# Appendix J.3

## Comment Letters

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

September 9, 2021

Brandon G. Anderson
Assistant District Manager
Bureau of Land Management
1201 Bird Center Drive
Palm Springs, California 92262

Subject: Draft Environmental Assessment for the proposed Oberon Solar Project, Riverside County, California

Dear Brandon Anderson:

The U.S. Environmental Protection Agency has reviewed the above-referenced document pursuant to the National Environmental Policy Act, Council on Environmental Quality regulations (40 CFR Parts 1500-1508), and our NEPA review authority under Section 309 of the Clean Air Act.

The EPA appreciates the Bureau of Land Management's commitment to coordination throughout the NEPA process. As a cooperating agency under NEPA during the development of the Environmental Assessment, the EPA provided project feedback to the BLM during the pre-application phase, and submitted comments during the scoping period and on the administrative Draft EA. We value collaboration with the BLM and fellow cooperating agencies, and the time and resources devoted by the BLM to identifying and addressing potential impacts from construction and operation of the Oberon Solar Project.

The proposed project is located within a development focus area (DFA) as identified through the Desert Renewable Energy Conservation Plan (DRECP). As described in the Draft EA, the application of the DRECP's Conservation Management Actions (CMAs) to the proposed action would preclude the ability to construct and operate the 500 -megawatt project. As a result, the proposed action would require a plan amendment to allow solar development within the application area.

The BLM in conjunction with federal and state resource agencies developed the DRECP and its CMAs through a multi-year intensive public process. The EPA also participated in its development and served as a cooperating agency. The DRECP CMAs are intended to assist federal land managers and applicants in balancing renewable energy development while protecting air, aquatic, biological and cultural resources in the Riverside East Solar Energy Zone (SEZ) and other DFAs. The Riverside East SEZ has served as the epicenter for utility scale solar development on federal lands and the EPA encourages careful siting and consistent adherence to the CMAs to reduce impacts to these resources including avoidance of microphyll woodlands and protection of DRECP designated wildlife linkage corridors.

We note that the neighboring Arica and Victory Pass solar projects, the first two projects subject to DRECP's requirements, expect to fully comply with all CMAs. The benefits of selecting a CMA compliant alternative are potentially many, including the streamlined efficiencies of utilizing the

DRECP Biological Opinion, support to justify a Finding of No Signification Impact (FONSI) and potentially avoiding project opposition.

In addition to the proposed action, we are pleased to note that the BLM has evaluated a CMA compliant alternative that would protect an additional 600 acres of desert dry wash woodlands, critical desert tortoise habitat, desert pavement and multi-species linkage area while producing 375 MW of energy. The Draft EA also evaluates a CMA compliant Reduced Acreage Alternative that would protect 1,100 acres while producing 300 MW. The EPA recommends that the BLM strongly consider these alternatives in consultation with resource agencies.

While we appreciate the BLM's responsiveness to a number of our recommendations to date, the EPA continues to have concerns about potential direct and indirect impacts to air quality, site hydrology, groundwater, sensitive species and cultural resources as well as cumulative impacts associated with the influx of the multitude of large-scale solar energy projects in the project's vicinity. We also note that Section 7 consultation has not been initiated on the proposed action and the expert opinions of resource agencies are not fully reflected in this document. Additional analysis may be required to better assess and quantify project impacts and design appropriate mitigation measures to minimize them and support a FONSI.

In addition, the DRECP was adopted 6 years ago and over 10,000 acres of solar have been either built or are under construction in the area. The EPA recommends incorporating best practices and mitigation measures from other BLM approved projects and utilizing the latest environmental guidances and policies to inform impact analyses and decision makers and to ensure project resilience over the 30 year project life. Additionally, as the Draft EA references impacts quantified in the DRECP (e.g. total desert tortoise critical habitat acreage expected to be impacted within the DRECP planning area) to demonstrate this project falls within those limits, we recommend including up to date figures for the acreages already impacted from the multitude of projects constructed, under construction and proposed. Such figures can help determine whether impacts have been exceeded and help clarify potential thresholds for development in the Riverside East SEZ. Please see our enclosed detailed comments describing our concerns and recommendations for the Final EA.

The EPA appreciates the opportunity to review this Draft EA, and we are available to discuss our comments. When the Final EA is released for public review, please email to the address below. If you have any questions, please contact me at (415) 947-4167 or Tom Plenys, the lead reviewer, at 415-972-3238 or plenys.thomas@epa.gov.

Sincerely,

Jean Prijatel
Manager, Environmental Review Branch

Enclosures: EPA's Detailed Comments

Cc: Brad Poiriez, Mojave Desert Air Quality Management District
Lijin Sun, South Coast Air Quality Management District

Peter Sanzenbacher, US Fish and Wildlife Service
Magdalena Rodriguez, California Department of Fish and Wildlife
Suhas Chakraborty, Colorado River Basin Regional Water Quality Control Board
Michael Hornick, Federal Emergency Management Agency
Lara Rozzell, National Park Service

**EPA DETAILED COMMENTS ON THE ARICA AND VICTORY PASS SOLAR PROJECTS, DRAFT ENVIRONMENTAL ASSESSMENT, RIVERSIDE COUNTY, CALIFORNIA – September 9, 2021**

## Air Quality

The Oberon Solar project is located in the Riverside County portion of the Mojave Desert Air Basin (p. 30). While the project area has federal designations of unclassifiable/attainment for all pollutants, the area is in non-attainment for ozone and coarse particulate matter ($PM_{10}$) under California Ambient Air Quality Standards (pg. 39). Appendix R shows that South Coast Air Quality Management District daily emission thresholds would be exceeded for nitrogen oxides ($NO_x$) and $PM_{10}$ during the construction period without mitigation. Neither the Draft EA nor Appendix R estimated cumulative emissions from other proposed projects in the area that may undergo concurrent construction (e.g. Arica and Victory Pass).

Due to potential air quality exceedances resulting from the concurrent construction of other reasonably foreseeable solar projects within the Riverside East Solar Energy Zone and the close proximity of Joshua Tree National Park, the EPA supports incorporating stringent mitigation strategies to reduce vehicular and equipment emissions as well as fugitive dust.

***Recommendations:*** We recommend that the BLM closely coordinate with the SCAQMD and the National Park Service, given the close proximity of Joshua Tree National Park, on cumulative emissions, visual impacts and mitigation opportunities and provide an update on such coordination in the Final EA. Additionally:

- Include, in Chapter 3.2, a table summarizing future annual cumulative emissions, broken out by year, for the Oberon project as well as projects that may overlap in construction and operation in the area including Arica and Victory Pass. Compare these cumulative emissions to de minimis thresholds as well as SCAQMD daily emission thresholds.
- Clarify the anticipated availability of Tier 3 and Tier 4 engines for the construction equipment expected to be used on site under MM-AQ-2 and footnote the tables that estimate emissions with mitigation measures in Chapter 3.2. We note that the BLM conducted a survey for the Crimson Solar Project to confirm the availability of Tier 4 engines for future project construction and found 85% of off-road equipment could meet Tier 4 standards. We suggest such a survey be completed to support the emissions estimates presented in the Final EA.
- Consider adopting a mitigation measure to limit idling on-site to two minutes for off-road equipment, further reducing emissions beyond California's five-minute maximum idling requirement. Such a mitigation measure was recently adopted by the BLM for the Crimson Solar Project (AQ-3) in their Record of Decision.
- Consider adding to proposed air quality mitigation measures a requirement to notify the local air district on the expected timing of phases of construction to apprise the agency of overlapping project construction schedules and the expected indirect and cumulative air impacts in the area.
- Based on the evaluation of cumulative emissions, if additional mitigation measures or reductions in acreages of soil disturbance would be needed, or if the project would affect the ability of other foreseeable projects to be permitted, discuss this in the Final EA.
- Consider requiring the installation of real-time $PM_{10}$ dust monitoring equipment, like that installed in the past at nearby solar facilities (e.g. Desert Sunlight), to monitor during both the construction and operational phases of the project. Creating a network of real-time monitors in the Riverside East SEZ would provide the data necessary to inform mitigation and adaptation measures for the multitude of projects in the SEZ.

*Site Preparation and Minimizing Impacts to Soils and Vegetation*

The EPA strongly supports consideration and implementation of design features that would further reduce fugitive dust by minimizing grading, soil disturbance and vegetation removal during construction. Reasonable mitigation measures to reduce fugitive dust should be implemented for the benefit of localized receptors such as construction workers and nearby residents, and to minimize potential exposure to *Coccidioides immitis.* According to the Draft EA, the project site has generally flat topography and solar panel installation should be conducive to eliminating the need for grading, rolling and cut and fill on the solar array portion of the site (pg. 18). We note that woody vegetation would be mowed and rolled to a height of 12 inches, but the Draft EA does not articulate the level of soil disturbance that would take place given root balls would be removed in places, and mowing, rolling, cutting and filling would occur. Chapter 3.12.2 indicates the proposed action would have long-term impacts on native habitats by removing or substantially altering the soils and vegetation on approximately 2,737 acres (pg. 98). This appears to indicate all soils in the solar array would be disturbed.

Research at the Ivanpah Solar Electric Generating Station indicates that mowing instead of grading or blading at solar facilities may allow for recovery of desert shrubs to pre-construction percent ground cover and heights within seven years.[1] To minimize such impacts and maximize opportunities for vegetation recovery, we recommend that the BLM consider the "Design Elements" that have been adopted at the Crimson Solar Project[2] located in the Riverside East SEZ. The EPA supports integrating best practices, mitigation measures and lessons learned to date from other BLM projects to ensure continued progress toward achieving environmentally responsible siting and design of utility-scale solar.

***Recommendations:***

- Analyze, and include where applicable, site preparation techniques that were adopted at the Crimson Solar Project (Design Elements 1 and 3):
  - utilize a track-mounted pile driver for solar array support structure installation which would limit soil disturbance to the areas under the two 12- to 18-inch wide tracks with a 4-foot space between the tracks;
  - mechanically trim vegetation to 18 inches high in the solar array field;
  - mount transformers on steel skids and piers to allow for soils underneath to remain pervious and undisturbed. Similarly, evaluate whether energy storage units can be similarly elevated also. We note that electrical inverters may be placed on steel skids which we recommend be incorporated as part of all alternative (pg. 19).
- Consider incorporating propagule islands – patches of intact vegetation and soils that provide seeds and soil microbial propagules that could facilitate revegetation or recolonization of adjacent disturbed areas. Such patches have protected sensitive plants at the Ivanpah site and have been proposed at the BLM's Yellow Pine Solar project in Nevada.
- Quantify, in the Final EA, the net effect on ground disturbance acreage and vegetation removal should bifacial panels be utilized (p. 12).

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[1] Grodsky, W.M. & R.R. Hernandez. 2020. Solar energy impacts on the ecosystem services and indigenous value of desert plants. Nature Sustainability. *In revision*.

[2] Crimson Solar Project, Final Environmental Impact Statement and Proposed Land Use Plan Amendment to the California Desert Conservation Area Plan, DOI-BLM-CA-D060-2017-0029-EIS, January 22, 2021, pages 2-14 and 2-15.

*Phased Approach to Site Preparation*
Prematurely grading or disturbing the entire site and removing vegetation can result in excessive dust problems and unnecessary impacts to air quality, habitat, vegetation, soils and other resources – particularly if the project is not constructed in its entirety. As PV technology improves, less land is needed per megawatt generated. During past solar site visits, we have seen large acreages graded that ultimately were not needed to meet the MW goals for a project. This land now sits idle, fenced in and may take decades to be restored.

> ***Recommendation****:* Consider incorporating a mitigation measure or permit condition that would require a phased approach to construction that ensures only the necessary acreage is built upon, and require that soil disturbance be contingent upon, and proportional to, an existing Power Purchase Agreement or equivalent.

**Site Hydrology, Microphyll Woodlands, Ephemeral Drainages and Flood Events**
The EPA remains concerned that the bulk of the project's solar arrays would experience some ground disturbance due to the proposed mowing and rolling method. As the Draft EA indicates, ground disturbance undermines the stability of soil and biotic crusts, leading to greater potential for erosion; affects soil density and water infiltration, cutting off water supplies to plant roots; and promotes invasion by exotic plant species (pg. 100). In addition to adoption of the Design Elements mentioned above, we recommend careful micro-siting of project components and utilizing best practices for site preparation to avoid ephemeral drainages to the greatest extent feasible, reduce soil disturbance, preserve site hydrology and prevent damage from floods.

The proposed action would not comply with four CMAs from the DRECP. Most notably, the proposed action would not adhere to the 200-foot setback on either side of desert dry wash woodlands on site. As a result, the proposed action would have long-term impacts to approximately 60 acres of microphyll woodlands (pg. 7). In coordination with the BLM and the US Fish and Wildlife Service, the applicant refined the development footprint to avoid desert dry wash woodland areas by imposing a minimum 50-foot and average of 134-foot buffer between such areas and the nearest solar panels. The footprint reflects a decision to protect higher value woodlands on site. Impacts to desert dry wash woodlands would be mitigated at a ratio of 5:1 (MM BIO-6a and 6b). The Draft EA indicates that the quality of the microphyll woodlands at the project site are substantially inferior quality to those proposed to be protected (pg. 102).

The CMA compliant alternative would protect the microphyll woodlands on site and reduce vegetation and habitat impacts by 600 acres. The Reduced Acreage alternative would protect 1,100 acres as compared to the proposed action.

We remain concerned about the potential precedent of allowing project specific plan amendments to the DRECP which provided a consistent framework to ensure protection of resources in the planning area. Reducing setbacks can result in reduced wildlife movement within the corridor, potential impacts due to additional disturbance to species and vegetation and inadequate buffers for severe precipitation events. Based on 100-year events, flood depths of 0.5 to 1 feet were modeled along and adjacent to desert washes and 1.5 feet within washes (pg. 122). While we understand the DRECP considered 100-yr flood events for planning purposes, this may not be sufficient to both protect project equipment and preserve natural on-site hydrology.

Executive Order 14030 signed on May 20, 2021 reinstated Executive Order 13690 (Establishing a

Federal Flood Risk Management Standard) which revised the definition of a floodplain from an area subject to a 100-yr floodplain to include areas potentially subject to a 500-year event.[3] In light of changed conditions since the DRECP was adopted in 2015, recent policy updates, increased severity of precipitation events resulting from climate change, and the expected 30 year life of the project, we continue to recommend evaluation of 500-year events to ensure informed decision making and that adequate protections are in place for the facilities as well as biological and aquatic resources.

***Recommendations:***

- Clarify, in Chapter 3.12, the criteria used to determine the varying amount of setback from microphyll woodlands under the proposed action.
- Clarify, in Chapter 3.12, how many acres of desert dry wash woodlands, multi-species linkage corridor and critical desert tortoise habitat would be protected under the CMA compliant alternatives. Include a tabular summary comparing the proposed alternatives.
- Provide, in the Final EA, an update on the overall acreage of suitable lands that are available for compensatory mitigation for impacts to desert dry wash woodlands in accordance with the DRECP.
- Discuss, in Chapter 3.12, the extent to which the USFWS and California Department of Fish and Wildlife have been consulted, their views on the potential trade-offs between the proposed action and CMA compliant alternatives, whether a plan amendment should be allowed for this particular project and whether such trade-offs can justify a FONSI in light of the impact analyses in the DRECP.
- Include a discussion on the trade-offs of selecting desert tortoise exclusion fencing along I-10 as a suitable compensatory mitigation versus protecting lands at a 5:1 ratio.
- Include an update on consultation with CDFW, and the extent to which state waters - 65 acres of unvegetated ephemeral dry washes and 71.5 acres of desert dry wash woodlands - would be avoided under the CMA compliant alternatives. Provide a tabular summary in Chapter 3.14.
- Consider, in the Final EA, the impacts of changing precipitation patterns on the project, as part of the analysis of impacts to water resources and protection of desert dry wash woodlands. Discuss the anticipated extent and depth of overland flows through the development areas given a 500-year flood event, as compared to a 100-year event. Identify design considerations needed to accommodate future anticipated effects (e.g. increased intensity and severity of storms) such as upsizing the stormwater management system. Incorporate such measures into MM HWQ-4 and 5 accordingly.
- Confirm, in the Final EA, whether all substations, energy storage units, and buildings are outside of the 500-year floodplain and consistent with FEMA guidance and describe how essential equipment would be protected from flooding. Identify if solar arrays, battery systems, inverters and transformers can be sufficiently elevated above a 500-year flood depth.
- Confirm the use of at-grade or Arizona crossings wherever possible, to maximize avoidance and minimization of impacts to the washes.
- Describe how adaptive management would be used to manage erosion within the project area. Identify the criteria that would be used to evaluate the effectiveness of erosion and sedimentation control measures.

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[3] Federal Register, Executive Office of the President, Executive Order 14030: Climate-Related Financial Risk, May 20, 2021. Available: https://www.federalregister.gov/documents/2021/05/25/2021-11168/climate-related-financial-risk

**Fencing**
The applicant proposes to install modified fencing that would allow some wildlife movement throughout the area during operation (pg. 24). After construction, desert tortoise, birds and small and medium sized mammals would be able to pass onto the site through the small gaps. It is our understanding that passages onto the site may be preferable to desert tortoise translocation in certain areas, but may not be preferable for the subject project given the proximity of suitable desert tortoise relocation habitat. Discuss the results of consultation with the USFWS and CDFW, in the Final EA, including the discovered roadrunner fatalities at neighboring sites and whether fencing design could help prevent future fatalities.

**Groundwater and Water Supply**
Construction of the proposed project would require 700 acre-feet of water over 15 to 20 months. During operations, up to 40 acre-feet would likely be required per year per project. Water would be sourced from an on-site groundwater well, off-site wells, or trucked in by an off-site water purveyor. Regardless of the water sources, the Draft EA indicates the water will be drawn from the Chuckwalla Valley Groundwater Basin (pg. 125).

The EPA has concerns regarding the potential cumulative impacts to groundwater basins should multiple projects draw from the underlying basins and the potential hydrologic connectivity between these basins and the Colorado River. Based on National Park Service estimates of baseline recharge, the CVGB is already in overdraft and the proposed action would contribute about 1 percent to the groundwater overdraft after the project's 30-year life (pg. 125).

***Recommendations:***

- Quantify the combined water use, by year, from reasonably foreseeable projects expected to draw from the underlying groundwater basins (including the neighboring Desert Sunlight, Desert Harvest, Athos, Palen, Arica, Victory Pass, Eagle Mountain Pumped Storage and Easley projects). The Desert Quartzite EIS contains an example of such an analysis.
- Clarify, in the Final EA and in HWQ-1 and 2, how an individual solar project's responsibility will be determined if multiple projects are drawing from the Chuckwalla Valley and Palo Verde Mesa Groundwater Basins and groundwater resources in the basins become overextended to the point that curtailment is necessary.
- Confirm, in the Final EA, whether water would be used for dust suppression during operations at the solar facility or on access roads. If water will not be used for dust suppression during operations, update the Final EA, as needed, and clarify the methods that will be used to eliminate fugitive dust.
- Consider eliminating or reducing panel washing in the Final EA. Our understanding is that some solar operators have found minimal efficiency losses by not washing the panels which are outweighed by the significant financial savings from not having to purchase water.

**Biological Resources**
Consultation with the USFWS and CDFW is expected to play an important role in informing the BLM's decision about which alternative to approve and the commitments, terms, and conditions that must accompany that approval. We understand that the DRECP Biological Opinion cannot be relied upon should the selected alternative require a plan amendment and that consultation has not yet been initiated. While we defer to the BLM's coordination with the USFWS and CDFW on matters pertaining to species and habitat protection, we offer the following suggestions based on our experience with multiple solar projects to help clarify potential impacts to biological resources.

***Recommendations:***

- Provide, in the Final EA, an update on the consultation process with the USFWS and CDFW. Summarize and append any relevant documents associated with the ESA Section 7 consultation process, including the Biological Assessment and Biological Opinion. Include a discussion on how the BLM, in consultation with the USFWS and CDFW, plan to protect the functions of the critical wildlife linkage on the east side of the project in the context of the proposed impacts from Arica, Victory Pass, Oberon and the Athos solar projects.
- Discuss, in Chapter 3.12, whether permanent impacts to the 598 acres of the eastern portion of the proposed project, which overlaps with the 3,480 acre critical multi-species linkage identified by the DRECP, would exceed acreages estimated to be impacted in the DRECP for this specific linkage (include impact acreage from the Athos and Victory Pass projects). It appears the 6,000 acre estimate of impacts from the DRECP in the Cadiz Valley and Chocolate Mountains areas would be for all 3 major linkages identified by the DRECP (pg. 110).
- Clarify, in Chapter 3.12, how many acres of desert scrub have already been permanently impacted by solar projects in the Riverside East SEZ. The Draft EA indicates that approximately 52,000 acres of impacts could result according to the DRECP, however an estimate of impacts to date was not provided which would disclose whether those predicted impacts have been exceeded. The proposed action alone would contribute 2,737 acres of impacts (pg. 98).
- Clarify, in Chapter 3.12, how many acres of desert tortoise critical habitat have already been permanently impacted by solar projects in the Riverside East SEZ. The Draft EA indicates that approximately 8,000 acres of impacts could result according to the DRECP, however an estimate of impacts to date was not provided which would disclose whether those predicted impacts have been exceeded (pg. 107). We note the proposed action would impact 817 acres of the Chuckwalla Critical Habitat Unit.
- Provide, in the Final EA, an update on the overall acreage of suitable lands that are available for compensatory mitigation for impacts to critical desert tortoise habitat, desert dry wash woodlands and multi-species linkages. Discuss whether such availability could limit compensatory mitigation for the multiple projects currently under review.
- Clarify why development must occur in the utility corridor north and adjacent to I-10 under the CMA compliant alternatives. Discuss how the DRECP applies to developing in utility corridors. We recommend the CMA compliant alternatives be amended to avoid development in such corridors to allow for greater wildlife movement.

**Cultural Resources and Tribal Consultation**

The BLM acknowledges that tribes have expressed their concerns about the importance and sensitivity of specific cultural resources which are also connected to a broader landscape within and near the project areas. Eight tribes agreed to participate in the completed ethnographic assessment. The BLM has concluded that the cultural landscape discussed in project consultation is not sufficiently defined at this time for the BLM to analyze it as a cultural property under Section 106 NHPA or as cultural resources under NEPA for the proposed action. Further, the BLM has determined that, for the current proposed action, the cost of obtaining the information required to attempt to identify landscape-level Traditional Cultural Properties (TCP) in accordance with the Department of Interior's/BLM Section 106 NRHP and NEPA policy and standards would be exorbitant (pg. 49). The DRECP EIS cultural resources analysis only addressed impacts qualitatively as the BLM lacked data on TCPs and cultural resources (pg. 51).

***Recommendations:***

- Provide, in the Final EA, any further updates on consultation between the BLM and the tribal governments contacted to date. Discuss how impacts to tribal or cultural resources will be avoided or mitigated, consistent with Executive Orders 13175 *Consultation and Coordination with Indian Tribal Governments* and Executive Order 13007 *Indian Sacred Sites.*

- Provide additional justification for a FONSI given "defining the geographic scope of these resources and further assessing the impact of development within that scope under existing legal frameworks that require evidence of significance has been elusive" (pg. 51). We continue to recommend that an impact assessment methodology be identified for each resource evaluated and include one or more significance thresholds against which project impacts can be compared to ultimately justify a FONSI. This will help interpret the impacts for the reader as the DRECP EIS did not analyze site-specific impacts on each resource and conditions have changed in the Riverside East SEZ since the DRECP EIS was finalized.

**Environmental Justice**

Impacts associated with the solar facility that could disproportionately affect minority or low-income populations primarily include short-term noise and air quality degradation during construction and long-term visual impacts to the overall desert landscape of the area (p. 79). Further, the DRECP FEIS notes that in addition to disproportionate effects from construction, much of the electricity generated by these projects would be delivered to populations outside communities disproportionately impacted. Discuss, in the Final EA, a potential mitigation measure for these impacts; for example, provide power from the project to impacted communities or to provide funding for local renewable energy generation to impacted communities that would otherwise note be serviced by the project.

**Battery Storage**

The proposed project may include up to 500 megawatts of energy storage systems housed in electrical enclosures (pg. 13). We recommend including an analysis of the potential energy needs of the energy storage systems (e.g. for HVAC), discuss to what extent such needs can be met by energy generated on site by the solar facility, and update air emission estimates for the project, as needed.

**Recycling of PV Components**

The Draft EA eliminated from further detailed analysis the downstream and end use hazards associated with recycling and waste processing for hazardous materials, but indicates that damaged solar panels would be stored and recycled as noted in the Plan of Development (Table 1-1). Small quantities of potentially hazardous materials – including cadmium and other heavy metals – can be contained within solar panels, batteries, battery storage systems, transformers, semiconductors, and inverters and could be released from broken or cracked modules through leaching. Research into this issue continues to develop and indicates that disposal and leaching could be a problem depending on screening thresholds.[4]

***Recommendations:***

- Discuss whether the solar panels manufacturer for these proposed projects, if known, is responsible for recycling, managing their products at end-of-life, or safely disposing of them in conjunction with extended producer responsibility laws.
- Consider, as a mitigation measure, periodic literature reviews of solar recycling programs – including state and government directives or guidelines – that address methodologies for the management of end-of-life solar photovoltaic modules.

[4] International Renewable Energy Agency, International Energy Agency Photovoltaic Power Systems Programme, 2016, *End-of-Life Management Solar Photovoltaic Panels.*

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|---|---|
| **From:** | Rodgers, Jane JER |
| **To:** | BLM_CA_Web_PS |
| **Cc:** | Rozzell, Lara R; Lee, Lena FS; Anderson, Brandon G; Ortega, Steven T; PS_OberonSolar, BLM_CA |
| **Subject:** | SUBMITTAL: NPS Oberon DEA Comments |
| **Date:** | Tuesday, September 14, 2021 12:45:53 PM |
| **Attachments:** | NPS Oberon DEA comments 2021.09.13.pdf |

Mr. Gilloon,

Please find attached comments from the National Park Service, Joshua Tree National Park.

Thank you for the opportunity to comment; please reach out any time to discuss opportunities to follow up and collaborate on this project.

FYI Superintendent David Smith will be returning to the park September 21, 2021. Until then, I remain on detail as Acting.

