
Edwards
Rosamond
Rosamond Lake
California Aqueduct
Barstow Rd
N Amboy Rd

**Appendix C**
**Reference list for landscape-level biological linkage areas**

Spencer, W.D., P. Beier, K. Penrod, K. Winters, C. Paulman, H. Rustigian-Romsos, J. Strittholt, M. Parisi, and A. Pettler. 2010. California Essential Habitat Connectivity Project: A strategy for conserving a connected California. Prepared for California Department of Transportation, California Department of Fish and Game, and Federal Highways Administration. February. (Spencer et al. 2010)

Beier, P., K. Penrod, C. Luke, W. Spencer, and C. Cabanero. 2006. South Coast Missing Linkages: restoring connectivity to wildlands in the largest metropolitan area in the United States. Pages 555-586 in: K. Crooks and M. Sanjayan (eds.). Connectivity Conservation. Cambridge University Press. (Beier et al. 2006)

Penrod, K., C.R. Cabanero, P. Beier, C. Luke, W. Spencer, E. Rubin, and C. Paulman. 2008. A linkage design for the Joshua Tree-Twentynine Palms connection. South Coast Wildlands, Fair Oaks, CA. www.scwildlands.org. (South Coast Wildlands 2008)
(http://www.scwildlands.org/reports/JT_TP_Connection.pdf)

Epps, C.W., J.D. Wehausen, V.C. Bleich, S.G. Torres, and J.S. Brashares. 2007. Optimizing dispersal and corridor models using landscape genetics. Journal of Applied Ecology 44:714-724. (Epps et al. 2007)