Sincerely,

Jane Rodgers
Superintendent (Acting)
Joshua Tree National Park
(760) 401-5117 (text/call)

# United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Ecological Services
Palm Springs Fish and Wildlife Office
777 East Tahquitz Canyon Way, Suite 208
Palm Springs, California 92262


In Reply Refer to:
FWS-ERIV-21B0181-21CPA0114

September 20, 2021
*Sent by Email*

Memorandum

To: Field Manager, Palm Springs-South Coast Field Office
Bureau of Land Management, Palm Springs, California

From: Assistant Field Supervisor, Palm Springs Fish and Wildlife Office
Palm Springs, California

Subject: Draft Environmental Assessment and Land Use Plan Amendment for the Oberon Renewable Energy Project (DOI-BLM-CA-D060-2020-0040-EA), Riverside County, California

This memorandum is in response to the notice dated August 13, 2021, soliciting comments on the draft Environmental Assessment (EA) and land use plan amendment for the Oberon Renewable Energy Project (Project) prepared by the Bureau of Land Management (BLM). IP Oberon, LLC (Applicant), a subsidiary of Intersect Power, LLC, proposes to develop and operate a 500-megawatt solar photovoltaic electricity generating station, battery energy storage facility, electrical substation, and generation intertie line on approximately 2,700 acres of undeveloped public lands administered by the BLM near Desert Center, California, in eastern Riverside County. The Applicant proposes to construct the Project within a Development Focus Area (DFA), as designated by the Desert Renewable Energy Conservation Plan (DRECP) Land Use Plan Amendment (LUPA), in the California Desert Conservation Area (CDCA). The EA also evaluates three alternatives to the Applicant's proposed project: the No Action Alternative, the Land Use Plan Compliant Alternative, and the Resource Avoidance Alternative.

We offer the following comments on the draft EA as they relate to potential impacts on public trust resources. The primary concern and mandate of the U.S. Fish and Wildlife Service (Service) is the conservation, protection, and enhancement of fish and wildlife resources and their habitats for the continuing benefit of the American people. We have legal responsibility for the welfare of migratory birds and federally threatened or endangered animals and plants. The comments provided herein are based on the information provided in the draft EA, our knowledge of sensitive and declining fish and wildlife resources, and our participation in regional renewable energy conservation planning efforts.

The DRECP is an interagency landscape-scale planning effort that includes a BLM LUPA to the CDCA Plan. As the draft EA states, the DRECP has two primary goals. One is to provide a streamlined process for the development of utility-scale renewable energy generation and transmission in the California deserts. The other is to provide for the long-term conservation and management of special-status species and desert vegetation communities, as well as other physical, cultural, scenic, and social resources within the DRECP Plan Area. The DRECP Final Environmental Impact Statement (FEIS) includes Conservation Management Actions (CMAs) designed to reduce the effects of renewable energy development on sensitive resources as well as highlighting other types of mitigation that might be required to further reduce impacts.

The draft EA describes that for the Applicant's proposed action the Applicant may not comply with CMAs that require setbacks from sensitive resource areas, specifically microphyll woodlands (CMA LUPA-BIO-RIPWET-1, CMA LUPA-BIO-3, CMA LUPA-BIO-SVF-6), and desert tortoise (*Gopherus agassizii*) clearance survey windows and exclusion fencing (CMA LUPA-BIO-IFS-4). Therefore, if the Applicant's proposed action is selected as the preferred alternative, the draft EA indicates the CDCA Plan would require an amendment. Based on the draft EA, a CDCA Plan amendment would not be required for the other three alternatives evaluated in the draft EA.

The Project proposes to construct solar arrays within a 1.5-mile-wide multi-species linkage identified in the DRECP that provides habitat connectivity between the Chuckwalla Mountains and the Chuckwalla Valley east of Desert Center. In addition, the proposed Project would impact 81.2 acres of microphyll woodland. The goal of the aforementioned CMAs is to maintain the function of the multi-species linkage and conserve microphyll woodlands, their constituent vegetation types, and other physical and biological features conducive to BLM special status species' dispersal. The draft EA concludes the permeable fencing within the linkage would, "help long-term viability of these linkage populations and contribute to maintaining the function of the linkage in compliance with CMA LUPA-BIO-13." We recommend the EA expand on the analysis and provide rationale for concluding the linkage will continue to remain viable.

Permeable fencing would also allow desert tortoises to use the Project site and move through large portions of the solar arrays during the life of the Project. The Service has issued biological opinions in Nevada for utility-scale solar projects that include permeable fences to accommodate habitat connectivity for desert tortoise populations based on landscape-scale assessments (Service 2015, Service 2019a, Service 2019b, Service 2020, Service 2021a, Service 2021b). Monitoring requirements outlined in those biological opinions will provide information to understand whether desert tortoises can use those areas effectively for their resource needs and habitat connectivity can be maintained. However, the Project location does not lend itself well to support future desert tortoise landscape-scale connectivity. First, it is within a DFA, specifically the Cadiz Valley and Chocolate Mountains Subunit 2, with existing and proposed utility-scale solar development adjacent to the Project site; we anticipate that about 16,338 acres of utility-scale solar will be developed in this subunit (Service 2016). Second, monitoring requirements are not proposed to help determine the effectiveness of permeable fencing and understand desert tortoise use and movement through this Project site. Third, this area was not identified as a desert tortoise linkage in the DRECP. Fourth, only about 50 percent of the Project site will include permeable fencing. Because of these factors, we anticipate that the Project would reduce the ability for the desert tortoise to forage, reproduce, and shelter on the site. Therefore, to avoid and minimize take, we recommend moving any desert tortoises found in the future within the solar arrays that are enclosed by a permeable fence in accordance with the Project's desert tortoise translocation plan.

Finally, the EA does not discuss potential Project effects on federally listed bird species. The DRECP FEIS concluded that southwestern willow flycatcher (*Empidonax traillii extimus*), least Bell's vireo (*Vireo bellii pusillus*), western yellow-billed cuckoo (*Coccyzus americanus*), and Yuma Ridgway's rail (*Rallus obsoletus* [=*longirostris*] *yumanensis*) would be adversely affected at that program-wide level and includes several CMAs to avoid and minimize the adverse effects to these species. The draft EA does not evaluate if or how these species would be affected by the Applicant's proposed Project, or a proposed CDCA Plan amendment. We recommend including a discussion of these species and an evaluation of if or how each alternative would affect these species.

The DRECP was a collaborative effort among many Federal, State, and local stakeholders to develop a comprehensive plan to streamline renewable energy development across the California desert and provide for the long-term conservation of unique and valuable desert ecosystems, outdoor recreation opportunities, and preservation of scenic and cultural values within the CDCA. We recommend the BLM select either the Land Use Plan Compliant Alternative or the Resource Avoidance Alternative. These alternatives would be in accordance with the DRECP, would not require a CDCA Plan amendment, would allow for the streamlined approach to a section 7 consultation as envisioned for renewable energy development in the DRECP Plan area, and would reduce adverse effects to federally listed species.

We appreciate the opportunity to provide comments on the draft EA. If you have any questions regarding this document, please contact Felicia Sirchia of the Palm Springs Fish and Wildlife Office at 760-322-2070, extension 405.

**References Cited**

[Service] U.S. Fish and Wildlife Service. 2015. Biological Opinion for Issuance of a Section 10(a)(l)(B) Incidental Take Permit for the Valley Electric Association's Community Solar Project Low-Effect Habitat Conservation Plan (84320-2015-F-0580), Pahrump, Nye County, Nevada, October 8, 2015. Southern Nevada Fish and Wildlife Office, Las Vegas, Nevada.

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[Service] U.S. Fish and Wildlife Service. 2019a. Formal and Informal Consultation under Section 7 of the Endangered Species Act for the Gemini Solar Project (08ENVS00-2019-F-0125), Clark County, Nevada. November 7, 2019 Southern Nevada Fish and Wildlife Office, Las Vegas, Nevada.

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[Service] U.S. Fish and Wildlife Service. 2020. Biological Opinion for the Arrow Canyon Solar Project, Moapa River Indian Reservation (08ENVS00-2019-F-0179), Clark County, Nevada, November 12, 2020. Southern Nevada Fish and Wildlife Office, Las Vegas, Nevada.

[Service] U.S. Fish and Wildlife Service. 2021a. Biological Opinion for the Southern Bighorn Solar I Project, Moapa River Indian Reservation (08ENVS00-2021-F-0106), Clark County, Nevada, April 19, 2021. Southern Nevada Fish and Wildlife Office, Las Vegas, Nevada.

[Service] U.S. Fish and Wildlife Service. 2021b. Biological Opinion for the Southern Bighorn Solar II Project, Moapa River Indian Reservation (08ENVS00-2021-F-0110), Clark County, Nevada, April 19, 2021. Southern Nevada Fish and Wildlife Office, Las Vegas, Nevada.

Friends of the Desert Mountains

51-500 Highway 74
P.O. Box 1281
Palm Desert, CA 92261

September 13, 2021

Brandon Anderson
Bureau of Land Management
1201 Bird Center Drive
Palm Springs, CA 92262 BLM_CA_PS_OberonSolar@blm.gov

Logan Raub
Colorado River Basin Regional Water Quality Control Board
c/o Aspen Environmental Group

235 Montgomery Street, Suite 640
San Francisco, CA 94104-2920 logan.raub@waterboards.ca.gov

Re: Environmental Assessment (EA) and Draft Environmental Impact Report (DEIR) for the Proposed Oberon (CACA- 58539) Solar Project.

Dear Mr. Anderson and Mr. Raub,

The Oberon Solar project is proposed for construction on 2700 acres of public land in the Riverside East renewable energy zone designated by the Desert Renewable Energy Conservation Plan (DRECP). Friends of the Desert Mountains was a seated stakeholder in DRECP and supports its conservation protections, which were carefully negotiated over many years by a range of stakeholders—environmentalists, the renewable energy industry, local and state governments, recreationists, Tribes and more across nearly eleven million acres of BLM public lands in the California desert —to ensure solar projects can be built without destroying sensitive habitats, migration corridors, cultural sites, and climate values.

The other recent projects in this renewable energy zone have complied with DRECP's conservation protections. But Oberon wants an exception to the rules so they can expand onto 600 acres that would encroach on a sensitive microphyll woodland. Microphyll woodland is a rare habitat, and one of the richest biological resources in the desert, so the DRECP requires developers to avoid microphyll and maintain buffers to sustain this rich habitat. It is important for the EA to explain that there are another 148,000 acres in the same renewable energy zone for developers to choose from, and the vast majority of those acres have no microphyll woodlands.

Encroaching a square mile—over 600 acres--into rare microphyll woodland and buffers just to expand the area of solar panels does not qualify as a "minor incursion" that might be allowed under DRECP. Minor incursions as defined by DRECP were contemplated only for essential infrastructure such as roads and transmission lines which could not be sited elsewhere. In any event, destroying

Friends of the Desert Mountains

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600 acres that was slated for preservation under DRECP is not a minor impact by any definition of the word minor.

Further, the notion that the acquisition of lands offsite in the Chuckwalla Bench somehow reduces this impact to a level of insignificance fails to recognize the unique value of the resources on the Oberon project site itself, a substantial portion of which is in a DRECP-designated multi-species wildlife connectivity corridor. The DRECP itself recognizes and protects those unique values, and they cannot simply be "replaced" or "offset" by buying land elsewhere in the Chuckwalla Bench. Friends of the Desert Mountains and others have acquired many thousands of acres in the Chuckwalla Bench and environs, and we will continue to do so. Those offsite resources are actively being preserved, so the suggestion that destroying sensitive habitat in one location is OK because it will allow for protection in another location is incorrect.

In sum, Friends requests that the EA and DEIR be revised to fully acknowledge and analyze the harm from the proposed project, and to only approve a project that fully avoids onsite microphyll woodlands and buffers, as required by the DRECP, while also maintaining a functioning multispecies corridor wide enough to accommodate threatened desert tortoise traversing the site.

Thank you for the opportunity to comment.

Sincerely,

Tammy Martin

Tammy Martin,
Executive Director

September 14, 2021

Oberon Solar Project
Attn: Brandon G. Anderson
Bureau of Land Management
1201 Bird Center Drive
Palm Springs, CA 92262
via email: BLM_CA_PS_OberonSolar@blm.gov

Dear Brandon:

The National Audubon Society protects birds and the places they need, today and tomorrow. Audubon works throughout the Americas using science, advocacy, education, and on-the-ground conservation. State programs, nature centers, chapters, and partners give Audubon an unparalleled wingspan that reaches millions of people each year to inform, inspire, and unite diverse communities in conservation action. A nonprofit conservation organization since 1905, Audubon believes in a world in which people and wildlife thrive.

The Natural Resources Defense Council (NRDC) is a non-profit environmental organization that uses law, science and the support of its members and activists to protect the planet's wildlife and wild places and to ensure a safe and healthy environment for all living things. NRDC has worked for many years to protect wildlands and natural values on public and private lands and to promote cost-effective energy efficiency measures and sustainable energy development. NRDC has been a long-time advocate for many of the "smart from the start" planning hallmarks of the DRECP, including landscape-level conservation planning, guided low-conflict development, and strategic regional mitigation that produces enduring protection for sensitive areas. NRDC has 2.4 members and activists in the U.S., including more than 380,000 in California.

The Wilderness Society (TWS) is a national nonprofit organization with more than 1 million members and supporters nationwide whose mission is to unite people to protect America's wild places. Since its founding in 1935, TWS has worked to provide scientific, legal, and policy guidance to land managers, communities, local groups, state and federal decision-makers, and diverse interests who care about our American public lands. TWS was highly engaged in the DRECP and deeply interested in the application of the management actions being implemented as intended by the DRECP.

Audubon's climate science at https://climate.audubon.org reveals that 389 species of North American birds may go extinct if warming reaches 3° Celsius above pre-industrial levels. Audubon is committed to 100% clean energy, net zero greenhouse gas emissions, and the Biden Administration's goal of siting and permitting 25 GW of renewable energy on federal lands by 2025.

For birds and many other wildlife species, however, climate change planning must do more; it must also preserve both key resources and habitats needed in coming decades as warming increases as well as protect climate strongholds resilient to climate change that will provide a safe haven for many decades to come. These issues are especially true in the desert southwest, where increasing needed renewables development while protecting habitats and species is most challenging.

Audubon's long-standing policy is to support clean energy projects that are well-sited and operated to avoid, minimize, and mitigate effectively for the impacts on birds and the places birds need, especially to adapt to climate change. Our concerns about this project are centered on the value of nearly irreplaceable Microphyll Woodlands habitat and the precedent involved in granting exceptions for the first project that would ever be permitted under the vast, pioneering, long-term collaborative effort of the Desert Renewable Energy Conservation Plan.

<u>The Project</u>
The Bureau of Land Management (BLM) has prepared this Environmental Assessment (EA) and draft Land Use Plan Amendment (LUPA) pursuant to the National Environmental Policy Act of 1969 (NEPA, 42 U.S.C. Section 4321), Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] Parts 1500–1508)1, Department of the Interior NEPA Regulations (43 CFR Part 46), and BLM NEPA Handbook H-1790-1, for the Oberon Renewable Energy Project proposed by IP Oberon, LLC (the Applicant), a subsidiary of Intersect Power, LLC. BLM would need to consider a project-specific LUPA to the California Desert Conservation Area (CDCA) Plan, as amended, because the Oberon Renewable Energy Project may not comply with all of the Conservation and Management Actions (CMAs) to the CDCA Plan, as amended by the Desert Renewable Energy Conservation Plan (DRECP) LUPA (see Section 1.6, Conformance with Land Use Plans, Laws, Regulations, and Policies).

Audubon takes a special interest in BLM's management of microphyll woodlands. As noted by Mark Dimmitt in *A Natural History of the Sonoran Desert*, "these woodlands occupy less than 5% of this subsection of the Sonoran Desert but support 90% of its bird life" (Dimmitt 2000). The importance of this desert habitat type is substantiated across biological disciplines and was supported throughout the DRECP stakeholder process by our organization and many others, who prioritized conservation and protections of this important vegetation assemblage and the CMA that protects it.

We focus our comments on the EA's treatment of microphyll woodlands in 2 alternatives: Alternative 2: Proposed Action; and Alternative 3: Land Use Plan Compliant Alternative. The Proposed Action Alternative suggests that a LUPA to the California Desert Conservation Area

Plan may be required to revise two CMAs of the DRECP. The EA reports that compliance with those CMAs would "limit developable land based on DRECP CMAs that protect desert dry wash woodland and establish a 200-foot buffer where no construction could occur."

BLM's decision on the Oberon project will set an important precedent for all future projects in the DRECP Plan Area. Choosing the Proposed Action of adopting a LUPA to the CDCA and revising CMA LUPA-BIO-RIPWET-1 and CMA LUPA-BIO-SVF-6 to remove protections for microphyll woodlands through allowing a 50' buffer rather than a 200' foot buffer as provided in the DRECP LUPA and Record of Decision (ROD) is setting a precedent that would encourage any Applicant to propose a LUPA to alter any CMA that may limit their development. This is a damaging precedent.

Audubon's geospatial analysis (Audubon analysis, attached) used data presented in the EA, specifically shape files of the project footprint along with the vegetation classification layer produced by the Applicant's consultant Ironwood. We found an additional impact of approximately 324 acres where project infrastructure could incur into the buffer zone of 200' from the microphyll woodland edge. This impact on microphyll woodlands of the Proposed Project Alternative has not been analyzed in the EA.

Should BLM adopt a LUPA to approve the project, it would allow an impact which has not been analyzed in the EA, potentially misuse a land use plan decision,[1] undermine the state and federal conservation partnership achieved through the DRECP[2], re-write the buffer zone from 200' to 50' with no scientific evidence, possibly force a recalculation of the amount of potential energy development in the Riverside East Development Focus Area (DFA)[3] and undermine the scientific integrity of the DRECP.

The EA underestimates the amount of microphyll woodlands present while at the same time overstating the minimization of impacts to microphyll woodlands from the Proposed Action.

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[1] "Land use plan decisions for public lands fall into two categories: desired outcomes (goals and objectives) and allowable uses (including restricted or prohibited) and actions anticipated to achieve desired outcomes (BLM 2005). In the DRECP LUPA, CMAs represent those management actions and allowable uses."

(DRECP BLM Land Use Plan Amendment, September 2016, p. 27

[2] "The Interagency Conservation Strategy also included biological Conservation Management Actions (CMAs). Those CMAs have been incorporated into the LUPA as Goals and Objectives." (DRECP Land Use Plan Amendment, p. 27)

[3] The CMAs would require avoidance with setback of all riparian vegetation types, specific wetland vegetation types, and managed wetlands in Imperial Valley. Therefore, these resources were assumed not to be impacted by renewable energy and transmission development. Unavoidable impacts to these resources may be permitted as described by the CMAs; however, the CMAs and existing regulations would require compensation for any unavoidable impacts such that no net loss of these resources would occur. (DRECP FEIS, p. IV.7-4)

The EA states:

> *The project would have a long-term impact to approximately 60 acres of microphyll woodland that would be developed with solar panels. If this disturbance is considered to be minor incursion by BLM, the project would comply with this CMA, because otherwise the solar panels, substation, and BESS have been designed to avoid desert dry wash woodland. If BLM determines that the impact does not qualify as minor incursion, then a LUPA would be required. (EA, p.7)*

We submit that that this may not be the decision before the BLM. The BLM decision whether to adopt a LUPA or not does not depend on whether the 60 acres are "minor incursions".

The proponent has proposed mitigation for the "unavoidable impacts" to 80+ acres (including the 60 acres) of microphyll woodlands. These are direct impacts and microphyll woodlands will be removed or covered with solar panels. We support this mitigation effort and BLM's finding that these are "unavoidable impacts" as the Applicant is proposing acres of higher quality microphyll woodlands than the woodlands of the unavoidable impacts, and the mitigation ratio is as required in the CMA of 5:1. Therefore we submit that the 80+ acres are not "minor incursions" as defined in the DRECP LUPA glossary.[4] BLM does not have to decide if these mitigated direct impacts are "minor incursions" which are well defined and not the characteristics of the mitigated direct impacts or "unavoidable impacts". However, BLM does have to measure, describe, and analyze the impacts to the buffer zone adopted in the DRECP LUPA of the Proposed Project. Again, BLM has failed to do this.

BLM must also determine whether these 324 additional acres of impact are "unavoidable impacts" which may be mitigated at 5:1, "minor incursions" as defined in the Glossary of the DRECP ROD, whether they are permanent such as fencing or panels or temporary such as construction activities, or not allowable at all under the CMA or some combination of these, and include this decision in the EA in choosing Alternative 3, the Compliance with the DRECP alternative.

The EA must provide credible scientific evidence and citations for the statements and rationale in the section titled Sensitive Vegetation Communities beginning on page 100 of the DEA. In this section it is unclear whether BLM is providing rationale or reciting an alternative proposal for conformance to the CMA by the Applicant. Although the process from the DRECP ROD for

[4] "Small-scale allowable impacts to sensitive resources, as per specific CMAs, that do not individually or cumulatively compromise the conservation objectives of that resource or rise to a level of significance that warrants development and application of more rigorous CMAs or a DRECP LUPA amendment. Minor incursions may be allowed to prevent or minimize greater resource impacts from an alternative approach to the activity. Not all minor incursions are considered unavoidable impacts." (DRECP LUPA, p. xviii)

the State Director to accept an alternative proposal from an Applicant is clearly described,[5] it's not clear whose rationale is being presented, in fact there are no scientific citations or evidence that any of the rationale has any merit whatsoever. The DRECP had a panel of Scientific Advisors and extensive input from a broad group of biologists, botanists and scientists from state and federal agencies; the rationale presented in the EA has none. Specifically, as per our organization, the identification and mapping of microphyll woodlands is the guiding science here rather than whether the project is in an Audubon Important Bird Area or not. The Audubon Important Bird Area program identifies areas with specific criteria, such as special status species which have been recorded or large congregations of birds or other data to define the boundaries for areas of high value for bird conservation. In general, all microphyll woodlands are important for birds even if special status species have not been recorded as present in a particular stand or string of microphyll woodland, as is the case with the project area.

BLM must correct this Sensitive Vegetation Communities section of the EA.

Additionally and finally, the EA fails to incorporate or report on a consultation with indigenous people of the Colorado River area of California and the impacts on the project on their use of microphyll woodlands. The plants, seeds, beans, and fruits of the ironwood, scrub mesquite, paloverde, and other plants in the desert dry washes may be important for collecting for cultural purposes, and if so, these values should be incorporated in the EA.

The Energy Act of 2020 (P.L. 116-260) requires DOI to permit 25 gigawatts of solar, wind, and geothermal production on public lands no later than 2025 and we support this goal. We also support the President's EO14008 which contained a goal of conserving 30% of America's lands and waters by 2030 and required federal agencies to compile the America the Beautiful report[6] and Governor Newsome's Executive Order N-82-20[7] directing conservation of 30% of our lands and water by 2030 to combat the climate crisis, conserve biodiversity and boost climate resilience.

BLM should incorporate these values and directives in their decision-making process as well as meeting clean energy goals to achieve the balance that our President, Governor, Department of the Interior and current leadership strives for.

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[5] "As part of subsequent project-specific NEPA analyses, a project proponent may be able to propose alternative methods for compliance with a particular CMA. The BLM California State Director will review such requests, in collaboration with USFWS, CEC, and CDFW, and may analyze, as appropriate, whether any proposed alternative approach or design feature to avoid, minimize, or mitigate impacts: (i) meets the goals and objectives for which the CMA was established, (ii) and provides for a similar or lesser environmental impacts. Such alternate methods would be addressed as part of any subsequent project-specific approvals. [DRECP LUPA page 228. See also page 63 of the DRECP ROD for similar language.]"

[6] https://www.doi.gov/sites/doi.gov/files/report-conserving-and-restoring-america-the-beautiful-2021.pdf

[7] https://www.gov.ca.gov/2020/10/07/governor-newsom-launches-innovative-strategies-to-use-california-land-to-fight-climate-change-conserve-biodiversity-and-boost-climate-resilience/

BLM should re-issue a supplemental EA or DEIS to correct these errors and omissions while working with the Applicant to design a project that conforms to the DRECP but may not provide 500 MW of development. The Proposed Action must be rejected if it can only be enacted through a Land Use Plan Amendment.

Thank you for the opportunity to comment.

Respectfully submitted,

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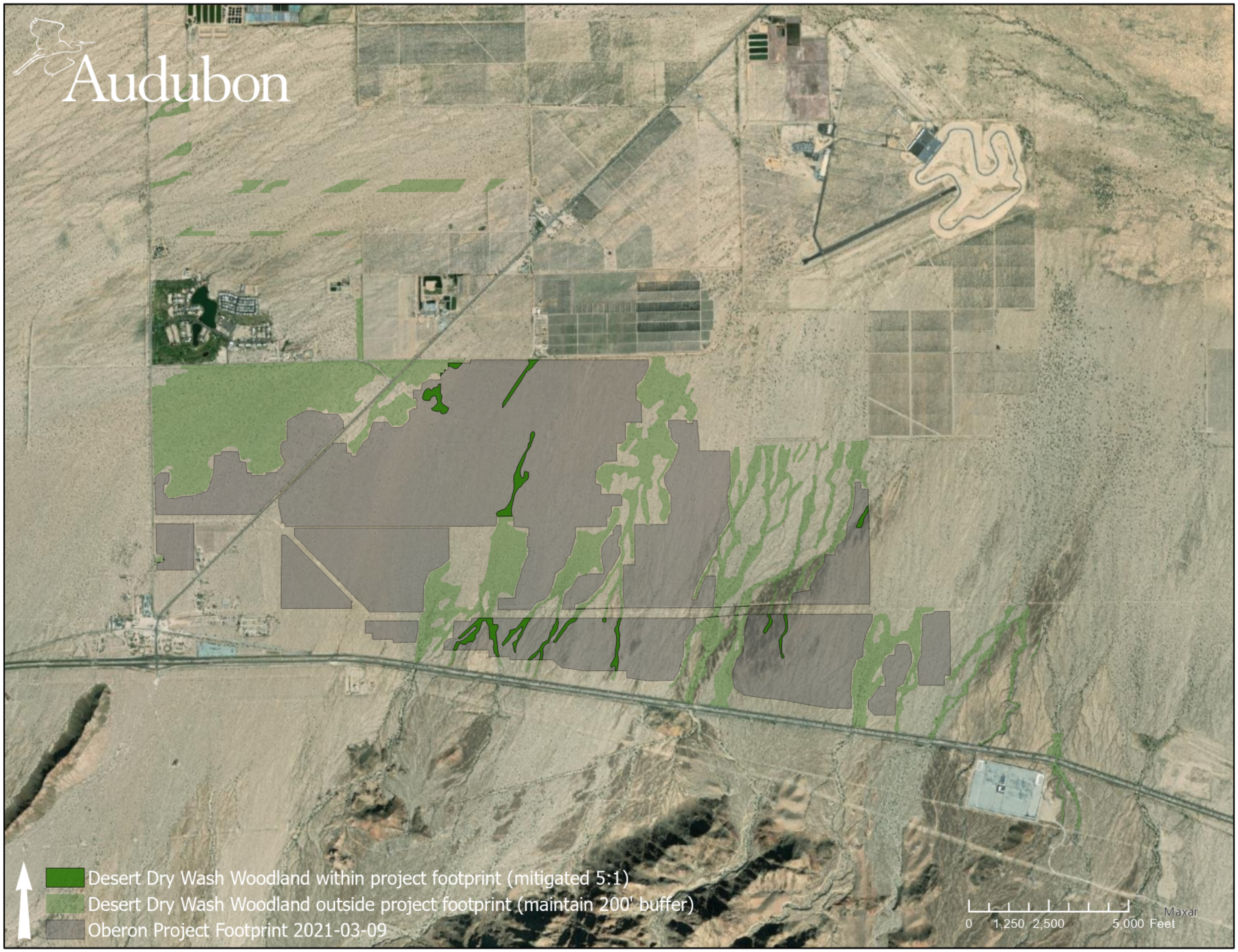
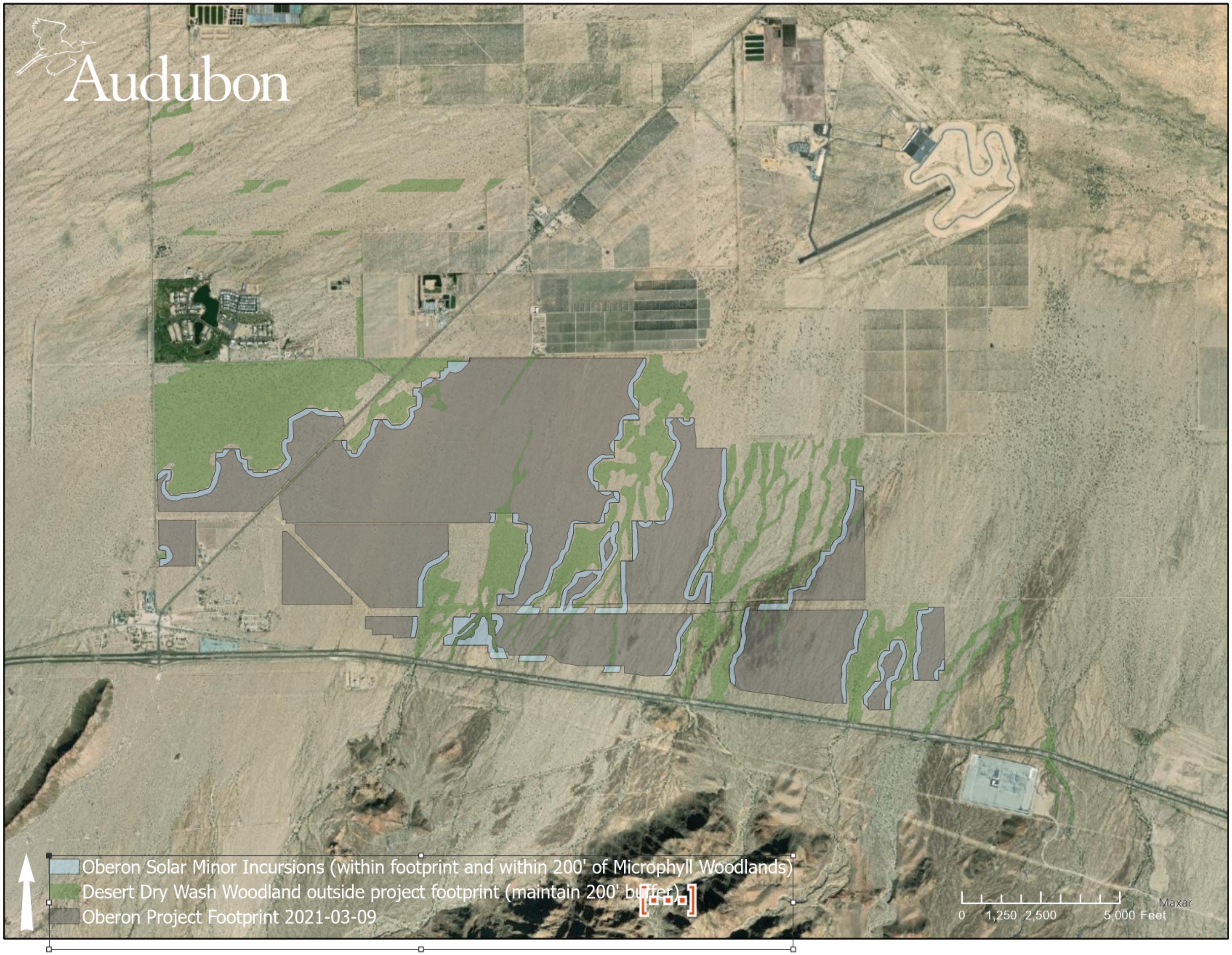
cc: Commissioner Karen Douglas, CEC
Director Check Bonham, California Department of Fish & Wildlife
Anthony Archuletta, Desert District Manager, BLM
Karen Mouritsen, State Director for California, BLM
Nada Culver, Interim Deputy Director, BLM

**Analysis of Oberon Solar Microphyll Woodland Incursions**

Assuming all direct impacts of microphyll woodland removal to install solar cell arrays within the proposed development footprint of the Oberon project would be mitigated at a 5:1 ratio, and that this is deemed sufficient by the BLM, vegetation removal and ground disturbance within the 200-foot buffer around these areas is no longer a minor incursion since the community being protected would no longer exist adjacent to the buffer. In Map 1 below, the loss of darker green areas would be compensated for by offsite mitigation and buffer areas around these areas are not mapped. However, there are still areas of incursion within the 200-foot buffer to the lighter green microphyll woodlands as proposed in the Proposed Action Alternative.

The light blue areas in Map 2 below are within the Proposed Action footprint as well as within 200 feet of microphyll woodlands. The total area of incursions is 324 acres.


Audubon
Desert Dry Wash Woodland within project footprint (mitigated 5:1)
Desert Dry Wash Woodland outside project footprint (maintain 200' buffer)
Oberon Project Footprint 2021-03-09
0 1,250 2,500 5,000 Feet
Maxar


Audubon
Oberon Solar Minor Incursions (within footprint and within 200' of Microphyll Woodlands)
Desert Dry Wash Woodland outside project footprint (maintain 200' buffer)
Oberon Project Footprint 2021-03-09
0 1,250 2,500 5,000 Feet
Maxar

**California Native Plant Society • California Wilderness Coalition**

**Center for Biological Diversity • Defenders of Wildlife • Sierra Club**

September 14, 2021

Brandon G. Anderson
Bureau of Land Management
1201 Bird Center Drive
Palm Springs, CA 92262
Sent via email to: BLM_CA_PS_OberonSolar@blm.gov, bganderson@blm.gov

Re: Oberon Solar Project Environmental Assessment

Dear Brandon:

Thank you for the opportunity to provide comments on Environmental Assessment (EA) for the proposed Oberon Renewable Energy Project (Oberon). Comments included in this letter are submitted by the California Native Plant Society (CNPS), California Wilderness Coalition (CalWild), Center for Biological Diversity (Center), Defenders of Wildlife (Defenders) and the Sierra Club.

CNPS is a statewide, non-profit organization dedicated to conserving California native plants and their natural habitats, and to increase the understanding, appreciation, and horticultural use of native plants. CNPS works closely with decision-makers, scientists, and local planners to advocate for well-informed policies, regulations, and land management practices. CNPS has more than 10,000 members in 35 chapters throughout California.

CalWild is a California non-profit conservation organization founded in 1976. CalWild works to protect and restore the state's wildest natural landscapes and watersheds on federal public lands. These important wild places provide clean air and water, refuges for wildlife, mitigation against the effects of climate change, and outstanding opportunities for recreation and spiritual renewal for people. We work with local communities to identify wild places that need protection, and then we build coalitions to support permanent protection for forests, mountains, rivers, deserts and other natural areas. CalWild has thousands of members in California.

The Center for Biological Diversity is a non-profit public interest organization with offices located across the country including offices in California, representing more than 1.7 million members and online activists nationwide dedicated to the conservation and recovery of species at-risk of extinction and their habitats.

Defenders is a national conservation organization founded in 1947 and dedicated to protecting all native animals and plants in their natural communities. To this end, we employ science, public education and participation, media, legislative advocacy, litigation, and proactive on-the-ground solutions to impede the accelerating rate of extinction of species, associated loss of biological diversity, and habitat alteration and destruction. Defenders has 2.2 million members in the U.S., including 323,000 in California.

The Sierra Club is a national nonprofit organization of approximately 2.5 million members and supporters dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives.

**Oberon Background**

Oberon is a proposed 500 MW photovoltaic electricity generating facility and related infrastructure located on approximately 2,700 acres of public land managed by the Bureau of Land Management (BLM) in a portion of the southwestern portion of the Chuckwalla Valley near Desert Center, CA, and within a Development Focus Area (DFA). Intersect Power has applied for a right of way grant from BLM for the construction and operation of Oberon.

The EA includes an effects analysis of the construction and operation of Oberon on the environment, including public lands and their resources. It also includes an analysis of the effects of a possible "...draft LUPA[1] to facilitate approval of the project." BLM decided to include the possible LUPA in the EA because one alternative in the EA (the applicant's proposed project), if ultimately approved by BLM, would require exempting Oberon from certain requirements in the 2016 Desert Renewable Energy Conservation Plan (DRECP), namely specific Conservation Management Actions or CMAs. Without exempting Oberon from compliance with certain CMAs, BLM determined that the 500 MW Project would not be able to be constructed.

To date, Oberon is one of three solar project applications in the DFA that are subject to all of the requirements and the CMAs in the DRECP. Oberon is unique because it is the first and only project where the applicant requested a right of way grant from BLM for a project that would not comply with the DRECP, and apparently decided that a fully-compliant project was not practicable.

**Comments on the EA**

Our organizations, individually and collectively, submit the following comments on the Oberon EA (Note: statements or text taken from the DRECP are shown in bold italic):

**1. Alternatives Analyzed in the EA**

We appreciate the inclusion of Alternative 3 and Alternative 4 in the Oberon EA, both of which fully conform to the DRECP and its CMAs. Alternative 3 (Land Use Plan Compliant Alternative) would result in a 375 MW solar project with a footprint of 2,100 acres that is intended to avoid development in sensitive habitats (i.e., microphyll woodland, protective buffers, wildlife corridors); and Alternative 4 (Resource Avoidance Alternative), would additionally avoid development in designated critical habitat for the threatened desert tortoise located north of Interstate 10, resulting in a project that would generate 300 MW with a footprint of 1,600 acres.

Alternative 2 (applicant's proposed project), would generate 500 MW with a project footprint of 2,700 acres. <u>It does not conform to the DRECP and its CMAs</u>. The EA does not include a reasonable justification why BLM determined that Alternative 2 deserved analysis. As Defenders and the California Wilderness Coalition stated in their Oberon scoping comment letter, the Record of Decision (ROD) for the DRECP stated, in part, ***BLM-authorized activities on public land must conform to the applicable land use plan. If the BLM receives an application for a project***

[1] LUPA is an acronym for Land Use Plan Amendment, referring to a possible amendment of the California Desert Conservation Area Plan of 1980 (as amended by the Desert Renewable Energy Conservation Plan).

***that does not conform to the land use plan, it may reject the application without additional analysis. If the BLM determines, however, that the proposal warrants further analysis, it must undertake a plan amendment, which includes a public process, as described in the land use planning regulations at 43 CFR 1610.2***.

The only reason BLM gave for deciding to analyze Alternative 2 was because it was the only alternative that would allow for a 500 MW solar project to be built and operate, which is what the applicant wanted. BLM had the authority to outright reject Intersect Power's 500 MW solar project application under both the DRECP ROD and its right-of-way regulations in 43 CFR 2800.

The BLM's right of way grant regulations, specifically 43 CFR 2801.2, requires, in part, that allowable uses of the public lands be done in a manner that: (a) Protects the natural resources associated with public lands and adjacent lands; (b) Prevents unnecessary or undue degradation to public lands; (c) Promotes the use of rights-of-way in common considering engineering and technological compatibility, national security, and land use plans (i.e., the California Desert Conservation Area Plan, as amended); and (d) Coordinates, to the fullest extent possible, all BLM actions with state and local governments and interested individuals.

The DRECP, including its CMAs, were developed over a period of approximately eight years by BLM in cooperation with the California Department of Fish and Wildlife (CDFW), California Energy Commission, U.S. Fish and Wildlife Service (USFWS), counties, and conservation organizations. Certain biological resources on the public lands within the DRECP area were identified as significant or sensitive, and warrant enhanced protection. Among those resources given enhanced protection within the Oberon project area are microphyll woodlands, their associated special status or sensitive species, desert tortoise critical habitat and a multi-species wildlife linkage.

Objective 1.4 of the DRECP is to ***Conserve unique landscape features, important landforms, and rare or unique vegetation types identified within the BLM Decision Area, including***:

- ***Desert riparian and wetland resources in the planning area, including riparian habitat (including microphyll woodlands), desert playas, and seeps/springs***.

It is important to understand the definition of Conserve: ***The term "conserve" (or "conservation") as used in the DRECP LUPA applies to the protection and management of resources and values BLM is managing with land allocations and CMAs. In the DRECP biological conservation strategy, this term is applied more narrowly to the protection and management of ecological processes, Focus and BLM Special Status Species, and vegetation types***.

It is clear that Alternative 2 is inconsistent with the DRECP, the ROD, the CMAs and BLM's right of way grant regulations. Accordingly, we recommend that BLM reject it when considering a final decision on Oberon. In addition, the significant adverse impacts associated with Alternative 2 would require further analysis under an Environmental Impact Statement for multiple reasons.

We provide additional comments on the manner in which Alternative 2 is inconsistent with the CDCA Plan (as amended by DRECP) under comments on CMAs.

**2. Applicable DRECP CMAs**

There are numerous DRECP CMAs associated with biological resources that are applicable to Oberon that are of primary importance to our organizations. Below, we identify each of those CMAs and describe whether or not Oberon complies with them.

A. ***LUPA-BIO-1: Conduct a habitat assessment (see Glossary of Terms) of Focus and BLM Special Status Species' suitable habitat for all activities and identify and/or delineate the DRECP vegetation types, rare alliances, and special features (e.g., Aeolian sand transport resources, Joshua tree, microphyll woodlands, carbon sequestration characteristics, seeps, climate refugia) present using the most current information, data sources, and tools (e.g., DRECP land cover mapping, aerial photos, DRECP species models, and reconnaissance site visits) to identify suitable habitat (see Glossary of Terms) for Focus and BLM Special Status Species. If required by the relevant species specific CMAs, conduct any subsequent protocol or adequate presence/absence surveys to identify species occupancy status and a more detailed mapping of suitable habitat to inform siting and design considerations. If required by relevant species specific CMAs, conduct analysis of percentage of impacts to suitable habitat and modeled suitable habitat.***

Based on our review of the Biological Resources Technical Report (BRTR) for Oberon, prepared by Ironwood Consulting under contract with Aspen Environmental Group, it is questionable if the delineation of microphyll woodlands was based on the most current, existing information, and specifically the 2013 inventory of DRECP vegetation communities.[2] As a result of this possible omission, the analysis of impacts in the Oberon EA on microphyll woodlands appears to significantly underestimate loss of this sensitive vegetation community under Alternative 2.

Using the inventory data for the microphyll woodland vegetation community in the 2013 inventory report,[3] Geographic Information System (GIS) scientists at the Center conducted an independent analysis of the effects of Oberon on microphyll woodland for Alternative 2. The results are presented in the following table along with corresponding acres of impact reported in the Oberon EA. The 2013 inventory of microphyll woodlands included each stand exceeding one acre in size and 90 feet in width as depicted on 1-meter resolution 2010 color National Agricultural Imagery Program imagery along with ancillary data and imagery sources.

| **Oberon Component** | **Acres of Microphyll Woodland within the Oberon Footprint** | | |
|---|---|---|---|
| | **BRTR** | **Center GIS Analysis** | **Notes** |
| Solar Panel Arrays | 56.53 | 140 | This difference may also result in inaccurate analysis of impacts to the required 200 foot setback or buffer for microphyll woodlands. |

2 Menke, J., E. Reyes, A. Glass, D. Johnson, and J. Reyes. 2013. 2013 California Vegetation Map in Support of the Desert Renewable Energy Conservation Plan. Final Report. Prepared for the California Department of Fish and Wildlife Renewable Energy Program and the California Energy Commission. Aerial Information Systems, Inc., Redlands, CA.
3 https://filelib.wildlife.ca.gov/Public/BDB/GIS/BIOS/Public_Datasets/700_799/ds735.zip

We recommend BLM perform an independent review of the impact analysis of Oberon on microphyll woodlands to determine if the EA needs to be revised based the 2013 vegetation community inventory completed specifically for use in the DRECP and subsequent impact analyses for activities proposed within the planning area, which was funded by BLM, CDFW and the California Energy Commission.

B. ***LUPA-BIO-3: Resource setbacks have been identified to avoid and minimize the adverse effects to specific biological resources. Setbacks are not considered additive and are measured as specified in the applicable CMA. Allowable minor incursions (see Glossary of Terms), as per specific CMAs do not affect the following setback measurement descriptions. Generally, setbacks (which range in distances for different biological resources) for the appropriate resources are measured from:***

- ***The edge of each of the DRECP desert vegetation types, including but not limited to those in the riparian or wetland vegetation groups (as defined by alliances within the vegetation type descriptions and mapped based on the vegetation type habitat assessments described in LUPA-BIO-1).***
- ***The edge of the vegetation extent for specified Focus and BLM sensitive plant species.***
- ***The edge of suitable habitat or active nest substrates for the appropriate Focus and BLM Special Status Species.***

The EA confirms that Oberon will not comply with this CMA, with this statement on page 10: *...the Applicant refined the development footprint to avoid desert dry wash woodland areas by imposing a minimum 50-foot and average of 134-foot (rather than 200-foot) buffer between such areas and the nearest solar panels. After the 50-foot buffer was imposed, the Applicant combined some of the nearby avoidance areas to create larger swaths of higher quality dry wash wood-land. To offset this acreage, less than 60 acres of the smaller "fingers" of DDWW were added to the solar panel development footprint*.

The applicant purposely chose to violate this CMA and substituted the required 200 foot setback or buffer with a 50 foot setback. Then, the applicant chose to place solar panels within the microphyll woodland to *offset* what it claims to have lost due to the requirements of the DRECP itself. The applicant clearly never intended to develop a project that complies with the DRECP. Again, we are pleased BLM developed Alternatives 3 and 4 and analyzed them in the EA, which demonstrates that a viable solar project can be developed in the Oberon application area that fully complies with the DRECP, although both would generate less electricity than what the applicant desires, 375 and 300 MW, respectively.

***C. LUPA-BIO-13: Implement the following CMA for project siting and design:***

***To the maximum extent practicable site and design projects to avoid impacts to vegetation types, unique plant assemblages, climate refugia as well as occupied habitat and suitable habitat for Focus and BLM Special-Status Species (see "avoid to the maximum extent practicable" in Glossary of Terms).***

In applying this CMA, it is essential to refer to the DRECP definition of maximum extent practicable, which is ***A standard that applies to implementation of activities. Under this***

***standard, implementation of the CMA is required unless there is no reasonable or practicable means of doing so that is consistent with the basic objectives of the activity***. Although Alternative 2 was reportedly designed to avoid microphyll woodland, it fails to comply with this CMA. In fact, Appendix C of the Oberon EA (Applicability of DRECP Conservation and Management Actions) states, *The Oberon Project will avoid impacts to unique plant assemblages and climate refugia to the extent practicable*. We call attention to omission of the term "maximum." Further, EA Appendix C states, *The Oberon Project would maximize retention of microphyll woodlands to the extent feasible*.

***The siting of projects along the edges (i.e. general linkage border) of the biological linkages identified in Appendix D (Figures D-1 and D-2) will be configured (1) to maximize the retention of microphyll woodlands and their constituent vegetation type and inclusion of other physical and biological features conducive to Focus and BLM Special Status Species' dispersal, and (2) informed by existing available information on modeled focus and BLM Special Status Species habitat and element occurrence data, mapped delineations of vegetation types, and based on available empirical data, including radio telemetry, wildlife tracking sign, and road-kill information. Additionally, projects will be sited and designed to maintain the function of Focal and Special Status Species connectivity and their associated habitats in the following linkage and connectivity areas:***

- ***Within a 1.5-mile-wide linkage across Interstate 10 to connect the Chuckwalla Mountains to the Chuckwalla Valley east of Desert Center***.

Appendix C of the EA addresses this CMA as follows: *The eastern area of the Oberon Project partially overlaps the 1.5-mile-wide linkage to connect the Chuckwalla Mountains and the Chuckwalla Valley. The Applicant is coordinating with the BLM to maintain the connectivity function and associated habitat including microphyll woodland in that area. The Applicant has redesigned the solar facility to pull panels out of microphyll woodland in the wildlife corridor area and is proposing installation of fencing that would allow desert tortoise movement throughout the area during operation. The Oberon Project would maximize retention of microphyll woodlands to the extent feasible. The avoidance of microphyll woodland in the eastern project area maintains a portion of the wildlife linkage*.

The Center's GIS analysis of the impact of Alternative 2 in the Oberon EA revealed that approximately 325 acres of the DRECP multi-species wildlife linkage would be lost due project facilities. This loss is the result of Alternative 2 failing to site project facilities along the edge of the identified linkage. In addition, the applicant failed to recognize that the 1.5-mile-wide linkage is not limited to just microphyll woodland, but all native plant communities that constitute the linkage, including the more widespread Sonoran Creosote Bush Scrub.

***D. LUPA-BIO-RIPWET-1: The riparian and wetland DRECP vegetation types and other features listed in Table 17 will be avoided to the maximum extent practicable, except for allowable minor incursions (see Glossary of Terms for "avoidance to the maximum extent practicable" and "minor incursion") with the specified setbacks.***

- ***Sonoran-Coloradan Semi-Desert Wash Woodland Scrub 200 feet***

***For minor incursion into the DRECP riparian vegetation types, wetland vegetation types, or encroachments on the setbacks listed in Table 17, the hydrologic function of the avoided riparian or wetland communities will be maintained.***

- ***Minor incursions in the riparian and wetland vegetation types or other features including the setbacks listed in Table 17 will occur outside of the avian nesting season, February 1 through August 31 or otherwise determined by BLM, USFWS and CDFW if the minor incursion(s) is likely to result in impacts to nesting birds***.

The Oberon EA ignores the DRECP mandate to avoid impacts to microphyll woodlands and simply states that ...*direct and indirect impacts to habitat would be minimized through habitat compensation and revegetation, pre-construction surveys, management plans, and construction crew training*. The DRECP allowed for minor incursions only, which are defined as ***Small-scale allowable impacts to sensitive resources, as per specific CMAs, that do not individually or cumulatively compromise the conservation objectives of that resource or rise to a level of significance that warrants development and application of more rigorous CMAs or a DRECP LUPA amendment. Minor incursions may be allowed to prevent or minimize greater resource impacts from an alternative approach to the activity. Not all minor incursions are considered unavoidable impacts***."

In applying this CMA, it is essential to consider the DRECP definition of Unavoidable Impacts to Resources: ***Small-scale impacts to sensitive resources, as allowed per specific CMAs, that may occur even after such impacts have been avoided to the maximum extent practicable (see definition). Unavoidable impacts are limited to minor incursions (see definition), such as a necessary road or pipeline extension across a sensitive resource required to serve an activity***. It is clear that the definition of minor incursions was intended to include infrastructure necessary to allow a solar project to be functional which, for Oberon and any other project, includes access roads, gen-tie or other linear facilities, and not the solar generating facility itself.

The EA states, *While the Applicant designed the project to minimize impacts to woodland areas, the project, as proposed, may not comply with the requirement for a 200-foot setback along such areas and if so would require a LUPA to the CDCA Plan, as amended*. The applicant chose to ignore the DRECP CMA designed to avoid loss of microphyll woodland and the associated 200 foot protective buffer by designing a project that would result in the direct loss of approximately 60 acres of microphyll woodlands and approximately 349 acres of the 200 foot buffer due to photovoltaic solar panels. These impacts do not meet the definition of minor incursions, which are small-scale residual impacts allowed to occur only if there is no reasonable or practicable means to avoid the subject resource, which is addressed in the DRECP definition of unavoidable impacts and avoiding impacts to the maximum extent practicable. Photovoltaic solar panels are modular and can be configured to avoid sensitive areas.

Page 7 of the Oberon EA states, *If this disturbance* [placement of solar panels into microphyll woodland] *is considered to be minor incursion by BLM, the project would comply with this CMA, because otherwise the solar panels, substation, and BESS have been designed to avoid desert dry wash woodland. If BLM determines that the impact does not qualify as minor incursion, then a LUPA would be required*." It appears BLM has yet to make a determination if the loss of 60 acres of microphyll woodland and 349 acres of its buffer constitute a minor incursion, or that this is an unresolved issue because the EA was prepared by a contractor and not BLM staff. We argue it is not a minor incursion because it is fully avoidable.

In addition, the impact analysis for the DRECP in the Final Environmental Impact Statement (FEIS) concluded that all microphyll woodlands, including their 200 foot protective setbacks or buffers, would remain protected due to CMAs that allowed for only minor incursions. As a result, the FEIS concluded there would be no loss of or impact to microphyll woodlands. For microphyll woodlands, the DRECP LUPA FEIS states, *Impacts to the dune, riparian, arid west freshwater emergent marsh, and Californian warm temperate marsh/seep would be avoided through implementation of CMAs*. (FEIS p. IV.7-142). Further, the FEIS states, *...impacts to riparian vegetation would not occur under the Preferred Alternative since application of the CMAs would require that riparian vegetation be avoided to the maximum extent practicable in DFAs. In addition, setbacks from riparian vegetation would be required that range from 200 feet for Madrean warm semi-desert wash woodland/scrub, Mojavean semi-desert wash scrub, and Sonoran-Coloradan semi-desert wash woodland/scrub to 0.25 mile for Southwestern North American riparian evergreen and deciduous woodland and Southwestern North -American riparian/wash scrub*. (FEIS p. IV.7-172).

### E. *LUPA-BIO-SVF-6: Microphyll woodland: impacts to microphyll woodland (see Glossary of Terms) will be avoided, except for minor incursions (see Glossary of Terms).*

In applying this CMA, we found it is critical to keep definitions of key terms in mind, as they are often interdependent. Key terms relative to microphyll woodland CMAs are:

<u>Microphyll woodland</u>: *Synonymous with desert dry wash woodland or Sonoran-Coloradan semi-desert wash woodland/scrub. Drought-deciduous, small-leaved trees occurring in bajadas and washes where water availability is somewhat higher than the plains occupied by creosote bush and has been called the "riparian phase" of desert scrub. Composed of the following alliances: desert willow, mesquite, smoke tree, and the blue palo verde-ironwood.*

<u>Minor incursions</u>: *Small-scale allowable impacts to sensitive resources, as per specific CMAs, that do not individually or cumulatively compromise the conservation objectives of that resource or rise to a level of significance that warrants development and application of more rigorous CMAs or a DRECP LUPA amendment. Minor incursions may be allowed to prevent or minimize greater resource impacts from an alternative approach to the activity. Not all minor incursions are considered unavoidable impacts*.

<u>Buffer or Setback</u>: *A defined distance, usually expressed in feet or miles, from a resource feature (such as the edge of a vegetation type or an occupied nest) within which an activity would not occur. The purpose of the buffer or setback is to maintain the function and value of the resource features identified in the DRECP LUPA CMAs.*

Based on the analysis in the EA, Alternative 2 would not comply with this CMA because it would result in the loss of 60 acres of microphyll woodland (140 acres using the Center's GIS analysis) and 349 acres of the designated setback or buffer that do not meet the definition of a minor incursion.

**F. *LUPA-BIO-SVF-1: For activity-specific NEPA analysis, a map delineating potential sites and habitat assessment of the following special vegetation features is required: Yucca clones, creosote rings, Saguaro cactus, Joshua tree woodland, microphyll woodland, Crucifixion thorn stands. BLM guidelines for mapping/surveying cactus, yuccas, and succulents shall be followed.***

Although the Oberon BRTR included the results of an inventory of microphyll woodland, which was used in the impact analysis, an independent analysis by the Center using the 2013 vegetation community inventory completed specifically for use in the DRECP showed that 140 acres of microphyll woodland would be lost under Alternative 2 compared to 60 acres using the inventory from the BRTR. We recommend that BLM perform an independent assessment of the effects of Alternative 2 on microphyll woodland, including its 200 foot protective buffer or setback, to determine the accuracy of the impact analysis in the EA.

**G. *LUPA-CUL-11: Promote and protect desert microphyll woodland vegetation type/communities to ensure Native American cultural values are maintained.***

Regarding this cultural CMA, Appendix C of the Oberon EA states, *The Oberon Project will avoid microphyll woodland where feasible. The project will comply with this CMA*. Avoiding microphyll woodland only where feasible does not equate to promoting and protecting this sensitive vegetation community. As noted elsewhere in our comment letter, the DRECP requires avoiding this resource to the maximum extent practicable.

**3. Detailed Comments on Impacts of Oberon on Wildlife Linkages and Connectivity**

The Oberon EA fails to adequately analyze and mitigate impacts to the multi-species wildlife linkage and connectivity. Wildlife connectivity corridors and linkages are place-based areas that are often unmitigable if impacts occur in them (Spencer et al. 2010). The DRECP identified and established three wildlife connectivity corridors/linkages, two of them within the boundaries of the Riverside-East DFA (See Figure 1, taken from DRECP LUPA/FEIS, Appendix H-1).

Oberon is located partially within the most westerly wildlife connectivity corridor. Figure 1 shows the overlap of the proposed Oberon project's solar array field into the BLM-designated Wildlife Connectivity Corridor. The EA fails to identify the impact to the multi-species linkage from the proposed project. Based on GIS layers from the DRECP, the fenced solar arrays cover 325 acres of the multi-species linkage. In addition, it fragments the linkage, making the linkage less functional for wildlife to move unimpeded through it (Ibid). We recommend that the EA be revised to fully analyze impacts to the multi-species linkage and comply with the DRECP.

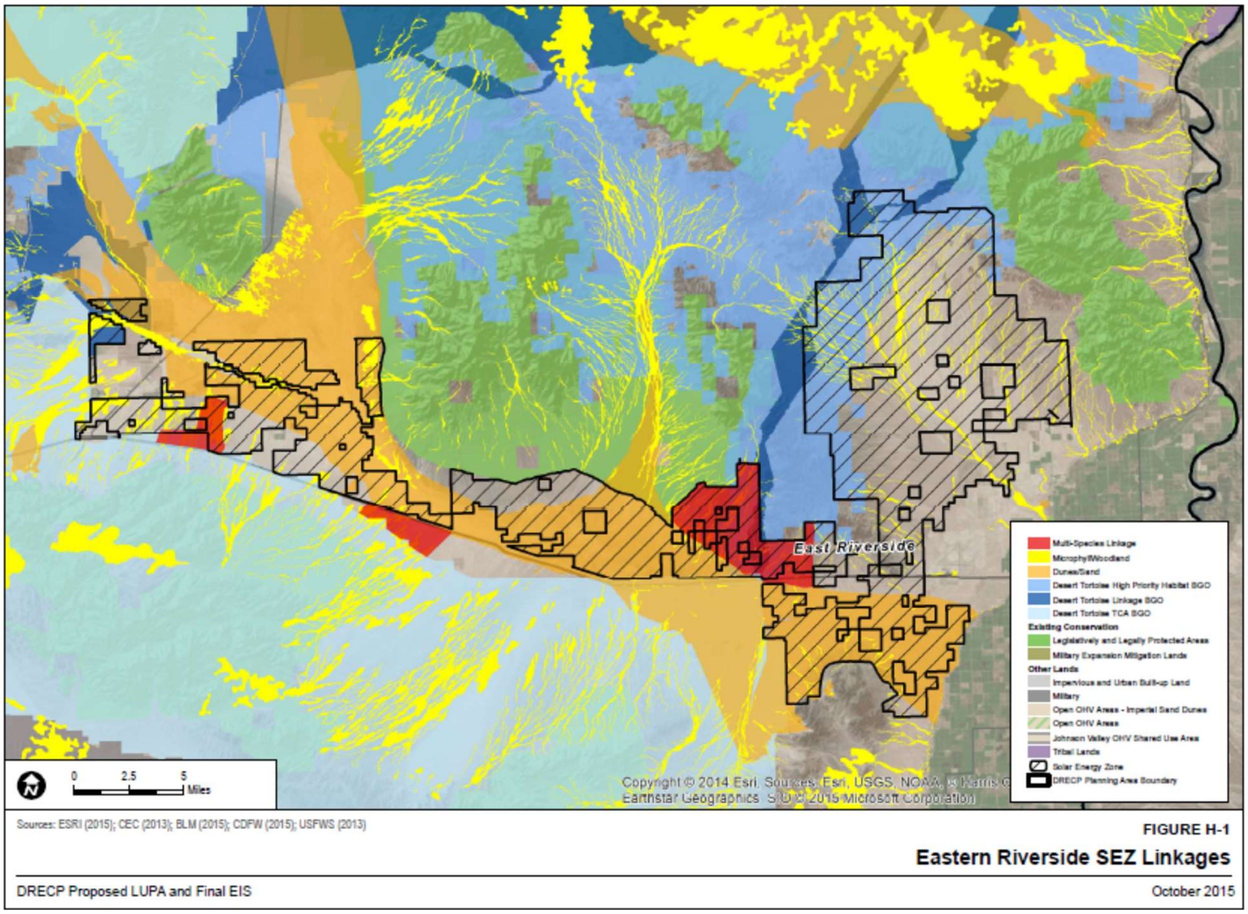



**Figure 1. BLM-designated multi-species wildlife linkages (shown in red) in DRECP LUPA/FEIS.**

The Oberon EA Figure 2-1 identifies the location of the proposed gen-tie from the project to the Red Bluff substation. However, it fails to identify that most of the gen-tie will be routed through the multi-species linkage, an impact that is analyzed in the EA in the context of only construction and avian impacts from collisions. Both the gen-tie towers and lines as well as the array fencing provide new perching opportunities for predatory birds (Barrows et al. 2006). This impact is not identified or analyzed in the EA. Nor is the option of co-locating the project gen-tie with the Eagle Crest gen-tie identified in the EA.

The EA states in Table C-1, pp. 7-8:

*The eastern area of the Oberon Project partially overlaps the 1.5-mile-wide linkage to connect the Chuckwalla Mountains and the Chuckwalla Valley. The Applicant is coordinating with the BLM to maintain the connectivity function and associated habitat including microphyll woodland in that area. The Applicant has redesigned the solar facility to pull panels out of microphyll woodland in the wildlife corridor area and is proposing installation of fencing that would allow desert tortoise movement throughout the area during operation. The Oberon Project would maximize retention of microphyll woodlands to the extent feasible. The avoidance of microphyll woodland in the eastern project area maintains a portion of the wildlife linkage.*

The EA fails to recognize that the BLM's designation is a multi-species linkage, yet it focuses on desert tortoise movement, while many other rare and common terrestrial and aerial species also rely on this linkage area for movement and use it in different ways. As noted previously, the EA assumes the multi-species linkage is based only on microphyll woodlands in washes, which is incorrect.

More importantly, the DRECP was carefully crafted to retain wildlife connectivity through the Riverside-East DFA to address species needs as climate change progresses, maintain genetic connectivity and reduce inbreeding caused by habitat fragmentation. The DRECP LUPA/FEIS states: *Figure H-1 depicts the wildlife linkages in the Eastern Riverside SEZ/DFA that are required to implement CMA LUPA-BIO-13*.

The EA fails to adequately address measures to maintain the function of the multi-species linkage. Simply ...*coordinating with the BLM to maintain the connectivity function and associated habitat* (EA, Appendix C, Table C-1 pp. 7-8) fails to ensure the functionality of this multi-species wildlife corridor over the long-term. BLM must ensure that the function of this important multi-species corridor is retained, must require changes in the proposed project layout to remove infrastructure from the multi-species linkage and must fully analyze the new proposal.

Figure 2.2 in Appendix B of the Oberon EA is troubling because it reveals the potential extent of cumulative impacts from other existing and proposed renewable energy projects in the western Chuckwalla Valley. One of those is the Easley Project, proposed by Intersect Power, which is also the proponent of Oberon. The Easley Project is located just to the north of the Athos and Victory Pass projects. Victory Pass would impact the multi-species linkage by placing solar arrays within the linkage. The Athos project, which is not on BLM-managed land and is currently under construction, has already constricted over half of the northern part of the linkage on the west. The proposed Easley project's southern or northern areas have the potential to block the northern part of the linkage, thereby completely eliminating the functionality of the multi-species linkage. BLM must comply with the DRECP and maintain the wildlife linkages and analyze all the known direct, indirect and cumulative impacts to the multi-species wildlife linkage.

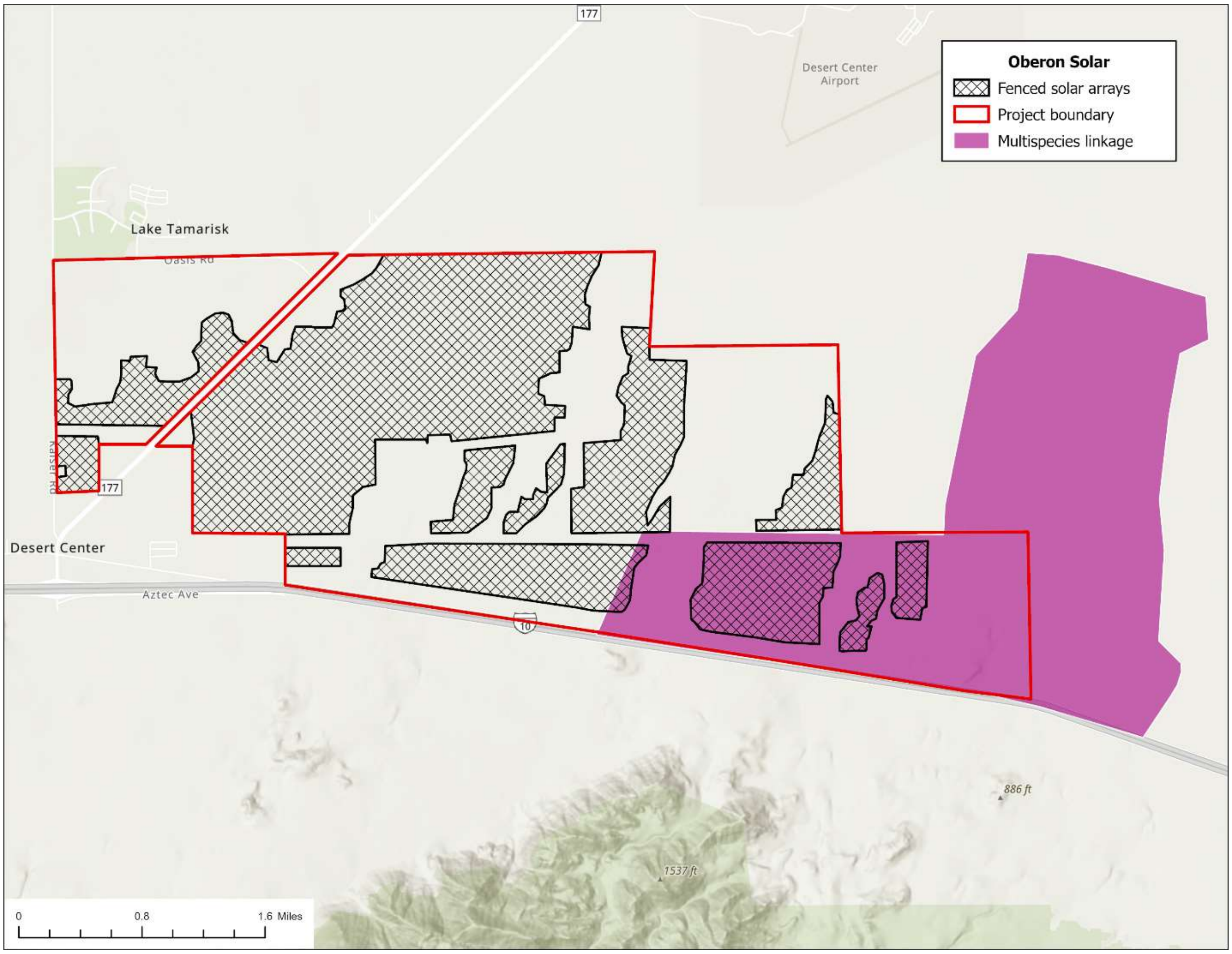



**Figure 2. Proposed Oberon Project's overlap with BLM-designated Multi-species Linkage in the Riverside-East DFA.**

## 4. Appendix C: Applicability of DRECP Conservation and Management Actions

The Oberon EA Appendix C includes statements that are misleading, incorrect or subjective. It is unclear if these defects originated with the Oberon applicant or proponent or the consultant that prepared the EA. We recommend BLM correct these defective statements in Appendix C, which are as follows:

A. *IP Oberon, LLC, the Applicant, has designed the Oberon Renewable Energy Project (project) to conform to the Desert Renewable Energy Conservation Plan (DRECP) Conservation and Management Actions (CMAs) and proposes to employ applicable construction- and operation-phase CMAs identified in the DRECP Record of decision (ROD) on U.S. Bureau of Land Management (BLM)-administered lands*.

The applicant's version of Oberon, Alternative 2, does not conform to the DRECP and its CMAs. If this statement were true, then Alternative 2 and Alternative 3 would be essentially the same, but they are not. This becomes evident upon further reading of Appendix C, Table C-1, which lists the applicable CMAs.

LUPA-BIO-3/ Resource Setback Standards: *The project cannot comply with this CMA, because Sonoran-Coloradan Semi-Desert Dry Wash Woodland occurs throughout the project site making complete avoidance of its buffer area infeasible. The project's direct impacts to desert dry wash woodland by solar panels is approximately 60 acres and in places the project extends into the required 200-foot buffer under LUPA-BIO-RIPWET-1, so the Applicant is seeking a Land Use Plan Amendment, if required*.

A correct and factual response would have been that Oberon **does not comply with this CMA**. Further, the Sonoran-Coloradan Semi-Desert Dry Wash Woodland community (microphyll woodlands) **does not** occur throughout the project site. According to the BRTR, Figure 5, Vegetation Communities, the most abundant vegetation community within Oberon Survey Area A (corresponding to the revised right of way application area) is Sonoran Creosote Bush Scrub, totaling 3,679 acres. Within Survey Area A, Dry Desert Wash Woodland (synonymous with microphyll woodlands) totals 1,182 acres, or approximately 1/3rd the area occupied by Sonoran Creosote Bush Scrub.

Based on an analysis performed by the Center's staff GIS experts (previously described), Oberon Alternative 2 overlaps 140 acres of microphyll woodland and 349 acres of the required 200 foot setback or buffer for microphyll woodlands with solar panel arrays.

LUPA-BIO-13/General Siting and Design: *The Oberon Project will avoid impacts to unique plant assemblages and climate refugia to the extent practicable. The eastern area of the Oberon Project partially overlaps the 1.5-mile-wide linkage to connect the Chuckwalla Mountains and the Chuckwalla Valley*.

LUPA-BIO-13 requires avoiding impacts to **maximum extent practicable**, not simply to the extent practicable, the latter of which is not used or defined in the DRECP.

LUPA-BIO-RIPWET-1/Riparian and Wetland Vegetation Type CMAs: *The riparian vegetation type on the Oberon site is Sonoran-Coloradan Semi-Desert Wash Woodland (mapped as desert dry wash woodland). It will be avoided where feasible. The Applicant has coordinated with BLM to develop and analyze a solar field layout alternative that is consistent with allowable minor incursion (see Glossary of Terms), and hydrologic function will be maintained.*

*The project cannot achieve a 200 foot setback across the entire site, because Sonoran-Coloradan Semi-Desert Wash Woodland occurs throughout the project site making complete avoidance of its buffer area infeasible. The Applicant is seeking a Land Use Plan Amendment, as needed*.

This CMA requires that microphyll woodland and its associated 200 foot protective setback or buffer be avoided to the **maximum extent practicable**. It would be more accurate to state that Oberon **does not comply** with this CMA. Based on the DRECP definition of maximum extent practicable and minor incursion, the loss of 140 acres of microphyll woodland and 349 acres of the buffer are not minor incursions. The definition of minor incursion in the DRECP is ***Small-scale allowable impacts to sensitive resources, as per specific CMAs, that do not individually or cumulatively compromise the conservation objectives of that resource or rise to a level of significance that warrants development and application of more rigorous CMAs or a DRECP LUPA amendment. Minor incursions may be allowed to prevent or minimize greater***

***resource impacts from an alternative approach to the activity. Not all minor incursions are considered unavoidable impacts***.

Microphyll woodland does not occur throughout the project site. As noted above, it occupies approximately 1/3rd of Study Area A where Oberon is located, or 1,182 acres.

LUPA-BIO-RIPWET-3/BLM Special Status Riparian Bird Species: *The Applicant will perform a pre-construction/activity nesting bird survey and will establish setbacks as necessary*.

For Oberon, this CMA requires surveys in microphyll woodlands that are within 0.25 mile of any project activity that has the potential to disrupt the nesting activity of Special Status Species of bird. If such bird species are found to be nesting, a 0.25 mile setback or buffer will be established where no activities are allowed that would disrupt nesting from February 1-August 31. Compliance with this CMA appears to be based on compliance with other CMAs that require avoidance of project facilities within microphyll woodlands and the 200 foot protective setback or buffer, except for minor incursions. We recommend BLM address this potential issue in a revised EA after conferring with CDFW.

LUPA-BIO-SVF-6/Avoidance of microphyll woodland except for minor incursions: *The Applicant will coordinate with BLM to develop and analyze solar field layout alternatives for consistency with allowable minor incursion (see Glossary of Terms). Hydrologic function will be maintained.*

*The panels have been designed to avoid desert dry wash woodland with the exception less than 60 acres of solar panel development in areas deemed to have little or no residual habitat value. If BLM determines that the small impact does not qualify as minor incursion, then a Land Use Plan Amendment would be required*.

Our comment on this CMA is addressed above. Additionally, it appears by this statement that the project description is not clear and finite as required.

LUPA-BIO-IFS-1: Individual Focus Species (IFS)/Desert Tortoise: Activities within desert tortoise linkages identified in DRECP Appendix D: *The eastern area of the southern parcel of the Oberon Project partially overlaps a 1.5-mile-wide wildlife linkage to connect the Chuckwalla Mountains and the Chuckwalla Valley... The Applicant is coordinating with the BLM to maintain the connectivity function and associated habitat including microphyll woodland in that area. The Applicant has redesigned the solar facility to pull panels out of microphyll woodland in the wildlife linkage area...*

In the DRECP, this CMA includes additional details and requirements: ***Activities that would compromise the long-term viability of a linkage population or the function of the linkage, as determined by the BLM in coordination with USFWS and CDFW, are prohibited and would require reconfiguration or re-siting***. The applicant coordinating with the BLM in response to this CMA is misplaced. It is BLM's responsibility to determine if Oberon will compromise the long-term viability of both the desert tortoise population utilizing the linkage and the linkage function, in coordination with CDFW and the USFWS.

LUPA-CUL-11/Promote and protect desert microphyll woodland vegetation type/communities to ensure Native American cultural values are maintained: *The intent of this*

*CMA is accomplished through compliance with NEPA, EX13175, EX13007 and all other applicable laws, regulations, and policies. The Oberon Project will avoid microphyll woodland where feasible.*

Oberon fails to meet this standard because it will not avoid microphyll woodlands to the maximum extent practicable.

**5. Impacts to BLM-designated Wildlife Habitat Management Areas**

Even after the DRECP amendment to the CDCA Plan was adopted, some aspects of the previous 2002 Northern and Eastern Colorado Desert (NECO) Plan Amendment to the CDCA Plan remain in effect. Under the NECO Plan Amendment, Wildlife Habitat Management Areas (WHMAs) *...address other special status species and habitat management* (NECO Plan Amendment at 2-2). The NECO Plan Amendment also states that *The existing restricted areas, DWMAs* [Desert Wildlife Management Areas for desert tortoise conservation] *and WHMAs form the Multi-species Conservation Zone* (NECO Plan Amendment at 2-2) which is the conservation basis of the plan amendment. Oberon overlaps one multi-species WHMA that connects the Palen and Mule Mountains, and the DWMA Continuity WHMA. Management emphasis for the multi-species WHMA is on active management of specific species and habitats mitigation, and restoration from authorized allowable uses. The DWMA Continuity WHMA is designed to provide for desert tortoise connectivity from the Chuckwalla Mountains to suitable habitat to the north and extending under I-10. The overlap and impacts of Oberon on these WHMAs are not addressed in the EA. The NECO Plan Amendment goals and objectives for *Other Special Status Animal and Plant Species, Natural Communities, and Ecological Processes* are very specific and focus on conservation. The goals for special status animal and plant species, natural communities, and ecological processes are as follows:

- Plants and Animals: *Maintain the naturally occurring distribution of 28 special status animal species and 30 special status plant species in the planning area. For bats, the term "naturally occurring" includes those populations that might occupy man-made mine shafts and adits.*
- Natural Communities: *Maintain proper functioning condition in all natural communities with special emphasis on communities that a) are present in small quantity, b) have a high species richness, and c) support many special status species.*
- Ecological Processes: *Maintain naturally occurring interrelationships among various biotic and abiotic elements of the environment.*

The corresponding objectives (NECO Plan at 2-52) are to:

- *Protect and enhance habitat*
- *Protect connectivity between protected natural communities*

Further, the NECO Plan Amendment adopted action items to promote the plan objectives, including to *Protect and enhance habitat* (NECO Plan at 2-55), and *Protect connectivity between protected communities* (NECO Plan at 2-58). See also NECO Plan Amendment ROD at D-1, D-3.

For the plan objective to *Protect and enhance habitat*, the first action required was to:

- *Designate seventeen multi-species WHMAs (totaling 555,523 acres) such that approximately 80 percent of the distribution of all special status species and all natural community types would be included in the Multi-*

*species Conservation Zone (NECO Plan, Appendix A, Map 2-21). See Appendix H for a description of the process used to define the WHMA and the concept of conservation zones*. (NECO Plan at 2-55)

For the second objective, to *Protect connectivity*, one of the actions required was:

- *The fragmenting effects of projects should be considered in the placement, design, and permitting of new projects.*" (NECO Plan at 2-58)

Other relevant actions required include:

- *Require mitigation of impacts of proposed projects in suitable habitat within the range of a special status species and within natural community types using commonly applied mitigation measures and conduct surveys in the proposed project area for special status species as follows (also see range maps 3-6a-f and 3-7a-f Appendix A).* (NECO Plan Amendment at 2-55)

Thus, under the NECO Plan Amendment, the impacts to multi-species WHMAs, and to sand, playa and Mojave fringe-toed lizard habitat, should be avoided. The Oberon EA does not mention, much less analyze, impacts to the WHMAs as required by the NECO Plan Amendment. We recommend BLM prepare a revised EA that addresses impacts of Oberon on the NECO Plan WHMAs and required actions to achieve plan goals and objectives.

**6. The Analysis of Cumulative Impacts in the DEA Is Inadequate**

A cumulative impact is ...*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. The Ninth Circuit Court rulings require federal agencies to *catalogue* and provide useful analysis of past, present, and future projects. *City of Carmel-By-The-Sea v. U.S. Dept. of Transp.*, 123 F.3d 1142, 1160 (9th Cir. 1997); *Muckleshoot Indian Tribe v. U.S. Forest Service*, 177 F.3d 800, 809-810 (9th Cir. 1999).

*In determining whether a proposed action will significantly impact the human environment, the agency must consider '[w]hether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment.' 40 C.F.R. § 1508.27(b)(7).*" *Oregon Natural Resources Council v. BLM*, 470 F.3d 818, 822-823 (9th Cir. 2006). NEPA requires that cumulative impacts analysis provide *some quantified or detailed information*, because *"[w]ithout such information, neither courts nor the public . . . can be assured that the Forest Service provided the hard look that it is required to provide*." *Neighbors of Cuddy Mountain v. United States Forest Service*, 137 F.3d 1372, 1379 (9th Cir. 1988); *see also id*. (*very general* cumulative impacts information was not the hard look required by NEPA).

The discussion of future foreseeable actions requires more than a list of the number of acres affected, which is a necessary but insufficient component of a NEPA analysis; the action agency must also consider the actual environmental effects that can be expected from the projects on those acres. See *Klamath-Siskiyou Wildlands Ctr. v. BLM*, 387 F.3d 989, 995-96 (9th Cir. 2004) (finding that the environmental review documents "*do not sufficiently identify or discuss the incremental impact that can be expected from each [project], or how those individual impacts might combine or synergistically interact with each other to affect the environment. As a result, they do not satisfy the requirements of the NEPA*.). Finally, cumulative impact analysis must be done as early in the environmental review process as possible, it is not appropriate to "*defer consideration of cumulative impacts to a future date. NEPA requires consideration of the potential impacts of an action before the action takes place*. *Neighbors*, 137 F.3d at 1380 *quoting City of Tenakee Springs v. Clough*, 915 F.2d 1308, 1313 (9th Cir. 1990) (emphasis in original).

The DEA fails to adequately identify the numerous cumulative projects and does not meaningfully analyze the cumulative impacts to resources in the California Desert Conservation Area from the many proposed projects (including renewable energy projects and others). Moreover, because the initial identification and analysis of impacts is incomplete, the cumulative impacts analysis cannot be complete.

**Conclusion**

Oberon is the first of three proposed solar energy projects within the East Riverside DFA that is fully subject to the DRECP and its CMAs. Unfortunately, Intersect Power, the applicant for a right of way grant for the project, designed Oberon in a manner that does not comply with the DRECP and its CMAs. Intersect Power attempted to persuade BLM that it complied with the intent of the DRECP CMAs by indicating, for example, that it designed Oberon to avoid microphyll woodlands to the extent it considered *feasible* or *practicable*, rather than to meet the DRECP CMA requirement to avoid this sensitive natural community to the *maximum extent practicable*.

Fortunately, BLM developed Alternative 3 and Alternative 4 to Intersect Power's proposed project, both of which comply with the DRECP CMAs, demonstrating that they are both feasible and practicable, contrary to Intersect Power's position. Further, Intersect Power appeared unwilling to propose or consider a project generating anything less than 500 MW, suggesting it had made premature commitments for a minimum amount of power generation prior to completion of the environmental review and final decision for the proposed project by the BLM. Based on our review of the EA, the DRECP and its CMAs and other legal and regulatory requirements, Intersect Power's proposed Oberon would result in impacts that would prevent BLM from making a Finding of No Additional Significant Impact, and requiring the preparation of an Environmental Impact Statement and proposed amendments to the DRECP.

We strongly encourage BLM to uphold the provisions of the DRECP and only consider and approve an alternative to Oberon that fully complies with the DRECP and its CMAs. Our organizations and many other stakeholders participated in development of the DRECP from its inception in 2009 through its adoption by BLM in 2016. A decision to approve Intersect Power's version of Oberon would constitute a significant weakening of the DRECP, disrespect the years of constructive contributions to the plan by multiple agencies and stakeholders, and result in unnecessary and undue degradation of the public lands and resources in the California Desert Conservation Area.

Again, we thank you for your consideration of these comments. In light of the shortcomings in the EA, we urge the BLM to revise and re-circulate a supplemental EA that addresses the issues raised in the comments above before making any decision regarding the proposed plan amendment and right-of-way application. In the event BLM chooses not to revise the EA and provide adequate analysis, the BLM should reject the proposed project right-of-way application and the plan amendment. Please feel free to contact us at the contact information below if you have any questions about these comments or the documents provided. Please add us to the list of interested parties for all notices associated with this project.

Sincerely,

Isabella Langone
Conservation Analyst
California Native Plant Society
ilangone@cnps.org

Linda Castro
Assistant Policy Director
California Wilderness Coalition
lcastro@calwild.org

Ileene Anderson
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Joan Taylor
Vice Chair
California/Nevada Desert Committee
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tahquitz@sangorgonio.sierraclub.org

Cc: Andrew Archuleta, District Manager, California Desert District: aarchule@blm.gov

Brian Croft, USFWS: Brian_Croft@fws.gov

References

Barrows, C.W., M.F. Allen and J.T. Rotenberry 2006. Boundary processes between a desert sand dune community and an encroaching suburban landscape. Biological Conservation 131: 486-494. https://pdfs.semanticscholar.org/574f/b229ffcf6f8d19d7dba74349c6fb40530d3b.pdf.

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. Pgs. 313 https://wildlife.ca.gov/Conservation/Planning/Connectivity/CEHC.

## Comment via ePlanning: Oberon Renewable Energy Project

September 14, 2021

Dear BLM supervisor,

On behalf of In Defense of Animals, an international animal protection nonprofit organization with 200,000 supporters in the United States, I am writing to express our grave concern over the 215 adult and 900 juvenile/hatchling desert tortoises whose lives will be distrupted or destroyed the Gemini Solar Project located near Valley of Fire State Park in Southern Nevada. We oppose the the desert tortoise clearance scheduled to begin next week.

The BLM estimates 215 adults and 900 juveniles and hatchlings on the site, but only prioritizes moving the adults. Since the younger ones are harder to find, we fear a large mortality from the project construction in December. We urge this agency consider cooperating with tortoise advocates to safely relocate all of the animals to ideal alternate sites.

The desert tortoise is a threatened species native to the project site. Instead of displacing this species, we implore your agency to protect desert tortoises and their dwindling habitat. Please make changes to the proposed project to prevent the death and suffering of these desert tortoises who are symbols of our great desert landscape.

Thank you for your empathy and consideration.

Sincerely,

Lisa Levinson
Campaigns Director and Wild Animals Campaigner
In Defense of Animals
www.idausa.org
3010 Kerner Blvd.
San Rafael, California 94901
215-620-2130
lisa@idausa.org

## Email: Oberon Renewable Energy Project

**From:** Ethan <Ethanfnp@comcast.net>
**Sent:** Saturday, August 14, 2021 8:01 AM
**To:** PS_OberonSolar, BLM_CA <BLM_CA_PS_OberonSolar@blm.gov>
**Cc:** Jenkins, David B <djenkins@blm.gov>
**Subject:** [EXTERNAL] Comments on Oberon Solar Project

To: Mr. Brandon G. Anderson

I am against the Oberon Solar Project for the following reasons:

1. Previous solar projects by private companies have destroyed the natural desert environment, reduce the public's access to public land, and been shown to be economic failures. For example, the Tonopah project. The project destroyed the desert, cost taxpayers almost a billion dollars, and is now owned by a foreign company (not supporting the American industrial economy).

2. Interest in outdoor recreation continues to climb to unprecedented levels, we need all the open space that's left in California. Data on the benefits of having access to open space in America continues to grow. Having access to multiple-use, public land benefits the American economy and the American people; it improves our quality of living, our mental health, and promotes a sense of attachment and value to our public land for the future.

3. The time has come for the BLM to examine its balance between resource extraction via private enterprise, and the duty of the BLM to provide the public with long-term, multiple-use outdoor recreation opportunities. Industrialization of our public lands in the desert to produce electricity has proven to be a failed concept. The federal government should invest in renewable electricity generation by providing low or no interest loans for homeowners to install solar panels on their rooftops, and through legislation that guarantees electricity generation payment for homeowners who add electricity to the power grid. Every single house in America should have solar panels on it's roof, or a windmill, to generate its own electricity. While Tonopah comes to mind, large mining operations (uranium in particular) provide good examples of companies that destroy the land, eliminate public access, and ultimately leave taxpayers with tremendous liabilities.

Thank you for consideration of my comments.

Ethan Lodwig
Emerald Trail Riders Association
PO Box 41617
Eugene, OR
97404

September 13, 2021

Mr. Brandon Anderson
Bureau of Land Management
1201 Bird Center Drive
Palm Springs, CA 92262
BLM_CA_PS_OberonSolar@blm.gov

Mr. Logan Raub
Colorado River Basin Regional Water Quality Control Board
c/o Aspen Environmental Group
235 Montgomery Street, Suite 640
San Francisco, CA 94104-2920
logan.raub@waterboards.ca.gov

RE: Proposed Oberon (CACA- 58539) Solar Project
Comments for Environmental Assessment and Draft Environmental Impact Report
Environmental Assessment DOI-BLM-CA-D060-2020-0040-EA

Dear Mr. Anderson and Mr. Raub,

I am writing on behalf of Mojave Desert Land Trust (MDLT) to comment on the proposed Oberon solar project. Founded in 2006, MDLT is a nonprofit conservation organization headquartered in Joshua Tree, CA. MDLT acquires, restores, and protects biologically and culturally important lands throughout a 26-million-acre service area in the California Desert. To date, we have conserved over 100,000 acres of desert conservation lands, and we have conveyed over 54,000 acres to federal and state agencies. We also hold a long-term interest in areas that we manage and monitor. These include Palisades Ranch on the Mojave River, Desert Springs in the Western Mojave, and habitat linkages in the Morongo Basin.

The proposed Oberon Solar project would construct facilities on 2,700 acres of public lands near Desert Center in eastern Riverside County in the Riverside East renewable energy zone of the Desert Renewable Energy Conservation Plan (DRECP). The DRECP was developed with the goal of providing for renewable energy development while ensuring the protection of the deserts' natural resources and ecosystems. It was negotiated over many years by a range of interests including conservation groups, the renewable energy industry, local and state governments, tribes, and recreationalists.

The proposed project is intended to produce 500 MW of photovoltaic solar energy, enough to power 200,000 homes, helping to achieve the Biden Administration's goal of a carbon pollution-free power sector by 2035. While achieving climate goals is important, this must be done in a way that does not result in significant degradation of desert species, communities, and ecosystems. To ensure this, the project needs to ensure consistency with the Desert Renewable Energy Conservation Plan (DRECP) and its conservation elements, goals, and actions.

The project, as proposed, requests exemptions from provisions of the Plan, Conservation Management Actions (CMAs), which are essential to its integrity of the conservation elements of the Plan. These exceptions would result in a 600-acre encroachment into a microphyll woodland, a rare and important habitat while at the same time compromising a designated multi-species wildlife corridor which is essential to ecosystem function. This is not a "minor incursion" as defined by the DRECP. The loss of connectivity would be in an area where existing renewable energy projects have already created an impediment to movement and one which will be further reduced by future developments. The proposed encroachment into the wildlife corridor must be viewed in this context. Coupled with past losses, and reasonably foreseeable future losses, it would have significant effects on the health of plant and animal populations due to reductions in gene flow and subsequent loss of genetic variation.

To mitigate for the proposed encroachments, the project proponents have suggested acquiring replacement or offset parcels elsewhere within the Chuckwalla Bench region. The loss of connectivity which would occur, cannot be compensated for or offset by preserving land elsewhere on the Chuckwalla Bench. It is not comparable and thus not adequate mitigation.

Moreover, such a program is not necessary. Conservation land acquisition goals are
are already being achieved on the Chuckwalla Bench by both MDLT and the Friends of the Desert Mountains. They each have active and successful acquisition programs in partnership with the BLM. For example, MDLT has 5,518 acres in combination that it owns, it has conveyed or is conveying to the BLM, or that are pending acquisitions.

In summary, while MDLT recognizes the threats and impacts of climate change and recognizes the importance of meeting renewable energy goals, this cannot, nor does it need to be done at the expense of our irreplaceable desert species and ecosystems, many of which are of national importance (see Appendix L of the DRECP). We ask that that the BLM not support or approve a project alternative that would make exceptions to the CMAs, but instead choose one which avoids the microphyll woodland and maintains the designated multi-species wildlife corridor. It is essential to the future health of the areas' ecosystems and to the future integrity of the DRECP that an alternative be approved which keeps the CMAs in place, and which maintains the resources they were designed to protect.

Sincerely,

Geary Hund
Executive Director
Mojave Desert Land Trust

September 14, 2021

Oberon Renewable Energy Project
Attention: Brandon Anderson
Bureau of Land Management
1201 Bird Center Drive, Palm Springs, CA 92262 Email: BLM_CA_PS_OberonSolar@blm.gov

Dear Mr. Anderson:

The Morongo Basin Conservation Association is responding to the call for comments regarding the Oberon Solar Project. Alternative 2 for the Oberon Solar Project is proposed for 5,000 desert acres in Desert Center within the DRECP East Riverside DFA. The proposal includes 500 MW PV and energy storage with a footprint of 2,500 acres. There will be a 500 kV generation-tie transmission line (~0.5 miles in 175-foot ROW), upgrades to the SCE Red Bluff Substation, and access roads.

The Project is in a designated Development Focus Areas (DFA) as written in the California Desert Conservation (CDCA) Plan as amended. This Alternative does not comply with all the Conservation Management Actions (CMAs) prescribed in the DRECP plan amendment to the CDCA, especially microphyll woodland. The proposed project also does not comply with tortoise exclusion fencing and clearance survey protocols.

The developer, Intersect Power, stated it needs a Land Use Plan Amendment (LUPA) to maintain its 500-megawatt (MW) project as designed, so will need to impact the microphyll woodland. The company is proposing CMAs. The Proposed action includes wildlife permeable fencing.

We turned to Basin and Range Watch to find an accurate description of the landscape Oberon Solar would cover if completed. Following a September visit to the project site a report with compelling photographs of the intact complex desert was published. https://www.basinandrangewatch.org/Oberon.html

> "*The Chuckwalla Valley is full of microphyll woodland, washes, a crucial connectivity corridor for wildlife, archaeological sites, Federally Threatened Agassiz desert tortoise Critical Habitat, and a healthy population of Mojave fringe-toed lizards (Uma scoparia).*
>
> *The designated tortoise Critical Habitat on the north side of I-10 is well-connected to Critical Habitat and protected ACEC to the south of the highway. This appears to be excellent tortoise habitat on the proposed Oberon Project site, with dense, old growth microphyll woodland, including desert ironwood trees. Mojave desert tortoises dine on fallen ironwood seed pods, so this looks to us like excellent tortoise habitat.*
>
> *Our site visit revealed that the Oberon Solar Project site has excellent wildlife connectivity across Chuckwalla Valley, through the I-10 highway, with three large highway undercrossings, where tortoise,*

> [1]*burro deer, and bighorn sheep would have no problem crossing under the highway on these large wash underpasses. Summer thunderstorms bring a lot of flash floods, and the highway architects understood this and built very large, wide, deep highway undercrossings*."

California Natural Resources Agency and other agencies are responding to the Governor's Executive Order EO-N-82-20 to support the global effort to combat the biodiversity and climate crises. It is the goal of the State to conserve at least 30 percent of California's land and coastal waters by 2030. This falls in line with the federal push to conserve 30 by 30 of U.S. lands and waters by the year 2030.

Climate-smart land management working toward carbon neutrality while building climate resilience while protecting biodiversity includes solar development both at point of use (roof tops everywhere) and at utility scale. Alternative 2 would develop 500MW on a pristine landscape used by multiple species as both live in and pass-through habitat going north from the Chuckwalla Mountains ACECs. See Maps: Figure 2-6 Fencing Plan and Figure 2-8 Resource Avoidance Alternative. This is not biodiversity smart.

## Problems for Intersect Power

Intersect Power wants to have the Bureau of Land Management amend the DRECP/CDCA Plan to weaken the Conservation Management Actions (CMAs) in order to build the solar project on more microphyll woodland and wash habitat, which was supposed to be protected in the DFAs under the DRECP. A project-specific Land Use Plan Amendment (LUPA) to the CECA will be required because the project does not fully comply with:

- CMA LUPA-BIO-RIPWET-1: Riparian and Wetland Vegetation Type (resource-specific setbacks)
- CMA LUPA-BIO-3: Resource Setbacks Standards
- CMA LUPA-BIO SVF-6: Microphyll woodland (avoidance)
- CMA LUPA-BIO-IFS-4: Desert Tortoise exclusion fencing and clearance surveys.

Alternative 3 Land Use Compliant Alternative (Maps Figure 2-7) provides a 200-foot buffer around the microphyll woodland. **This alternative would reduce the project from 500 MW down to 375 MW.**

Alternative 4: Resource Avoidance Alternative (Maps Figure 2-8) avoids desert tortoise critical habitat, more microphyll woodland, and the wildlife corridor.
**This alternative would reduce the project 500 MW down to 300 MW.**

## DRECP Solution to Problems

**It is not the role of the DRECP to bend to accommodate a project proposal. It is the project proponent's role to accommodate the DRECP.**

To protect the California Desert area and streamline the permitting process, the California Energy Commission, the California Department of Fish and Wildlife, the U.S. Bureau of Land Management (BLM), and the U.S. Fish and Wildlife Service developed the Desert Renewable Energy Conservation Plan (DRECP) that identifies areas in the desert appropriate for the utility-scale development of wind, solar, and geothermal energy projects.

Oberon wants the BLM Plan Amendments which ignores the fact that there are another 148,000 acres in the same renewable energy zone to choose from, the vast majority of which do not have microphyll woodlands.

If one project can bend the rules, others will follow, undercutting the carefully crafted protections for sensitive resources on ten million acres of public lands in the DRECP. This would also undermine the DRECP's intent to streamline solar projects in the right places in the right way – setting back progress on important climate goals

## EA Pesticide Use Proposal and Roundup

The Pesticide Use Proposal (PUP) lists Glyphosate (Roundup Custom and Roundup PRO Max) for use to control Sahara mustard, Russian thistle, and common annuals, including red brome, redstem filaree, and Mediterranean grass over 2,700 acres as needed.

> "The intent of this Pesticide Use Proposal (PUP) is to obtain approvals for use of herbicides for ongoing weed treatment within the Proposed Action area on BLM-administered lands. The desired results of the invasive plant treatments are the minimization of aboveground target nonnative vegetation. The intent of the proposed IPM program is to provide invasive plant treatment within the Project Area to facilitate restoration of temporary impact areas and support O&M weed abatement activities. Nonnative vegetation can outcompete native flora by utilizing available resources for growth (light, soil, etc.), and producing allelopathic chemicals. Therefore, minimization and removal of existing invasive vegetation will ultimately minimize the input of nonnative weed seeds into the soil bank and reduce nonnative plant competition. Over time less competition for resources by nonnative vegetation will promote the establishment and succession of native species. As weed loads are managed, the overall nonnative seed bank will diminish, allowing for the expansion and establishment of native plant communities." (Page 4 PUP)

The Classification Reference for Roundup is given as
OSHA Hazard Communication Standard, 29 CFR 1910.1200 (2012) (Attached as a pdf)
Not classified as hazardous.

HOWEVER the only safety precautions referenced are to avoid skin contact and exposure to glyphosate In air, avoid skin contact with all solvents, and wear safety glasses at all times. The recommendation is for further study and their method used should be fully validated. All references are from the 1980s and do not reference field exposures.

The analysis does not reveal or consider that Bayer, after purchasing Monsanto, was sued for the effects of Roundup on users. Bayer agreed to pay more than $10 billion to settle tens of thousands of claims while continuing to sell the product without adding warning labels about its safety.

After researching *What's the Problem with Roundup?* The Ecology Center has some answers that are attached to this document. In brief:

- Glyphosate, the active ingredient in Roundup, is the third most commonly reported cause of pesticide illness among agricultural workers in California.
- Glyphosate is the most commonly reported cause of pesticide illness among landscape maintenance workers in California.
- The surfactant ingredient in Roundup is more acutely toxic than glyphosate itself and the combination of the two is yet more toxic.
- Glyphosate is suspected of causing genetic damage.
- Glyphosate is acutely toxic to fish and birds and can kill beneficial insects and soil organisms that maintain ecological balance.
- Laboratory studies have identified adverse effects of glyphosate-containing products in all standard categories of toxicological testing,
- Glyphosate residues in soil can persist over a year.

- Glyphosate residues has been found in strawberries, wild blueberries and raspberries, lettuce, carrots and barley.
- Glyphosate has been measured 1,300 – 2,600 feet away from its application site.

Monsanto, manufacturer of Roundup, agreed with the New York Attorney General's office to discontinue their use of the terms "biodegradable" and "environmentally friendly" in ads promoting glyphosate-based products, including Roundup.

Glyphosate, Part 1 and 2: Human Exposure and Ecological Effects by Caroline Cox discusses and provides references for the bullet points above. (PDF Attached)

Based on the information provided by Carolyn Cox, Roundup, in any form, should not be used to eradicate non-native plants on the BLM administered land to be cleared by Oberon, should the project be approved. Especially worrying is the finding that Roundup is acutely toxic to birds and can kill beneficial insects and soil organisms that maintain ecological balance. The residues of glyphosate can persist in soil over a year and have been measured 1,300 – 2,600 feet away from its application. The microphyll woodland drainage pattern will distribute this toxic herbicide over a greater distance than intended. The residue could prevent any recolonization by natives, as desired. AND, documenting the aftereffects of application overtime is not in the work plan so the BLM could be poisoning the surface more than 2,700 acres in complete ignorance.

**Carbon Sequestration and Storage**

In Appendix R Air Quality/Greenhouse Gas Emissions (page 17) the estimated loss of natural carbon uptake is not expected to exceed 4.31 MTCO2e per year per acre with a total of 15,085 MTCO2e per year of sequestration capability being lost. This estimate is based on ground disturbance and removal of some vegetation that naturally provides carbon uptake.

> "Ground disturbance and vegetation removal during construction accordingly adds to the GHG impact because a portion of the soils and vegetation on site would no longer be present to sequester CO2."

This analysis overlooks the full extent of carbon capture in deserts. Inland deserts account for 10% of the state's total stored carbon. Quoting from the Science Brief prepared by Dr. Lindsay Rosas, Defenders of Wildlife

> "Carbon Capture in Deserts
> There are several ways in which deserts store carbon. To start, desert plants store carbon in their biomass just as other plants do; through photosynthesis, plants take in CO2 from the air and convert that into tissue. Many desert plants also have important relationships with underground fungi: roots bond with these fungi in a mutually beneficial relationship. As part of this relationship, the plants transfer carbon to the mycorrhizae, which also store carbon. The majority of stored and sequestered carbon, however, is in soils. Plant or animal excretion and decomposition release some carbon, which reacts with calcium in the desert soil to create calcium carbonate crystals. Since some desert plants' roots grow to over a hundred feet, these crystals, called caliches, can be deep underground. Caliches build into larger chunks over time and create carbon sinks. Additionally, when the root fungi die, they leave behind their waxy coating, which aggregates and helps keep carbon in the soil. For their storage and sequestration potential, arid-semiarid soils are considered the third largest global pool of carbon (Emmerich 2003). (Attached as Appendix B in Letter to Dr. Alan Moreno discussed below.)

The Science Brief was prepared for presentation to the California Natural Resources Board as part of a presentation for their work on the state's 30 by 30 project. In addition a letter with attachments was provided to Dr. Adam Moreno, Lead Natural and Working Lands Climate Scientist to support the state's Implementation of Below Ground Carbon Sequestration Modeling. This letter includes Notes on Models of Carbon dynamics for the California Deserts prepared by Dr. Michael F. Allen, Ph.D., Distinguished Professor Emeritus, Department of Microbiology and Plant pathology, UC Riverside.

The information in the Science Brief and Dr. Michael Allen's Notes are just recently available in this format and provided with our comments in the expectation that the information will be used to account for carbon sequestration and storage in the desert when analyzing utility solar and other projects that disturb intact desert systems. (PDF of letter with Appendices A and B attached)

Thank you for the opportunity to present our concerns on this proposed development. With the effects of climate change becoming increasing apparent on the unique and fragile ecosystem of the California deserts, we urge you to reject Alternative 2 and support **Alternative 4** that serves to protect the ecosystem and the services it performs in support of the diversity of life on our planet.

Sincerely,

Pat Flanagan, director
for the Morongo Basin Conservation Association

PDFs
OSHA Evaluation of Glyphosate
New York Times: Roundup Maker to Pay $10 Billion to Settle Cancer Suits
So What's the Problem with Roundup? Ecology Center.org
Glyphosate Fact Sheets 1 and 2 Carolyn Cox
CARB Comments with Appendices A_B

# GLYPHOSATE

| | |
|---|---|
| Method number: | PV2067 |
| Matrix: | Air |
| Target Concentration: | 1 mg/$m^3$ (arbitrary level). There is no OSHA permissible exposure limit (PEL) or ACGIH threshold limit value (TLV) for glyphosate. |
| Procedure: | Samples are collected by drawing known volumes of air through glass fiber filters. Samples are desorbed with 0.025 M borate buffer, derivatized and analyzed by high performance liquid chromatography (HPLC) using an ultraviolet detector (UV). |
| Recommended air volume and sampling rate: | 100 L at 1.0 L/min |
| Detection limit of the overall procedure (based on the recommended air volume): | 1 μg/$m^3$ |
| Status of method: | Stopgap method. This method has been only partially evaluated and is presented for information and trial use. |

Date: November, 1989

Chemist: Duane Lee

Carcinogen And Pesticide Branch
OSHA Analytical Laboratory
Salt Lake City, Utah

1. General Discussion

1.1 Background

1.1.1 History of procedure

The OSHA Analytical Laboratory received samples on glass fiber filters and OVS-2 tubes requesting the analysis of Roundup which is the isopropylamine salt of glyphosate. A NIOSH procedure was tried but it did not yield a satisfactory separation. (Ref. 5.1) From a literature search there were procedures for the analysis of glyphosate in soil and water samples. (Refs. 5.2 to 5.4) These procedures were modified for the analysis of air samples. This report describes the preliminary validation of a sampling and analytical method using glass fiber filters. The OVS-2 tubes were examined but felt to be unnecessary since glyphosate is a solid with a melting point over 200 °C.

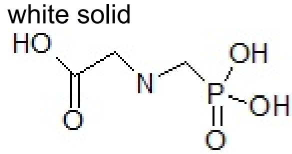
1.1.2 Toxic effects (This section is for information only and should not be taken as the basis of OSHA policy.)

The acute oral $LD_{50}$ for rats is 4300 mg/kg for glyphosate. (Ref. 5.6)

1.1.3 Potential workplace exposure

Glyphosate is used as a non-selective, postemergence herbicide. (Ref. 5.6) No information could be found on the number of workers exposed to glyphosate.

1.1.4. Physical properties (Refs. 5.5 to 5.7)

| | |
|---|---|
| Molecular weight: | 169.07 |
| Molecular formula: | $C_3H_8NO_5P$ |
| CAS #: | 1071-83-6 |
| Melting point: | 230 °C (decomposition) |
| Solubility: | soluble in water at 25 °C 12 g/L, insoluble in most organic solvents |
| Chemical name: | glycine, N-(phosphonomethyl)- |
| Other names: | Mon 0573; N-(phosphonomethyl)glycine; phosphonomethyliminoacetic acid |
| Description: | white solid |
| Structure: |  |

UV scan:

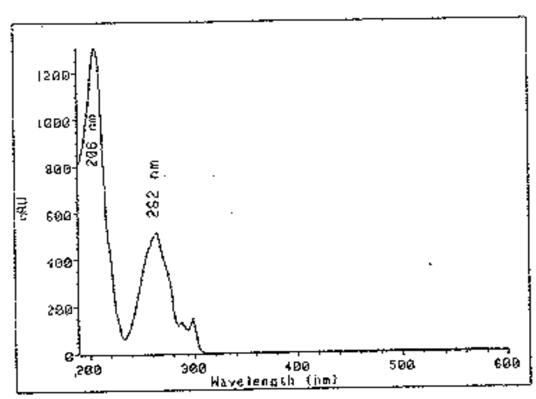



Figure 1.
UV Scan of Glyphosate Product in Mobile Phase

1.2 Limit defining parameters

The detection limit of the analytical procedure is 0.84 ng per injection. This is the amount of analyte which will give a peak whose height is approximately five times the baseline noise.

2. Sampling Procedure

2.1 Apparatus

2.1.1 A personal sampling pump that can be calibrated to within ± 5% of the recommended flow rate with the sampling device in line.

2.1.2 Gelman type A/E 37-mm glass fiber filters. The filters were assembled in two-piece 37-mm polystyrene cassettes with backup pads. The cassettes are sealed with shrink bands and the ends are plugged with plastic plugs.

2.2 Reagents

No sampling reagents are required.

2.3 Sampling technique

2.3.1 Immediately before sampling, remove the plastic plugs from the filter cassettes.

2.3.2 Attach the cassette to the sampling pump with flexible tubing.

2.3.3 Attach the cassette vertically in the employee's breathing zone in such a manner that it does not impede work performance.

2.3.4 After sampling for the appropriate time, remove the cassette and seal with plastic plugs.

2.3.5 Wrap each sample end-to-end with an OSHA seal (Form 21).

2.3.6 Submit at least one blank for each set of samples. Handle the blank in the same manner as the samples, except no air is drawn through it.

2.3.7 Record the air volume (in liters of air) for each sample, and list any possible interferences.

2.3.8 Submit bulk samples for analysis in a separate container.

2.4 Extraction efficiency

Six treated glass fiber filters were each liquid spiked with 20 µL of a 5.22 mg/mL glyphosate standard. These were allowed to dry and placed in a drawer overnight. The next day each filter was extracted with 3.0 mL of 0.025 M borate buffer, shaken for 30 min and then analyzed as per Section 3.5. The results are listed in the table below.

Table 2.4
Extraction Efficiency

| amount spiked, µg | amount found, µg | % recovered |
|---|---|---|
| 104.4 | 103.91 | 99.5 |
| 104.4 | 87.77 | 84.1 |
| 104.4 | 107.5 | 103.0 |
| 104.4 | 99.68 | 95.5 |
| 104.4 | 107.39 | 102.9 |
| 104.4 | 103.34 | 99.0 |
| | X | 97.3 |

2.5 Retention efficiency

Six glass fiber filters were liquid spiked with 20 µL of a 5.22 mg/mL standard and humid air (~80% relative humidity) was drawn through each filter at 1 L/min for 100 minutes. The filters were extracted with 3 mL of 0.025 M borate buffer, shaken for 30 min and then analyzed as per section 3.5. The results are listed in the table below.

Table 2.5
Retention Efficiency

| amount spiked, µg | amount found, µg | % recovered |
|---|---|---|
| 104.4 | 100.44 | 96.2 |
| 104.4 | 103.46 | 99.1 |
| 104.4 | 105.75 | 101.3 |
| 104.4 | 109.59 | 105.0 |
| 104.4 | 104.94 | 100.5 |
| 104.4 | 10~~3~~.1 | 98.8 |
| | X | 100.2 |

2.6 Sample storage

Twelve glass fiber filters were liquid spiked with 20 µL of a 5.22 mg/mL standard and humid air (~80% relative humidity) was drawn through each filter at 1 L/min for 100 minutes. Six of the samples were stored at ambient temperature in a drawer, and six were stored in a freezer. After four days of storage, three samples from each group were extracted with 3 mL of 0.025 M borate buffer, shaken for 30 min and then analyzed as per section 3.5. The remaining samples were desorbed and analyzed after six days of storage. The results are given in the tables below.

Table 2.6.1
Ambient Storage

| days stored | amount spiked, µg | amount found, µg | % recovered |
|---|---|---|---|
| 4 | 104.4 | 97.49 | 93.4 |
| 4 | 104.4 | 100.91 | 96.7 |
| 4 | 104.4 | 100.38 | 96.1 |
| 6 | 104.4 | 94.18 | 90.2 |
| 6 | 104.4 | 94.71 | 90.7 |
| 6 | 104.4 | ~~9~~5.67 | 91.6 |
| | | ~~X~~ of 4 | 99.2 |
| | | X of 6 | 91.6 |

Table 2.6.2
Freezer Storage

| days stored | amount spiked, µg | amount found, µg | % recovered |
|---|---|---|---|
| 4 | 104.4 | 103.16 | 98.8 |
| 4 | 104.4 | 102.89 | 98.6 |
| 4 | 104.4 | 104.65 | 100.2 |
| 6 | 104.4 | 96.87 | 92.8 |
| 6 | 104.4 | 92.40 | 88.5 |
| 6 | 104.4 | ~~9~~7.76 | 93.6 |
| | | ~~X~~ of 4 | 99.2 |
| | | X of 6 | 91.6 |

2.7 Recommended air volume and sampling rate

2.7.1 The recommended air volume is 100 L.

2.7.2 The recommended flow rate is 1.0 L/min.

2.8 Interferences (sampling)

It is not known if any compounds will interfere with the collection of glyphosate.

2.9 Safety precautions (sampling)

2.9.1 Attach the sampling equipment in such a manner that it will not interfere with work performance or employee safety.

2.9.2 Follow all safety practices that apply to the work area being sampled.

3. Analytical Procedure

3.1 Apparatus

3.1.1 A balance capable of weighing to the nearest tenth of a milligram. A Mettler HL52 balance was used in this evaluation.

3.1.2 Mechanical shaker.

3.1.3 A high performance liquid chromatograph (HPLC) equipped with an ultraviolet (UV) detector. A Hewlett-Packard (HP) 1090M with a diode array detector was used in this evaluation.

3.1.4 An HPLC column capable of separating glyphosate from any interferences. A 25 cm × 4.6 mm i.d. Zorbax $NH_2$ column was used in this evaluation.

3.1.5 An electronic integrator, or some other suitable method for measuring detector response. The Hewlett-Packard 3357 Laboratory Data System and the Hewlett-Packard 1090M system were used in this evaluation.

3.1.6 Volumetric flasks and pipets.

3.1.7 Vials, 4-mL with Teflon-lined caps.

3.1.8 Vials, 2-mL suitable for use on HPLC autosamplers.

3.2 Reagents

3.2.1 Acetonitrile, HPLC grade from Burdick and Jackson.

3.2.2 Glyphosate, Environmental Protection Agency (EPA #3801, 97.3% purity).

3.2.3 Borate, sodium borate ($Na_2B_4O_7 \bullet 10H_2O$) from Mallinckrodt. The borate buffer was 0.025 M sodium borate with a pH = 9.

3.2.4 HPLC grade water, Milli-Q filtered water, Millipore Inc.

3.2.5 Acetone, high purity solvent from Burdick and Jackson.

3.2.6 9-Fluorenylmethyl chloroformate (FMOCCL), reagent grade obtained from Aldrich. This was made 0.002 M in acetone and used as the derivatizing reagent.

3.2.7 Potassium hydroxide, reagent grade from Baker. This was 7 N in water and used to adjust the pH of the mobile phase.

3.2.8 Potassium phosphate monobasic ($KH_2PO_4$), reagent grade from Mallinckrodt.

3.3 Standard preparation

Prepare stock glyphosate standards by weighing 10 to 15 mg of glyphosate. Transfer the glyphosate to separate 10-mL volumetric flasks, and add borate buffer to the mark. Make working range standards of 0.03 to 80 µg/mL by pipet dilutions of the stock standards with borate buffer. This range corresponds to 0.09 to 240 µg per sample when an extraction volume of 3 mL is used. Store stock and dilute standards in a freezer.

3.4 Sample preparation

3.4.1 Transfer the glass fiber filter of each cassette to a 4-mL vial.

3.4.2 Add 3.0 mL of borate buffer to each vial and seal with a Teflon-lined cap.

3.4.3 Shake the vials for 30 minutes on a mechanical shaker.

3.5 Derivatization of samples and standards

3.5.1 Transfer 1 mL of each sample and standard to 4-mL vials.

3.5.2 Add 1.0 mL of 0.002 M FMOCCL to each vial.

3.5.3 Cap the vials and then shake them for 10 to 15 seconds to ensure mixing and allow them to sit at room temperature for 30 min.

3.5.4 Transfer, if necessary, a portion of each sample and standard to separate 2-mL vials for the HP autosampler.

3.6 Analysis

3.6.1 Instrument conditions

| | | |
|---|---|---|
| Column: | 25 cm × 4.6 mm i.d. Zorbax $NH_2$ | |
| Mobile phase: | 50% acetonitrile 50% water 0.05 M $KH_2PO_4$ pH adjusted to 6.0 with 7 N KOH | |
| Flow rate: | 1.0 mL/min | |
| Column temperature: | 40 °C | |
| Injection volume: | 25.0 µL | |
| Retention time: | 9.6 min | |
| Detectors: | UV | 206 nm |
| | Fluorescence | excitation = 206 nm<br>emission = 320 nm filter |

3.6.2 Chromatogram

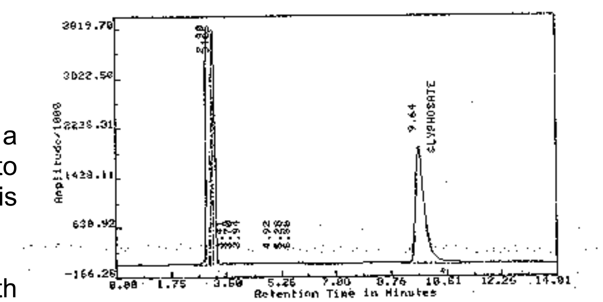



Figure 2.
Chromatogram of Glyphosate from Fluorescence Data

3.7 Interferences (analytical)

3.7.1 Any collected compound having a similar retention time and responds to a UV and a fluorescence detector is an interference.

3.7.2 Any compound that reacts with FMOCCL is an interference.

3.7.3 HPLC conditions may be varied to circumvent an interference.

3.7.4 Retention time alone is not proof of chemical identity. Analysis by an alternate HPLC column, ratioing between fluorescence and UV detectors and confirmation by mass spectrometry are additional means of identification.

3.8 Calculations

3.8.1 Construct a calibration curve by plotting detector response versus concentration (µg/mL) of glyphosate.

3.8.2 Determine the µg/mL of glyphosate in each sample and blank from the calibration curve.

3.8.3 Blank correct the samples by subtracting the µg/mL in the blank from each sample.

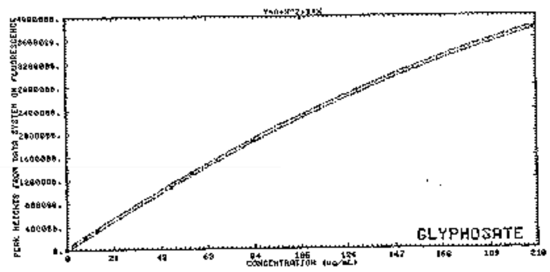



Figure 3.
Calibration Curve from Fluorescence Data

3.8.4 Use the following formula to determine the air concentration.

$$\frac{mg}{m^3} = \frac{\left(\frac{\mu g,\ \text{blank corrected}}{mL}\right) \times (\text{extraction volume, mL})}{(\text{air volume, L}) \times (\text{extraction efficiency, decimal})}$$

3.9 Safety precautions (analytical)

3.9.1 Avoid skin contact and exposure to glyphosate in air.

3.9.2 Avoid skin contact with all solvents.

3.9.3 Wear safety glasses at all times.

4. Recommendation for Further Study

The method should be fully validated.

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The New York Times | https://www.nytimes.com/2020/06/24/business/roundup-settlement-lawsuits.html

# *Roundup Maker to Pay $10 Billion to Settle Cancer Suits*

Bayer faced tens of thousands of claims linking the weedkiller to cases of non-Hodgkin's lymphoma. Some of the money is set aside for future cases.

**By Patricia Cohen**

June 24, 2020

When Bayer, the giant German chemical and pharmaceutical maker, acquired Monsanto two years ago, the company knew it was also buying the world's best-known weedkiller. What it didn't anticipate was a legal firestorm over claims that the herbicide, Roundup, caused cancer.

Now Bayer is moving to put those troubles behind it, agreeing to pay more than $10 billion to settle tens of thousands of claims while continuing to sell the product without adding warning labels about its safety.

The deal, announced Wednesday, is among the largest settlements ever in U.S. civil litigation. Negotiations were extraordinarily complex, producing separate agreements with 25 lead law firms whose clients will receive varying amounts.

"It's rare that we see a consensual settlement with that many zeros on it," said Nora Freeman Engstrom, a professor at Stanford University Law School.

Bayer, which inherited the litigation when it bought Monsanto for $63 billion, has repeatedly maintained that Roundup is safe.

Most of the early lawsuits were brought by homeowners and groundskeepers, although they account for only a tiny portion of Roundup's sales. Farmers are the biggest customers, and many agricultural associations contend glyphosate, the key ingredient in Roundup, is safe, effective and better than available alternatives.

The settlement covers an estimated 95,000 cases and includes $1.25 billion for potential future claims from Roundup customers who may develop the form of cancer known as non-Hodgkin's lymphoma.

The company is taking a calculated risk that the benchmark settlement will largely resolve its legal problems. Bayer still faces at least 30,000 claims from plaintiffs who have not agreed to join the settlement.

Werner Baumann, Bayer's chief executive, said that the two critical conditions for a settlement were that it was financially reasonable and that it would bring closure to the litigation.

"We are totally convinced" this does both, Mr. Baumann said in an interview on Wednesday. There is money put aside for existing claimants outside of the agreement, he said, and a structure to deal with future claimants that could emerge.



Fletch Trammell, a Houston-based lawyer who said he represented 5,000 claimants who declined to join, disagreed. "This is nothing like the closure they're trying to imply," he said. "It's like putting out part of a house fire."

But Kenneth R. Feinberg, the Washington lawyer who oversaw the mediation process, said he expected most current claimants to eventually sign on to the settlement.

"In my experience, all those cases that have not yet been settled will quickly be resolved by settlement," said Mr. Feinberg, best known for running the federal September 11th Victim Compensation Fund. "I will be surprised if there are any future trials."

Bayer said the amount set aside to settle current litigation was $8.8 billion to $9.6 billion, including a cushion to cover claims not yet resolved. It said the settlement included no admission of liability or wrongdoing.

Individuals, depending on the strength of their cases, will receive payments of $5,000 to $250,000, according to two people involved in the negotiations.

The coronavirus outbreak, which has closed courts across the country, may have pushed the plaintiffs and the company to come to an agreement.

“The pandemic worked to the advantage of settlement because the threat of a scheduled trial was unavailable,” Mr. Feinberg said.

Talks began more than a year ago at the prompting of Judge Vince Chhabria of U.S. District Court in San Francisco, who was overseeing hundreds of federal Roundup lawsuits.

Judge Chhabria appointed Mr. Feinberg to lead negotiations for an agreement that would include all the cases, including thousands of others filed in state courts and other jurisdictions.



The $1.25 billion set aside for future plaintiffs will be applied to a class-action suit being filed in Judge Chhabria’s court on behalf of those who have used Roundup and may later have health concerns.

Part of the $1.25 billion will be used to establish an independent expert panel to resolve two critical questions about glyphosate: Does it cause cancer, and if so, what is the minimum dosage or exposure level that is dangerous?

If the panel concludes that glyphosate is a carcinogen, Bayer will not be able to argue otherwise in future cases — and if the experts reach the opposite conclusion, the class action’s lawyers will be similarly bound.

Pressure on Bayer for a settlement has been building over the past year after thousands of lawsuits piled up and investors grew more vocal about their discontent with the company’s legal approach.

Just weeks after the deal to purchase Monsanto was completed in 2018, a jury in a California state court awarded $289 million to Dewayne Johnson, a school groundskeeper, after concluding that glyphosate caused his cancer. Monsanto, jurors said, had failed to warn consumers of the risk.

In March 2019, a second trial, this time in the federal court in San Francisco, produced a similar outcome for Edwin Hardeman, a homeowner who used Roundup on his property, and an $80 million verdict.

Two months later, a third jury delivered a staggering award of more than $2 billion to a couple, Alva and Alberta Pilliod, who argued that decades of using Roundup caused their non-Hodgkin’s lymphoma.

“Plaintiffs have gone to the plate three times and hit it out of the park,” Ms. Engstrom at Stanford said. “When you see they’re batting a thousand, and thousands more cases are waiting in the wings, that spells a very bleak picture for Monsanto.”

All three monetary awards were later reduced by judges and Bayer appealed the verdicts, but the losses rattled investors and the stock price tumbled sharply. Those cases are unaffected by Wednesday’s settlement.

Glyphosate was introduced in 1974, but its journey to becoming the world’s No. 1 weedkiller gained momentum in 1996 after Monsanto developed genetically modified seeds that could survive Roundup’s concentrated attacks on weeds.

Farmers quickly latched onto the agricultural products to reduce costs and increase crop yields. In the United States, for example, 94 percent of soybean crops and roughly 90 percent of cotton and corn now come from genetically altered seeds.

But long-simmering anxieties over possible hazards exploded in 2015 when the International Agency for Research on Cancer, an arm of the World Health Organization, announced that glyphosate could “probably” cause cancer.

Monsanto denounced the findings, arguing that years of research in laboratories and in the field had proved glyphosate’s safety. Regulators in a string of countries in Asia, Australia, Europe and North America have mostly backed Monsanto’s — and now Bayer’s — position.

The longest and most thorough study of American agricultural workers by the National Institutes of Health, for example, found no association between glyphosate and overall cancer risk, though it did acknowledge that the evidence was more ambiguous at the highest levels of exposure.

The Environmental Protection Agency ruled last year that it was a “false claim” to say on product labels that glyphosate caused cancer. The federal government offered further support by filing a legal brief on the chemical manufacturer’s behalf in its appeal of the Hardeman verdict. It said the cancer risk “does not exist” according to the E.P.A.’s assessment.

Then in January, the agency issued another interim report, which “concluded that there are no risks of concern to human health when glyphosate is used according to the label and that it is not a carcinogen.”

This week, a federal judge in California referred to the agency’s pronouncement when it ruled that the state could not require a cancer warning on Roundup, writing that “that every government regulator of which the court is aware, with the exception of the I.A.R.C., has found that there was no or insufficient evidence that glyphosate causes cancer.”

Critics have countered that regulators based their conclusions on flawed and incomplete research provided by Monsanto. Several cities and districts around the world have banned or restricted glyphosate use, and some stores have pulled the product off its shelf.

Part of the discrepancy between the international agency’s conclusions and so many other investigators’ findings is related to differences in the questions that were asked and the way the data was selected and analyzed.

The international agency, in essence, was asking whether glyphosate has the potential to cause cancer. Its researchers judged the chemical “probably carcinogenic to humans,” and added it to a list that already included beef, pork, mobile phone use, dry cleaning and working night shifts. Glyphosate escaped a stronger classification — “carcinogenic to humans” — that includes bacon, red wine, sun exposure, tobacco and plutonium.

Government regulators, by contrast, are looking at the risk that glyphosate will actually cause cancer given most people’s levels of exposure. Sharks, for example, are potentially dangerous. But people who stay out of the water are not at much risk of being attacked.

In court, lawyers argued over the available scientific evidence. Perhaps most damaging for the defendants, though, were revelations that reinforced Monsanto’s image as a company that people love to hate.

Monsanto’s aggressive tactics to influence scientific opinion and discredit critics undercut the company’s credibility. It had taken aim at hundreds of activists, scientists, journalists, politicians and even musicians. At one point, a team monitored Neil Young’s social media postings after he released an album, “The Monsanto Years,” in 2015 and a short film that attacked the company and genetically modified food.

“Monsanto didn’t seem concerned at all about getting at the truth of whether glyphosate caused cancer,” Judge Chhabria of the U.S. District Court in San Francisco said when he reviewed the Hardeman verdict last summer.

With Bayer’s purchase in 2018, the Monsanto brand ceased to exist, but the shadows over one of its marquee products persisted.

Bayer announced Wednesday that it would separately spend up to $400 million to settle claims stemming from another Monsanto chemical, dicamba, that can drift after it is sprayed and damage other crops. Bayer also put aside $820 million to settle longstanding lawsuits related to toxic chemicals in the water supply known as PCBs — for polychlorinated biphenyls — that were banned in the United States four decades ago.

# SO WHAT'S THE PROBLEM WITH ROUNDUP?

They say: *"It's Safer than Mowing"; "Biodegradable";"Environmentally Friendly"*

## SOME IMPORTANT FACTS YOU SHOULD KNOW

- Glyphosate, the active ingredient in Roundup, is the third most commonly-reported cause of pesticide illness among agricultural workers in California.
- Glyphosate is the most commonly reported cause of pesticide illness among landscape maintenance workers in California.
- The surfactant ingredient in Roundup is more acutely toxic than glyphosate itself and the combination of the two is yet more toxic.
- Glyphosate is suspected of causing genetic damage.
- Glyphosate is acutely toxic to fish and birds and can kill beneficial insects and soil organisms that maintain ecological balance.
- Laboratory studies have identified adverse effects of glyphosate-containing products in all standard categories of toxicological testing.
- Glyphosate residues in soil can persist over a year.
- Glyphosate residues has been found in strawberries, wild blueberries and raspberries, lettuce, carrots and barley.
- Glyphosate has been measured 1,300 – 2,600 feet away from its application site.
- This year Monsanto, manufacturer of Roundup, agreed with the New York Attorney General's office to discontinue their use of the terms "biodegradable" and "environmentally friendly" in ads promoting glyphosate-based products, including Roundup.

*Effective and Safe Alternatives Exist!*
For more information, contact the Ecology Center.

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**Glyphosate Fact Sheets: Part 1 and Part 2**

# Glyphosate, Part 1: Toxicology

**by Caroline Cox**
**Journal of Pesticide Reform, Volume 15, Number 3, Fall 1995. Northwest Coalition for Alternatives to Pesticides, Eugene, OR.**

## Introduction

Glyphosate is a broad-spectrum herbicide widely used to kill unwanted plants both in agriculture and in nonagricultural landscapes. Estimated use in the U.S. is between 19 and 26 million pounds per year.

Most glyphosate-containing products are either made or used with a surfactant, chemicals that help glyphosate to penetrate plant cells.

Glyphosate-containing products are acutely toxic to animals, including humans. Symptoms include eye and skin irritation, cardiac depression, gastrointestinal pain, vomiting, and accumulation of excess fluid in the lungs. The surfactant used in a common glyphosate product (Roundup) is more acutely toxic than glyphosate itself; the combination of the two is yet more toxic.

In animal studies, feeding of glyphosate for three months caused reduced weight gain, diarrhea, and salivary gland lesions. Lifetime feeding of glyphosate caused excess growth and death of liver cells, cataracts and lens degeneration, and increases in the frequency of thyroid, pancreas, and
liver tumors.

Glyphosate-containing products have caused genetic damage in human blood cells, fruit flies, and onion cells.

Glyphosate causes reduced sperm counts in male rats, a lengthened estrous cycle in female rats, and an increase in fetal loss together with a decrease in birth weights in their offspring.

It is striking that laboratory studies have identified adverse effects of glyphosate or glyphosate-containing products in all standard categories of toxicological testing.

Two serious cases of fraud have occurred in laboratories conducting toxicology and residue testing for glyphosate and glyphosate-containing products.

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Advertised as herbicides that can "eradicate weeds and unwanted grasses effectively with a high level of environmental safety,"1 glyphosate-based herbicides can seem like a silver bullet to those dealing with unwanted vegetation. However, an independent, accurate evaluation of their health and environmental hazards can draw conclusions very different than those presented by these advertisements. The following summary of glyphosate's hazards is intended to serve that purpose. It will appear in two parts: Part 1 discusses the toxicology of glyphosate, its metabolites, and the other ingredients of glyphosate products and Part 2 will discuss human exposure to glyphosate and its ecological effects.

Glyphosate, N-(phosphonomethyl) glycine (Figure 1), is a post-emergent, systemic, and non-selective herbicide used to kill broad-leaved, grass, and sedge species.2 It has been registered as a broad spectrum herbicide in the U.S. since 1974 and is used to control weeds in a wide variety of agricultural, lawn and garden, aquatic, and forestry situations.3

Most glyphosate herbicides contain the isopropylamine salt of glyphosate. A related chemical, the sodium salt of glyphosate, acts as a growth regulator in sugar cane and peanuts and is marketed for that purpose. The monoammonium salt of glyphosate is also marketed as an herbicide and growth regulator.4

Glyphosate products are manufactured by Monsanto Company worldwide. The herbicide is marketed under a variety of trade names: Roundup (including Roundup D-Pak, Roundup Lawn and Garden Concentrate, and Roundup Ready-to-Use) and Rodeo are the most common U.S. trade names.2 The sodium salt is sold as Quotamaster. The monoammonium salt is sold as Deploy Dry.2 Other brand names used for the isopropylamine salt are Accord,5 Vision, Ranger, and Sting.2

As an herbicidal compound, glyphosate is unusual in that essentially no structurally related compounds show any herbicidal activity.6

**Use**

Glyphosate is the eighth most commonly used herbicide in U.S. agriculture and the second most commonly used herbicide in nonagricultural situations. Estimated annual use according to
the U.S. Environmental Protection Agency (EPA) is between 15 and 20 million pounds in agriculture and between 4 and 6 million pounds elsewhere.7 The largest agricultural uses are in the production of soybeans, hay and pasture, corn, and oranges.4

About 25 million applications per year are made in U.S. households; most of these are made on lawns or outdoor areas where a total vegetation kill is wanted.8

In California, where pesticide use reporting is more comprehensive than in other states, about 3.4 million pounds were used in 1992; about 25 percent of this was used along rights-of-way, while 15 percent was used on almonds and 10 percent was used on grapes.9

**Mode of Action**

The mode of action of glyphosate is "not known at this time,"4 according to EPA. However, "herbicidal action probably arises from the inhibition of the biosynthesis of aromatic amino acids."10 These amino acids (phenylalanine, tyrosine, and tryptophan) are used in the

synthesis of proteins and are the essential for growth and survival of most plants. One particular enzyme important in aromatic amino acid synthesis, called 5-enolpyruvylshikimate-3-phosphate synthase, is inhibited by glyphosate.10 Glyphosate also "may inhibit or repress"4 two other enzymes, chlorismate mutase and prephrenate hydratase, involved in other steps of the synthesis of the same amino acids. These enzymes are all part of what is called the shikimic acid pathway, present in
higher plants and microorganisms but not in animals.11

Two of the three aromatic amino acids (tryptophan and phenylalanine) are essential amino acids in the human diet because humans, like all higher animals, lack the shikimic acid pathway, cannot synthesize these amino acids, and rely on their foods to provide these compounds. Tyrosine is synthesized in animals through another pathway.12

Glyphosate can affect enzymes not connected with the shikimic acid pathway. In sugar cane, it reduces the activity of one of the enzymes involved in sugar metabolism, acid invertase. This reduction appears to be mediated by auxins, plant hormones.13

Glyphosate also affects enzyme systems found in animals and humans. In rats, injection into the abdomen decreases the activity of two detoxification enzymes, cytochrome P-450 and a monooxygenase, and decreases the intestinal activity of the enzyme aryl hydrocarbon hydroxylase (another detoxification enzyme).14

## "Inert" Ingredients in Glyphosate-containing Products

Virtually every pesticide product contains ingredients other than what is called the "active" ingredient(s), those designed to provide killing action. Their purpose is to make the product easier to use or more efficient. These ingredients are called "inert," although they are often not biologically, chemically, or toxicologically inert. In general, they are not identified on the label of the pesticide product.

In the case of glyphosate products, many "inerts" have been identified. Roundup contains a polyethoxylated tallowamine surfactant (usually abbreviated POEA), related organic acids of glyphosate, isopropylamine, and water. Both Rodeo and Accord contain glyphosate and water.15 (However, label instructions usually require adding a surfactant during use.15) See "Toxicology of 'Inert' Ingredients of Glyphosate-containing Products," p. 17, for basic information about these "inert" ingredients.

Many of the toxicology studies that will be summarized in this factsheet have been conducted using glyphosate, the active ingredient, alone. Some have been conducted with commercial products containing glyphosate and "inert" ingredients. When toxicology testing is not done with the product as it is actually used, it is impossible to accurately assess its hazards.

We will discuss both types of studies, and will identify insofar as is possible exactly what material was used to conduct each study.

## Acute Toxicity to Laboratory Animals

Glyphosate's acute oral median lethal dose (the dose that causes death in 50 percent of a population of test animals; LD50) in rats is greater than 4,320 milligrams per kilogram (mg/kg) of body weight. This places the herbicide in Toxicity Category III (Caution).4 Its acute dermal toxicity (dermal LD50) in rabbits is greater than 2,000 mg/kg of body weight, also Toxicity Category III.4

If animals are given glyphosate in other ways, it is much more acutely toxic. When given intraperitoneally (the dose applied by injection into the abdomen), glyphosate is between 10 and 20 times more toxic to rats (with an LD50 between 192-467 mg/kg)2,16 than it is when given orally. Intraperitoneal injection also caused fever, cessation of breathing, and convulsions.17 While this kind of exposure is not one that would be encountered under conditions of normal use, these studies indicate the kinds of effects glyphosate can potentially cause in mammals.

Commercial glyphosate-containing products are more acutely toxic than glyphosate alone. Two recent (1990 and 1991) studies compared the amount of Roundup required to cause death in rats with the amount of either glyphosate alone or POEA alone that would cause death. The studies found that in combination, the amount of glyphosate and POEA required to kill was about 1/3 of a lethal dose of either compound separately. The Roundup formulation tested was also more toxic than POEA alone.18,19

As with glyphosate alone, glyphosate-containing products are more toxic when administered other ways than orally. Inhalation of Roundup by rats caused "signs of toxicity in all test groups,"20 even at the lowest concentration tested. These signs included a dark nasal discharge, gasping, congested eyes, reduced activity, hair standing erect,21 and body weight loss following exposure.20 Lungs were red or blood-congested.21 The dose required to cause lung damage and mortality following pulmonary administration of Roundup Lawn and Garden Concentrate or Roundup-Ready-to-Use (the glyphosate product is directly forced into the trachea, the tube carrying air into the lungs) was only 1/10 the dose causing damage through oral administration.18

**Effects on the Circulatory System**: When dogs were given intravenous injections of glyphosate, POEA, or Roundup so that blood concentrations were approximately those found in humans who ingested glyphosate, a variety of circulatory effects were found. Glyphosate increased the ability of the heart muscle to contract. POEA reduced the output of the heart and the pressure in the arteries. Together (Roundup), the result was cardiac depression.22

**Eye Irritation**: Glyphosate is classified as a mild eye irritant by EPA, with effects lasting up to seven days4 although more serious effects were found by the World Health Organization. In two of the four studies they reviewed, glyphosate was "strongly irritating"2 to rabbits' eyes and a third test found it "irritating."2 In tests of glyphosate-containing products, all eight products tested were irritating to rabbit eyes, and four of the products were "strongly" or "extremely" irritating.2

**Skin Irritation**: Glyphosate is classified as a slightly irritating to skin. Roundup is a "moderate skin irritant" and causes redness and swelling on both intact and abraded rabbit skin. Recovery can take more than two weeks.20

## Acute Toxicity to Humans

The acute toxicity of glyphosate products to humans was first widely publicized by physicians in Japan who studied 56 cases of Roundup poisoning. Most of the cases were suicides or attempted suicides; nine cases were fatal. Symptoms of acute poisoning in humans included gastrointestinal pain, vomiting, excess fluid in the lungs, pneumonia, clouding of consciousness, and destruction of red blood cells.23 They calculated that the mean amount ingested in the fatal cases was slightly more than 200 milliliters (about 3/4 of a cup). They believed that POEA was the cause of Roundup's toxicity.23 More recent reviews of glyphosate poisoning incidents have found similar symptoms, as well as lung congestion or dysfunction,24-26, erosion of the gastrointestinal tract,24,26 abnormal electrocardiograms,26 massive gastrointestinal fluid loss,27 low blood pressure,23,26 and kidney damage or failure.24,25,27

Smaller amounts of Roundup also cause adverse effects. In general these include the skin or eye irritation documented in animal studies, as well as some of the symptoms seen in humans following ingestion. For example, rubbing of Roundup in an eye caused swelling of the eye and lid, rapid heartbeat, palpitations, and elevated blood pressure. Wiping the face with a hand that had contacted leaky Roundup spray equipment caused a swollen face and tingling of the skin. Accidental drenching with Roundup (horticultural strength) caused recurrent eczema of the hands and feet lasting two months.25

Different symptoms have been observed when a different type of exposure has occurred. In Great Britain, a study compared the effects of breathing dust from a flax milling operation that used flax treated with Roundup with the effects of dust from untreated flax. Treated flax dust caused a decrease in lung function and an increase in throat irritation, coughing, and breathlessness.28

## Subchronic Toxicity

Experiments in which glyphosate was fed to laboratory animals for 13 weeks showed a variety of effects. In experiments conducted by the National Toxicology Program (NTP), microscopic salivary gland lesions were found in all doses tested in rats (200 - 3400 mg/kg per day) and in all but the lowest dose tested in mice (1,000-12,000 mg/kg per day). Both the parotid and submandibular salivary glands were affected in rats; in mice the lesions were confined to the parotid gland. Based on further experiments, NTP concluded the lesions were mediated by the adrenal hormone adrenalin.29

The NTP study also found evidence of effects on the liver: increases in bile acids as well as two liver enzymes were found in both males and females. Other effects found in this study were reduced weight gain in male and female rats and mice; diarrhea in male and female rats; and changes in the relative weights of kidney, liver and thymus in male rats and mice.29

Other subchronic laboratory tests found decreased weight gains (using doses of 2500 mg/kg per day)30 along with an increase in the weights of brain, hearts, kidney, and livers in mice.2 In rats, blood levels of potassium and phosphorus increased at all doses tested (60-1600 mg/kg/day) in both sexes. There was also an increase in pancreatic lesions in males.4

As in acute toxicity tests, glyphosate-containing products are more toxic than glyphosate alone in subchronic tests. In a 7 day study with calves, 790 mg/kg of Roundup caused labored breathing, pneumonia, and death of 1/3 of the animals tested. At lower doses decreased food intake and diarrhea were observed.2

## Chronic Toxicity

Glyphosate is also toxic in long-term studies. The following effects were found in lifetime glyphosate feeding studies using mice: decreased body weight, excessive growth of particular liver cells, death of the same liver cells, and chronic inflammation of the kidney. Effects were significant only in males and at the highest dose tested (about 4800 mg/kg of body weight per day). In females, excessive growth of some kidney cells occurred.31 At a lower dose (814 mg/kg of body weight per day) excessive cell division in the urinary bladder occurred.2

Lifetime feeding studies with rats found the following effects: decreased body weight in females; an increased incidence of cataracts and lens degeneration in males; and increased liver weight in males. These effects were significant at the highest dose tested (900-1200 mg/kg of body weight per day).4 At a lower dose (400 mg/kg of body weight per day) inflammation of the stomach's mucous membrane occurred in both sexes.2

## Carcinogenicity

The potential of glyphosate to cause cancer has been a controversial subject since the first lifetime feeding studies were analyzed in the early 1980s. The first study (1979-1981) found an increase in testicular interstitial tumors in male rats at the highest dose tested (30 mg/kg of body weight per day).32 as well as an increase in the frequency of a thyroid cancer in females.33 The second study (completed in 1983) found dose-related increases in the frequency of a rare kidney tumor in male mice.34 The most recent study (1988-1990) found an increase in the number of pancreas and liver tumors in male rats together with an increase of the same thyroid cancer found in the 1983 study in females.35

All of these increases in tumor incidence are "not considered compound-related"35 according to EPA. In each case, different reasons are given for this conclusion. For the testicular tumors, EPA accepted the interpretation of an industry pathologist who said that the incidence in treated groups (12 percent) was similar to those observed in other control (not glyphosate-fed) rat feeding studies (4.5 percent).36 For the thyroid cancer, EPA stated that it was not possible to consistently distinguish between cancers and tumors of this type, so that the incidences of the two should be considered together. The combined data are not statistically significant.33 For the kidney tumors, the registrants reexamined slides of kidney tissue, finding an additional tumor in untreated mice so that statistical significance was lost. This was despite a memo from EPA's pathologist stating that the lesion in question was not really a tumor.34 For the pancreatic tumors, EPA stated that there was no dose-related trend and no progression to malignancy. For the liver tumors and the thyroid tumors, EPA stated that pairwise comparisons between treated and untreated animals were not statistically significant and there was no progression to malignancy.35

EPA concluded that glyphosate should be classified as Group E, "evidence of non-carcinogenicity for humans."35 They added that this classification "is based on the available evidence at the time of evaluation and should not be interpreted as a definitive conclusion that the agent will not be a carcinogen under any circumstances." 35 From a public health perspective, the results of the laboratory tests leave many questions unanswered. An EPA statistician wrote in a memo concerning one of the carcinogenicity studies, "Viewpoint is a key issue. Our viewpoint is one of protecting the public health when we see suspicious data."36 Unfortunately, EPA has not taken that conservative viewpoint in its assessment of glyphosate's cancer-causing potential.

There are no studies available to NCAP evaluating the carcinogenicity of Roundup or other glyphosate-containing products. Without such tests, the carcinogenicity of glyphosate-containing products is unknown.

## Mutagenicity

Laboratory studies of a variety of organisms have shown that glyphosate-containing products cause genetic damage:

* In fruit flies, Roundup and Pondmaster (an aquatic herbicide consisting of glyphosate and a trade secret surfactant)37 both increased the frequency of sex-linked, recessive lethal mutations. (These are mutations that are usually visible only in males because two damaged genes are required in order to be expressed in females.) In this study, the frequency of lethal mutations was between 3 and 6 times higher in fruit flies that had been exposed to glyphosate products during their larval development than in unexposed flies.38

* A laboratory study of human lymphocytes (one type of white blood cell) showed an increase in the frequency of sister chromatid exchanges following exposure to high doses of Roundup.39 (Sister chromatid exchanges are exchanges of genetic material during cell division between members of a chromosome pair. They result from point mutations.)

* In Salmonella bacteria, Roundup was weakly mutagenic at high concentrations. In onion root cells, Roundup caused an increase in chromosome aberrations.40

Glyphosate alone has rarely caused genetic damage in laboratory tests. None of the mutagenicity studies required for registration of glyphosate have shown it to be mutagenic. Tests included studies of mutations in hamster ovary cells, bacteria, and mouse bone marrow cells.4 Glyphosate was also not mutagenic in other studies of rats, mice,2 and onion cells40 but caused chromosome stickiness and fragmentation in water hyacinth root cells.41

## Reproductive Effects

Laboratory studies have demonstrated a number of effects of glyphosate on reproduction,including effects on mothers, fathers, and offspring.

In rat feeding studiess, glyphosate reduced sperm counts (at the two highest doses tested) andlengthened the estrous cycle, how often a female comes into heat (at the highest dose tested).29 Other effects on mother rats in laboratory tests include soft stools, diarrhea, breathing rattles, red nasal discharge, reduced activity, growth retardation, decreased body weights, and increased mortality.2 Effects on offspring included an increase in fetal loss, a decrease in the number of embryos successfully implanted into the uterus, a decrease in the number of viable fetuses, a slight decrease in litter size, a decrease in fetal and pup weights, and an increase in problems with breast bone formation.2 Effects were observed at the highest doses tested (1500 and 3500 mg/kg of body weight per day).2

In a study of rabbits using doses that were lower than those used in the rat studies above, glyphosate caused diarrhea, nasal discharge, and death in mothers.2 The only effect on offspring was a decrease in fetal weight in all treated groups.42

A study in which glyphosate was fed to rats for three generations after which the offspring were examined for birth defects found kidney damage at a relatively low dose (30 mg/kg of body weight). However, a second study (only two generations long) did not find similar effects, and EPA called the damage in the first study "spurious."4 From a public health perspective, however, a new three generation study is crucial.

**Toxicology of Glyphosate's Major Metabolite**

In general, studies of the breakdown of glyphosate find only one metabolite,aminomethylphosphonic acid (AMPA).2 (See Figure 5.) Although AMPA has low acute toxicity (its LD50 is 8,300 mg/kg of body weight in rats)20 and is only slightly irritating to eyes,43 it causes a variety of toxicological problems. In subchronic tests on rats, AMPA caused decreased weight gain in males; an increase in the acidity of urine in both males and females; an increase in the activity of an enzyme, lactic dehydrogenase, in both sexes; a decrease in liver weights in males at all doses tested; and excessive cell division in the lining of the urinary bladder and in part of the kidney in both sexes.20 AMPA is much more persistent than glyphosate; studies in eight states found that the half-life in soil (the time required for half of the original concentration of a compound to break down or dissipate) were between 119 and 958 days.2

**Quality of Toxicology Testing**

Tests done on glyphosate to meet registration requirements have been associated with fraudulent practices.

Laboratory fraud first made headlines in 1983 when EPA publicly announced that a 1976 audit had discovered "serious deficiencies and improprieties" in toxicology studies conducted by Industrial Biotest Laboratories (IBT).44 Problems included "countless deaths of rats and mice that were not reported," "fabricated data tables," and "routine falsification of data."44

IBT was one of the largest laboratories performing tests in support of pesticide registrations.44 About 30 tests on glyphosate and glyphosate-containing products were performed by IBT, including 11 of the 19 chronic toxicology studies.45 A compelling example of the poor quality of IBT data comes from an EPA toxicologist who wrote, "It is also somewhat difficult not to doubt the scientific integrity of a study when the IBT stated that it took specimens from the uteri (of male rabbits) for histopathological examination."46 (Emphasis added.)

In 1991, laboratory fraud returned to the headlines when EPA alleged that Craven Laboratories, a company that performed contract studies for 262 pesticide companies including Monsanto, had falsified test results.47 "Tricks" employed by Craven Labs included "falsifying laboratory notebook entries" and "manually manipulating scientific equipment to produce false reports."48 Roundup residue studies on plums, potatoes, grapes, and sugarbeets were among the tests in question.49

The following year, the owner/president of Craven Laboratories and three employees were indicted on 20 felony counts. A number of other employees agreed to plead guilty on a number of related charges.50 The owner was sentenced to five years in prison and fined $50,000; Craven Labs was fined 15.5 million dollars, and ordered to pay 3.7 million dollars in restitution.48

Although the tests of glyphosate identified as fraudulent have been replaced, these practices cast shadows on the entire pesticide registration process.

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# Glyphosate, Part 2: Human Exposure and Ecological Effects

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## Overview

Residues of the commonly-used herbicide glyphosate have been found in a variety of fruits and vegetables. Residues can be detected long after glyphosate treatments have been made. Lettuce, carrots, and barley planted a year after glyphosate treatment contained residues at harvest.

In California, where reporting of pesticide-caused illnesses is more comprehensive than in other states, glyphosate exposure was the third most commonly-reported cause of pesticide illness among agricultural workers. For landscape maintenance workers, glyphosate ranked highest.

Glyphosate can drift away from the site of its application. Maximum drift distance of 400 to 800 meters (1300-2600 feet) have been measured.

Glyphosate residues in soil have persisted over a year.

Although not expected for an herbicide, glyphosate exposure damages or reduces the population of many animals, including beneficial insects, fish, birds, and earthworms. In some cases glyphosate is directly toxic; for example, concentrations as low as 10 parts per million can kill fish and 1/20 of typical application rates caused delayed development in earthworms. In other cases, (small mammals and birds, for example) glyphosate reduces populations by damaging the vegetation that provides food and shelter for the animals.

Glyphosate reduces the activity of nitrogen-fixing bacteria. These bacteria transform nitrogen, an essential plant nutrient, into a form that plants can use. Glyphosate reduces the growth of mycorrhizal fungi, beneficial fungi that help plants absorb water and nutrients. Glyphosate also increases the susceptibility of plants to diseases, including Rhizoctonia root rot, take-all disease, and anthracnose.

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Glyphosate is a widely-used, broad-spectrum herbicide that is used to kill unwanted plants in a wide variety of agricultural, lawn and garden, aquatic, and forestry situations. It ranks among the top ten herbicides used in the U.S., both in agricultural and nonagricultural situations. Common brand names are Roundup, Rodeo, Accord, and Vision. This is the second part of a summary of glyphosate's hazards. Part 1 (JPR 15(3):14-20) discussed the toxicology of glyphosate, its breakdown products, and the other ingredients in glyphosate-containing products. This part discusses human exposure to glyphosate and its ecological effects.

## Human Exposure

The most important ways that people are exposed to glyphosate are through workplace exposure (for people who use glyphosate products on the job), eating of contaminated food, exposure caused by off-target movement following application (drift), contact with contaminated soil, and drinking or bathing in contaminated water. The next five sections of this factsheet summarize information about these five routes of exposure. The third section, discussing drift, also covers impacts on plants.

## Contamination of Food

Analysis of glyphosate residues is "in general laborious, complex, and costly."1 For this reason, it is not included in government monitoring of pesticide residues in food.1 The only information available about contamination of food comes from research situations. Such studies demonstrate several important points:

* First, glyphosate can be taken up by plants and moved to parts of the plant that are used for food. For example, glyphosate has been found in strawberries,2 wild blueberries and raspberries,3 lettuce, carrots, barley,4 and fish5,6 following treatment.

* Second, pre-harvest use of glyphosate on wheat (to dry out the grain prior to harvest) results in "significant residues in the grain,"1 according to the World Health Organization. Bran contains between 2 and 4 times the amount on whole grains. Residues are not lost during baking.1

* Third, glyphosate residues can be found in food long after treatments have been made. For example, lettuce, carrots, and barley contained glyphosate residues at harvest when planted a year after treatment.4

## Occupational Exposure

Workers in a variety of occupations are exposed to glyphosate. Researchers have documented exposure for forestry workers in Finland7 and the southeastern U.S., palm plantation workers in Malaysia1 and conifer nursery workers in Mississippi and Oregon.8 All of these studies generally found low, but consistent, exposure rates.

Physicians, however, paint a different picture. In California, the state with the most comprehensive program for reporting of pesticide-caused illness, glyphosate was the third most commonly-reported cause of pesticide illness among agricultural workers.9 Among landscape maintenance workers, glyphosate was the most commonly reported cause.10 (Both these statistics come from reviews of illness reports collected between 1984 and 1990.) Even when glyphosate's extensive use in California is considered, and the illness statistics presented as "number of acute illnesses reported per million pounds used in California," glyphosate ranked twelfth.9

## Drift

In general, movement of a pesticide through unwanted drift is "unavoidable."11 Drift of glyphosate is no exception. Glyphosate drift, however, is a particularly significant problem. Its wide use means that there is a correspondingly large potential for drift.12 When drift does occur, "damage is likely to be much more extensive and more persistent than with many other herbicides. "13 This is because glyphosate translocates (moves) within plants readily so that even unexposed parts of a plant can be damaged. Damage to perennial plants (when not exposed to enough glyphosate to kill them) is persistent, with some symptoms lasting several years.13 In addition, plant susceptibility varies widely. Some wildflowers are almost a hundred times more sensitive than others; small amounts of drift will damage these species.14

A fundamental question about drift is "How far can I expect glyphosate to travel off-site?" Unfortunately, the question is difficult to answer, since drift is "notoriously variable."15 Factors that increase drift are aerial application techniques, high wind speeds (over 10 kilometers, or 6 miles, per hour), spray nozzles that produce a high proportion of fine droplets, and calm conditions (without enough turbulence to drive the glyphosate droplets onto plant foliage).15 Drift distances that have been measured for the major application techniques include the following:

* Ground Applications: Between 14 and 78 percent of glyphosate applied as ground sprays moves off-site.15 Seedling mortality has been demonstrated 20 meters (66 feet) downwind when using a tractor-mounted sprayer. Sensitive species were killed at 40 meters (131 feet).16 Models indicate that even more sensitive species would be killed at distances approaching 100 meters (328 feet).14 Glyphosate residues have been measured 400 meters (1312 feet) downwind from ground applications.17

* Helicopter applications: Between 41 and 82 percent of glyphosate applied from helicopters moves off the target site.15 Two studies done in Canada18,19 measured glyphosate residues 200 meters (656 feet) from target areas following helicopter applications to forest sites. In both studies, 200 meters was the farthest distance at which samples were taken, so the longest distance glyphosate travelled is not known.18,19 A third study (from California) found glyphosate 800 meters (2624 feet) downwind following a helicopter application. Again, this was the farthest distance at which measurements were made. Plant injury was recorded 400 meters (1312 feet) downwind.17

Fixed-wing aircraft: Long drift distances occur following applications of glyphosate made from fixed-wing airplanes. Three studies on forested sites conducted by Agriculture Canada (the Canadian agricultural ministry) showed that glyphosate was consistently found at the farthest distance from the target areas that measurements were made (200, 300, and 400 meters, or 656, 984, and 1312 feet).20-22 A California study found glyphosate 800 meters downwind of an airplane application. Again, this was the farthest distance at which measurements were made. Plant injury was observed at 100 meters (328 feet). Unlike the first three studies, this study used a grass field as the test site.17

One of the Canadian studies22 calculated that buffer zones of between 75 and 1200 meters (246 feet - 0.75 miles) would be required to protect nontarget vegetation.

## Soil Contamination

**Persistence:** Glyphosate's persistence in soil varies widely, so giving a simple answer to the question "How long does glyphosate persist in soil?" is not possible. Half-lives (the time required for half of the amount of glyphosate applied to break down or move away) as low as 3 days and as long as 141 days have been measured by glyphosate's manufacturer.4 Initial degradation (breakdown) is faster than the subsequent degradation of what remains, resulting in long persistence.23 Long persistence has been measured in the following studies: 55 days on an Oregon Coast Range forestry site24; 249 days on Finnish agricultural soils25; between 259 and 296 days on eight Finnish forestry sites23; 335 days on an Ontario (Canada) forestry site26; 360 days on 3 British Columbia forestry sites27; and, from 1 to 3 years on eleven Swedish forestry sites.28 These are minimum estimates because, in all but two of these studies, glyphosate was detected on the last date samples were analyzed.

Glyphosate is thought to be "readily bound to many soils and clay minerals"1 and therefore "immobile or slightly immobile in many soils."1 This means that the glyphosate will be unlikely to move away from the application site and contaminate water or soil elsewhere. However, a new study29 paints a different picture. The researchers found that glyphosate bound readily to the four soils studied. However, desorption, when glyphosate unbinds from soil particles, also occurred readily. In one soil, 80 percent of the added glyphosate desorbed in a two hour period. The study concludes that "this herbicide can be extensively mobile in the soil environment.."29

## Water Contamination

Based on the prevailing view that glyphosate binds readily to soil particles, it does not have the chemical characteristics of a pesticide that is likely to leach into either ground or surface water.1 (If it readily desorbs, as described above, this picture would change.) In either case, glyphosate can move into surface water when the soil particles to which it is bound are washed into streams or rivers.4 How often this happens is not known, because routine monitoring for glyphosate in water is infrequent.1

However, glyphosate has been found in both ground and surface water. Examples include two farm ponds in Ontario, Canada, contaminated by run-off from an agricultural treatment (one pond) and a spill (the other pond)30; the run-off from a watersheds treated with Roundup during production of no-till corn and fescue31; contaminated surface water in the Netherlands1; and seven U.S. wells (one in Texas, six in Virginia) contaminated with glyphosate.32

Glyphosate's persistence in water is shorter than its persistence in soils. Two Canadian studies found glyphosate persisted 12 to 60 days in pond water following direct application.33,34 Glyphosate persists longer in sediments. For example, a study of Accord applied to forest ponds found glyphosate residues in sediment 400 days after application.1 The half-life in pond sediments in a Missouri study was 120 days; persistence was over a year in pond sediments in Michigan and Oregon.4

## Ecological Effects

Glyphosate can  impact many organisms not intended as targets of the herbicide. The next two sections describe both direct mortality and indirect effects, through destruction of food or shelter.

### Effects on Nontarget Animals

**Beneficial insects**: Glyphosate-containing products pose hazards to insects that are economically beneficial because they  kill pest insects. The International Organization for Biological Control found that exposure to freshly dried Roundup killed over 50 percent of three species of beneficial insects: a parasitoid wasp, a lacewing, and a ladybug.35 Over 80 percent of a fourth species, a predatory beetle, was killed.

Similar impacts on beneficial insects have been shown in field studies. In North Carolina winter wheat fields, populations of large carabid beetles declined after treatment with a commercial glyphosate product and did not recover for 28 days.36 A study of Roundup treatment of pasture hedgerows in the United Kingdom showed a similar decline in carabid beetles.37

Roundup treatment of a Maine clear-cut caused an 89 percent decline in the number of herbivorous (plant-eating) insects. While these are not usually considered beneficial insects, they serve as an important food resource for birds and insect-eating small mammals.38

Aquatic insects can also be affected by glyphosate. Midge larvae (important food for breeding waterfowl39) are killed by glyphosate in amounts that vary widely. For example, one study found that 55 parts per million (ppm) of glyphosate killed midge larvae6 while other studies found that 65040 -560039 ppm of Rodeo (containing glyphosate and water) were required to kill the larvae. Part of the variability is related to water hardness.39

The U.S. Fish and Wildlife Service has identified one endangered species of insect, a longhorn beetle, that would be jeopardized by use of glyphosate.41

**Other arthropods**: Glyphosate and glyphosate-containing products kill a variety of other arthropods. For example, over 50 percent of test populations of a predatory mite that is an important predator of pest mites was killed by exposure to Roundup.35 In another laboratory study, Roundup exposure caused a decrease in survival and a decrease in body weight of woodlice. These arthropods are important in humus production and soil aeration.42 Roundup treatment of pasture hedgerows reduced the number of spiders, probably by killing the plants they preferred for web-spinning.37 The water flea Daphnia pulex is killed by concentrations of Roundup between 3 and 25 ppm.6,43,44 Young Daphnia are more susceptible than mature individuals, and suspended sediments in the water increased the toxicity.43 The red swamp crawfish, a commercial species, was killed by 47 ppm of Roundup.45

**Fish:** Both glyphosate and the commercial products that contain glyphosate are acutely toxic to fish. In general, glyphosate alone is less toxic than the common glyphosate product, Roundup, and other glyphosate products have intermediate toxicity. Part of these differences in toxicity to fish can be explained by the toxicity of the surfactant (detergent-like ingredient) in Roundup. It is about 30 times more toxic to fish than glyphosate itself.44

Acute toxicities of glyphosate vary widely: median lethal concentrations (LC50s; the concentrations killing 50 percent of a population of test animals) from 10 ppm to over 1000 ppm have been reported depending on the species of fish and test conditions.1 In soft water there is little difference between the toxicities of glyphosate and Roundup.

Acute toxicities of Roundup to fish range from an LC50 of 3.2 ppm to an LC50 of 52 ppm.1 Acute toxicities of Rodeo (used with the surfactant X-77 per label recommendations) vary from 120 to 290 ppm.46

Factors important in determining the toxicity of glyphosate or glyphosate-containing products to fish include the following:

* First, different species of fish have different susceptibilities. For example, coho and chinook salmon are more tolerant of glyphosate than pink or chum salmon.47

* Water quality is important: glyphosate in soft water was 20 times more toxic to rainbow trout than was glyphosate in hard water. For Roundup, the reverse is true: it is more toxic in hard water than in soft.47,48

* Age affects the susceptibility of fish because juveniles are often more susceptible than adults. For example, Roundup was four times more toxic to rainbow trout fry and fingerlings than it was to larger fish.6

* Nutrition also can determine toxicity. Hungry fish are more susceptible to glyphosate than fed fish. For example, fed flagfish were 10 times more tolerant of glyphosate than unfed fish.49

* Finally, glyphosate toxicity increases with increased water temperature. In both rainbow trout and bluegills, toxicity about doubled between 7 and 17!C (45 and 63!F).6 Treatment of riparian areas with glyphosate causes water temperatures to increase for several years following treatment 50 because the herbicide kills shading vegetation. This means that repeated use of glyphosate in a watershed could favor its increased toxicity to fish. In addition, the temperature increase itself could be critical for fish, like juvenile salmon, that are sensitive to water temperature.

Sublethal effects of glyphosate on fish are also significant and occur at low concentrations. Studies of rainbow trout and Tilapia found that concentrations of about 1/2 and 1/3 of the LC50 (respectively) caused erratic swimming.51,52 The trout also exhibited labored breathing.51 Behavioral effects can increase the risk that the fish will be eaten, as well as affecting feeding, migration, and reproduction.52

**Birds**: Glyphosate is acutely toxic to birds, but only in large amounts. The LC50, the amount in food that kills 50 percent of a population of test animals, is often above 4000 milligrams per kilogram of food.1

Glyphosate also has indirect impacts on birds. Because glyphosate kills plants, its use creates a dramatic change in the structure of the plant community. This affects bird populations, since the birds depend on the plants for food, shelter, and nest support.

For example, a study of four glyphosate-treated clear-cuts (and an unsprayed control plot) in Nova Scotia found that the densities of the two most common species of birds (white-throated sparrow and common yellowthroat) decreased for two years after glyphosate treatment. By the fourth year post-spray, densities had returned to normal for these two species. However, the unsprayed plot had by then been colonized by new species of birds (warblers, vireos, and a hummingbird). These species did not appear on the sprayed plots.53

An earlier three year study of songbird abundance following glyphosate treatment of clear-cuts in Maine forests showed similar results. Abundances of the total number of birds (Figure 2) and three common species decreased. The decrease in bird abundance was correlated with decrease in the diversity of the habitat.54

Black grouse avoided glyphosate-treated clear-cuts in Norway for several years after treatment.55 Researchers recommended that the herbicide not be used near grouse courtship areas.

**Small mammals**: In field studies, small mammals have also been indirectly affected when glyphosate kills the vegetation they (or their prey) use for food or shelter. This was first shown in studies of clear-cuts in Maine.38 Insect-eating shrews declined for three years post-treatment; plant-eating voles declined for two. A second study in Maine56 found similar results for voles, but not shrews. A British Columbia study found that deer mice populations were dramatically (83 percent) lower following glyphosate treatment.57 While some other studies have found no affect on mice, this may have occurred because treated areas were small.1 This suggests that effects are more severe when large areas are treated.

In Norway, there was a "strong reduction" in use of sprayed clear-cuts by mountain hare.58

**Earthworms:** A study of the most common earthworm found in agricultural soils in New Zealand showed that glyphosate significantly affects growth and survival of earthworms. Repeated biweekly applications of low rates of glyphosate (1/20 of typical rates) caused a reduction in growth, an increase in the time to maturity, and an increase in mortality.59

## Effects on Nontarget Plants

As a broad-spectrum herbicide, glyphosate has potent acutely toxic effects on most plant species. However, there are other kinds of serious effects. These include effects on endangered species, reduction in the ability to fix nitrogen, increased susceptibility to plant diseases, and reduction in the activity of mycorrhizal fungi.

**Endangered species**: Because essentially all plants are susceptible to glyphosate-caused damage or mortality, glyphosate can seriously impact endangered plant species. The U.S. Fish and Wildlife Service has identified 74 endangered plant species that it believes could be jeopardized by use of glyphosate. This list is based on the use of glyphosate on 9 crops, and does not include over 50 other uses.41

**Nitrogen fixation**: Nitrogen is important because of its "near omnipresence" in membranes, proteins, and genetic material of living things. Most living things cannot use nitrogen in its common form and instead use ammonia and nitrates, much rarer compounds. The processes by which ammonia and nitrates are created are called nitrogen fixation and nitrification. They are carried out by certain bacteria.60

A number of studies (from Iowa,61 Australia,62 eastern Canada,63 and Ontario (Canada)64,65) have shown that commercial glyphosate products can reduce nitrogen-fixing or nitrification activity of soils. The amount of glyphosate that produces inhibitory effects varies from 262 to 200063 ppm. Effects can be persistent; the formation of nitrogen-fixing nodules on clover roots was inhibited 120 days after treatment. 62

In addition, tests of cultured nitrogen-fixing bacteria have also shown that glyphosate inhibits nitrogen-fixation. These studies included the nitrogen-fixing species in roots of soybeans66 and clover.67-68

Given the importance of nitrogen-fixation to agriculture, more research is crucial.

**Mycorrhizal fungi**: Mycorrhizal fungi are beneficial fungi that live in and around plant roots. They help plants absorb nutrients and water and can protect them from cold and drought.69 Glyphosate is toxic to many species of mycorrhizal fungi. Effects, mostly growth inhibition, have been observed at concentrations between 1 and 100 ppm.70-73

**Plant diseases**: Glyphosate treatment increases the susceptibility of crop plants to a number of diseases. For example, glyphosate reduced the ability of bean plants to defend themselves against the disease anthracnose.74 Glyphosate increased the growth of take-all disease in soil from a wheat field. In addition, the proportion of soil fungi which was antagonistic to the take-all fungus decreased.75 Bean seedlings also survived glyphosate treatment when grown on sterile soil, but not when grown on normal (not sterilized) soil.76 Spraying of Roundup prior to planting barley increased the severity of Rhizoctonia root rot and decreased barley yield.77 In addition, Roundup injection of lodgepole pine inhibited the defensive response of the tree to blue stain fungus.78

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August 3, 2021

Dr. Adam Moreno
Lead Natural Working Lands Climate Scientist
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Implementation of Below Ground Carbon Sequestration Modeling

Dear Dr. Moreno:

We thank you and your team at the California Air Resources Board (CARB) for taking time to meet with representatives of several environmental protection groups, scientists, and concerned individuals on Thursday, July 22, 2021 to provide feedback on aspects related to quantifying a statewide carbon target for use in the upcoming Scoping Plan Update (California's roadmap for combating climate change).

During this meeting we were made aware that currently, CARB's potential modeling system for quantifying carbon in California lacks the appropriate systems to record the amount of carbon sequestration taking place below-ground. It's our understanding that CARB's modeling systems require them to fit within Intergovernmental Panel on Climate Change (IPCC) protocols -- which are deficient in desert carbon sequestration studies and modeling systems.

A complicating factor in desert carbon modeling is an assumption that inorganic carbon cannot be included in carbon modeling because we are unable to increase inorganic carbon, and therefore we cannot plan to manage it. While it is true that we cannot increase inorganic carbon stores, we certainly can degrade the capacity for carbon sequestration and storage in desert soils by land management practices that allow for vegetation removal and soil disturbance.

Another complicating factor is that the desert ecosystem is not homogeneous, but instead is a mix of varied topographic and geologic features, habitats, microhabitats, and climatic variations depending on elevation and location. One model for the entire desert may not correctly predict the carbon processes for every acre of the desert.

*(continued on next page)*

Based on scientific evidence, it is our position that:

- Production of organic carbon is low in hot desert ecosystems. Therefore, carbon in desert ecosystems has been overlooked or even criticized as a crucial element in global and regional models. ***But there are very high pulses of carbon inputs that scientists do not understand.***

- Up to 10% of carbon sequestration in California stems from below-ground activity in its deserts (see appendix B).

- California's hot deserts contain a large pool of inorganic carbon in the form of calcium carbonate (caliche), derived from biological processes. Because of carbon's potential to remain sequestered in mineralized form for eons, it is often considered that carbon stored underground in caliche does not affect greenhouse gases, so it should not be included in carbon models. Although this mineralized carbon can be stored underground for many thousands of years, it can also be released back into the atmosphere if weathered upon exposure when disturbed.

- Carbon is patchy across California's deserts, and can be distributed between 1 meter (3 feet) and 60 meters (197 feet) deep, below depths commonly surveyed. Most research involving carbon storage in desert soils has been conducted to depths of 1 meter or less, but carbon capture in hot desert ecosystems occurs mostly below those depths.

- Inorganic carbon is fixed but dependent upon bioweathering of calcium. While the chemical steps are well known, the temporal and spatial interaction patterns are complex.

Therefore, we urge you and your colleagues to consider Appendix A, a white paper authored by Dr. Michael Allen, Distinguished Professor Emeritus, Department of Microbiology and Plant Pathology University of California, Riverside as a means to properly model carbon sequestration in the California desert; and Appendix B, a science briefing by Defenders of Wildlife scientist, Dr. Lindsay Rosa.

Dr. Allen's white paper compares various models for relative success or shortfalls in tracking carbon across the desert landscape. Highlights from his white paper (with citations) that can serve as a roadmap include:

<u>Models of carbon accumulation</u> ~

- **DayCENT**: Parton et al. 1998. Global and Planetary Change: 19:35

- **Hydrus**: Šimůnek, & Suarez. 1993. Water Resources Research, 29: 487

- Šimůnek et al. 2005. University of California, Riverside, Research Reports, 240.

However, *empirical data of groundwater access is critical* to accurately model carbon accumulation: Kitajima et al. 2013. Journal of Geophysical Research- Biogeosciences

118: 1561, data underlying Allen et al. 2014. In M. Tausz, N.E. Grulke (eds). Trees in a changing environment.

Model of calcium carbonate sequestration ~

- **SLIC**: Hirmas et al. Geoderma 154: 486. *But actual rhizosphere $CO_2$ concentration empirical data* are needed as inputs: Allen et al. 2013. CEC-500-2013-063.

It is our hope to shed light on the intricate but largely unacknowledged sequestration processes that work together to capture and store carbon deep in hot desert soils. We appreciate your review of our material and welcome further conversations with you and your colleagues at CARB. The health of our planet and our communities deserve to have our "lungs" in the desert protected and conserved. We thank you in advance for your consideration and all the work that this type of endeavor requires.

Best regards,

Signatories:

Sam Young
Important Plant Areas Program Manager
California Native Plant Society

Dr. Rebecca R. Hernandez, Associate Professor
Wild Energy Initiative - Muir Institute of the Environment | Energy and Efficiency Institute
University of California, Davis

Lauren Cullum
Policy Advocate
Sierra Club California

Chris Clarke
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National Parks Conservation Association

Frazier Haney
Executive Director
The Wildlands Conservancy

Susan Philips, Ph.D.
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Environmental Analysis Faculty at Pitzer College

Sendy Barrows
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Robin Kobaly
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Steve Bardwell
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Morongo Basin Conservation Association

Dr. Michael Allen, Distinguished Professor Emeritus
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Defenders of Wildlife

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Center for Biological Diversity

Geary Hund
Executive Director
Mojave Desert Land Trust

*(end)*

# APPENDIX A

# NOTES ON MODELS OF CARBON DYNAMICS FOR THE CALIFORNIA DESERTS

(content begins on next page)

# Notes on Models of Carbon Dynamics for the California Deserts

Prepared By Michael F. Allen, Ph.D., Distinguished Professor Emeritus,
Department of Microbiology and Plant Pathology, UC Riverside

Production of organic Carbon ($C_{organic}$) is generally low in hot desert ecosystems. Net primary production in the Mojave desert generally ranges from 10 to 30gC/m$^2$/y (Rundel and Gibson 1996), with a pool of 0.9 to 1.1kgC/m$^2$ (Evans et al. 2014). Photosynthesis is limited by temperature and moisture, and decomposition can remain high. $Q_{10}$ values for RuBP Carboxylase is generally credited as a bit over 2 for ten degree increments between 10 and 40$^o$C. Above 30$^o$C, rates of photosynthesis decline rapidly. In deserts, however, soil respiration rates indicative of enzymatic activity can remain high up to 60 to 70$^o$C (Cable et al. 2011). For this reason, C in desert ecosystems has been overlooked or even criticized as a crucial element in global and regional models.

Importantly, there are reports of very high rates of net ecosystem exchange of C (e.g., Xie et al. 2009, Wohlfahrt et al. 2008). These have been criticized as being unreasonable (Schlesinger and Amundson 2019), but no one has provided an alternative explanation for the measured values. While scientists continue to study the patterns and mechanisms of $C_{organic}$ in deserts, we know that California deserts have been accumulating inorganic C ($C_{inorganic}$) for millennia (Schlesinger 1986). While some measurements of the rates of input are controversial, including localized, temporal values equal to those of forest ecosystems (e.g., Schlesinger et al. 2009, Schlesinger and Amundson 2019), ***a large pool of stored C has the potential to be lost through anthropogenic disturbance and exposure***. The mechanisms of C dynamics in desert ecosystems are outlined here with a focus on southern California.

Cable, J. M., K. Ogle, D. G. Williams, J. F. Weltzin, and T. E. Huxman. 2008. Soil texture drives responses of soil respiration to precipitation pulses in the Sonoran Desert: Implications for climate change. Ecosystems **11**:961-979.

Evans, R. D., A. Koyama, D. L. Sonderegger, T. N. Charlet, B. A. Newingham, L. F. Fenstermaker, B. Harlow, V. L. Jin, K. Ogle, S. D. Smith, and R. S. Nowak. 2014. Greater ecosystem carbon in the Mojave Desert after ten years exposure to elevated $CO_2$. Nature Climate Change **4**:394-397.

Rundel, P., and A. Gibson. 1996. Ecological communities and processes in a Mojave Desert Ecosystem: Rock Valley, Nevada. Cambridge University Press, Cambridge.

Schlesinger, W. H. 1985. The formation of caliche in soils of the Mojave Desert, California. Geochimica Et Cosmochimica Acta **49**:57-66.

Schlesinger, W. H., and R. Amundson. 2019. Managing for soil carbon sequestration: Let's get realistic. Global Change Biology **25**:386-389.

Schlesinger, W. H., J. Belnap, and G. Marion. 2009. On carbon sequestration in desert ecosystems. Global Change Biology **15**:1488-1490.

Wohlfahrt, G., L. F. Fenstermaker, and J. A. Arnone. 2008. Large annual net ecosystem CO2 uptake of a Mojave Desert ecosystem. Global Change Biology **14**:1475-1487.

Xie, J. X., Y. Li, C. X. Zhai, C. H. Li, and Z. D. Lan. 2009. CO2 absorption by alkaline soils and its implication to the global carbon cycle. Environmental Geology **56**:953-961.

**What is Caliche?**

Caliche is a layer of calcium carbonate ($CaCO_3$) formed between the soil surface, and accumulating at the depth to which water will percolate carrying calcium (Ca) and to which roots will respire $CO_2$. $CO_2$ from respiring roots and microorganisms, plus atmospheric $CO_2$, dissolves in rainwater forming bicarbonate $HCO_3^-$ and hydrogen ions ($H^+$). Using the free Ca, the equilibrium reaction results in $CaCO_3$, and the $CaCO_3$ crystals precipitate, until the next storm, when the reaction reoccurs and percolates the dissolved $CaCO_3$ in solution down to that storm's depth.

Caliche forms in bajadas below mountains comprised of high concentrations of Ca, particularly basalts (mineral CaO) and silicates ($CaSiO_3$) and limestone $CaCO_3$ formed under the oceans and pushed up geologically, along with its derivatives, dolomite (with added Mg) and marble, limestone's metamorphic derivative. Weathering of well-known mountain ranges, including the Alps and the Himalayas, yields Ca. When in semi-arid to arid regions, deep layering of $CaCO_3$ forms, such as in most of Mediterranean Europe, and the deserts of the southwestern US and northwestern Mexico. As much C in the form of $CO_3$ is sequestered in arid to semiarid soils as in plant organic C mass globally, and there remains a large "missing sink of C" somewhere in terrestrial ecosystems.

Despite the large amount of $CaCO_3$ sequestered over the past several thousand years, three assumptions contribute to a view among decision-makers that this C can be ignored in the quest to understand C fluxes between the biosphere and the atmosphere. These are three assumptions that pose serious limitations to global carbon modeling and are at least contributors to the large gaps remaining in closing the global C models. These are: (1) $CaCO_3$ is patchily distributed globally and not easily mapped, (2) that the processes are geological and, because the dominant form is inorganic ($CaCO_3$), it is a geological and not biological process. Therefore, no accounting need be undertaken using ecosystem models. And (3), there is an assumption that the rates of transformations and loss are on a geological time scale and not relevant to global change models.

Given that approximately 40% of the increase in atmospheric $CO_2$ driving global climate change is due to land use change (compared with 60% from fossil fuel burning), it is critical to understand the nature of the largest single terrestrial C pool, especially since much of it is in desert ecosystems.

## 1) How much and where is Carbon in California deserts?

Surface soil $CaCO_3$ is distributed widely, but in patches throughout the desert. In the surface layers, we can see, for example large swaths in the southern California (SoCal) deserts, where as much as 5% or more of the surface soil is $CaCO_3$ (Fig 1).

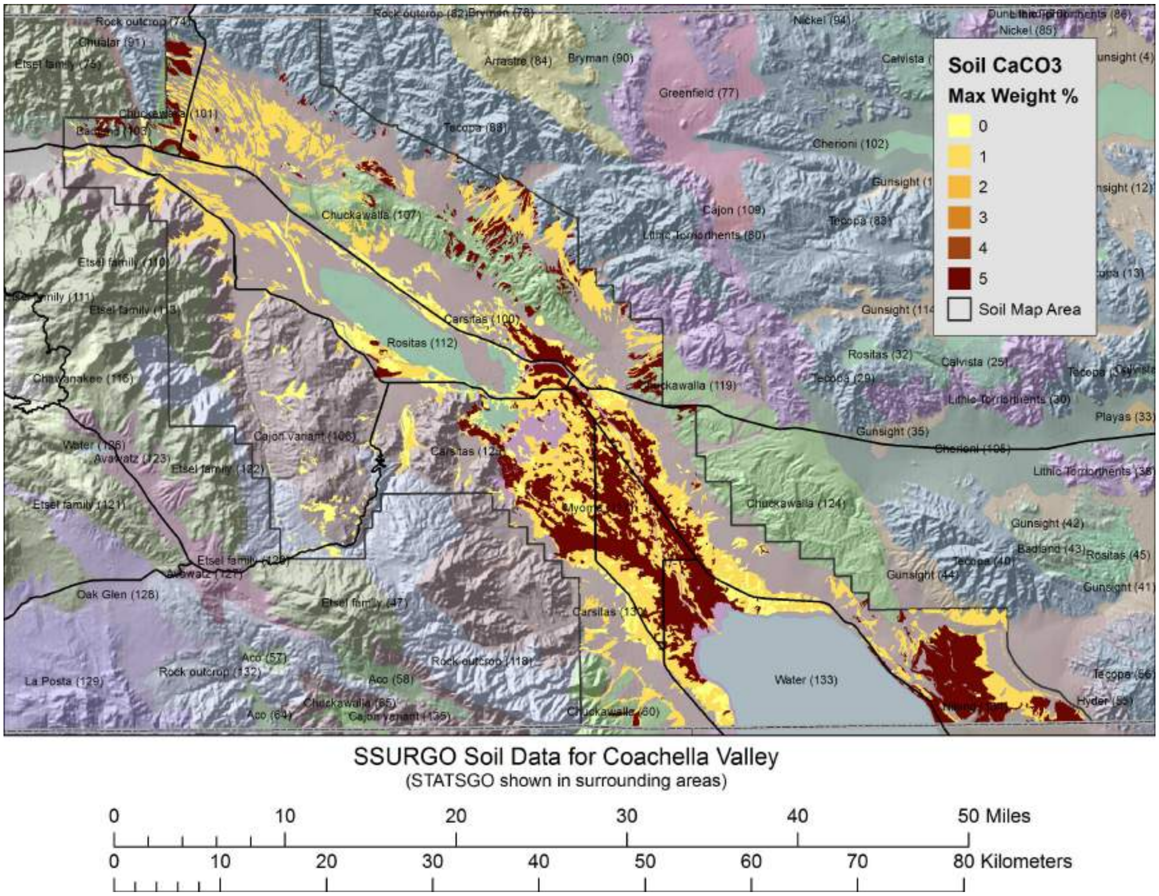



*Figure 1. USDA NRS high resolution SSURGO map for surface soil $CaCO_3$, adding the STATSGO data for areas surrounding the Coachella Valley, information from (https://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/survey/office/ssr12/tr/?cid=nrcs142p2_010596). Map created by the Center for Conservation Biology, UCR.*

Schlesinger (1985) found that at depths in the Chuckwalla Valley of greater than a meter, as much as 12% was $CaCO_3$, or between 30 and 70kg/m$^2$ of $CaCO_3$; or between 4 and 8.4kg $C_{inorganic}$/m$^2$, or as much C as is stored in mixed grass prairie as soil organic C.

Schlesinger, W.H. 1985. The formation of caliche in soils of the Mojave Desert, California. *Geochimica et Cosmochimica Acta* 49: 57-66.

Other C forms may also be critical in desert ecosystems. Garvie (2006) reported an accumulation of 2.4g $C_{inorganic}$/m$^2$/y under saguaro cactus accumulating as much as 40g $C_{inorganic}$/m$^2$, through the production and release of oxalic acid. The importance of oxalic acid rests not only in and of itself, nor its role in P (phosphorus) nutrition of plants (Jurinak et al. 1986), but in an ability to lead to $CaCO_3$, or caliche accumulation (discussed below).

Garvie, L.A.J. 2006. Decay of cacti and carbon cycling. *Naturwissenschaften* **93,** 114–118. https://doi.org/10.1007/s00114-005-0069-7

It is important to get a better handle on the C distributions and exchanges of both organic and biologically-derived inorganic forms. ***Clearly more extensive surveys of desert C are needed to know how much is actually sequestered.***

**2) Do the processes occur only in geologic time scales** and, because the dominant form is inorganic ($CaCO_3$), can we ignore this sequestered carbon because it is a geological and not a biological process? In essence, what is the time scale?

Bioweathering by fungi and lichens, and even by many plants, commonly occurs initially in the California desert mountains, resulting in a source of Ca downslope to the bajadas. The biogeochemical pathways provide for a continuous dance between Ca and atmospheric $CO_2$ across the landscape from the mountain tops to the desert floor, where C is biotically converted to a form, $CaCO_3$ that can be sequestered. However, this form also can be rapidly weathered upon exposure.

**The BioGeoChemical Pathways for Biologically-derived Inorganic C.**

1) $CO_2$ (atmospheric) -> $C_6H_{12}O_6$ (photosynthesis): plants, lichen algae, cyanobacteria

2) $C_6H_{12}O_6 + O_2$ -> $H_2C_2O_4$ (bioweathering): lichen fungi, plants, mycorrhizal fungi

3) Ca + $H_2C_2O_4$ -> $CaC_2O_4$ (calcium oxalate production): desert crusts, rhizosphere, mycorrhizosphere

4) $CaC_2O_4$ ->Ca + $CO_2$ (C source, degradation): bacteria, fungal exoenzymes

5) $CO_2 + H_2O$ -> $HCO_3^-$ (bicarbonate formation): root and microbial respired $CO_2$

6) Ca + $HCO_3^-$ (in solution) <-> $\mathbf{CaCO_3}$ + $H^+$

***As the soils dry, the $CaCO_3$ precipitates, and upon layering, creates a caliche layer.***

7) If exposed, with rainfall, $CaCO_3 + H^+ + O_2$ <-> $CO_2 + H_2O$ + Ca

8) Ca + $HPO_4^-$ -> $CaPO_4$, $CaSO_4$ (gypsum)

cycle back to step 1 and step 4.

**Description of Steps**: It is important to remember that equilibrium does not equal stasis. Each time $CaCO_3$ goes into solution, some of the $CaCO_3$ dissolves into Ca + $CO_2$ + $H^+$, with a potential for $CO_2$ to be released back to the atmosphere. This is a mechanism whereby Ca moves from the mountains into the bajada, and then deeper into the bajada.

1) $CO_2$ (atmospheric) -> $C_6H_{12}O_6$ , or $C_{organic}$ (photosynthesis): plants, lichen algae, cyanobacteria

Photosynthesis and primary production is well understood, and I will not further elaborate. However, it is important to note that photosynthesis is carried on from the tops of desert mountains to the desert floors in plants and desert crusts. These sources of organic C inputs should never be ignored.

2) $C_6H_{12}O_6 + O_2$ -> $H_2C_2O_4$ (bioweathering): lichen fungi, plants, mycorrhizal fungi

Fungi and bacteria produce oxalic acid, among others including citric acid, carbonic acid, and nitric acid. These acids, especially oxalic acid, in particular, allow the fungi of lichens and the mycorrhizal fungi of plants to acquire P from etched rock surfaces (e.g., Gadd et al. 2014).

Gadd, G.M. et al. 2014. Oxalate production by fungi: significance in geomycology, biodeterioration and bioremediation. Fungal Biology Reviews 28: 36-55. https://doi.org/10.1016/j.fbr.2014.05.001.

3) Ca + $H_2C_2O_4$ -> $CaC_2O_4$ (calcium oxalate production): desert crusts, rhizosphere, mycorrhizosphere

Once arriving at the bajada, oxalic acid is also produced by a wide variety of organisms. Cacti produce high concentrations (Franceschi and Nakata 2005). Many of the fungi in desert crust lichens, but also other biotic crusts produce them. Ectomycorrhizal fungi, such as associated with oaks and pines, produce these acids (e.g., Allen et al. 1996) and even the arbuscular mycorrhizal fungi, formed with the majority of desert perennial plants, form Ca-oxalates as a mechanism, when combined with increasing $CO_2$ respired within the mycorrhizosphere, to obtain limiting P (Jurinak et al. 1986, Knight et al. 1989).

Allen, M.F. C. Figueroa, B.S. Weinbaum, S.B. Barlow, and E.B. Allen. 1996. Differential production of oxalates by mycorrhizal fungi in arid ecosystems. Biology and Fertility of Soils 22: 287-292.

Franceschi, V.R. and P.A. Nakata. 2005. Calcium oxalate in plants: formation and function. Annual Review of Plant Biology 56: 41-71.

Jurinak, J.J., L.M. Dudley, M.F. Allen & W.G. Knight. 1986. The role of calcium oxalate in the availability of phosphorus in soils of semiarid regions: a thermodynamic study. Soil Science 142:255-261.

Knight, W.G., M.F. Allen, J.J. Jurinak and L.M. Dudley. 1989. Elevated carbon dioxide and solution phosphorus in soil with vesicular-arbuscular mycorrhizal western wheatgrass. Soil Science Society of America Journal 53: 1075-1082.

4) $CaC_2O_4$ -> $Ca + CO_2$ (C source, degradation): bacteria, fungal exoenzymes. Once Ca-oxalate is formed, like any organic material, there are both fungi and bacteria awaiting to use it as a carbon source (Morris and Allen 1994, Gadd et al. 2014).

Morris, S.J. and M.F. Allen. 1994. Oxalate metabolizing microorganisms in sagebrush steppe soils. Biology and Fertility of Soils 18: 255-259.

5) $CO_2 + H_2O$ -> $HCO_3^-$ (bicarbonate): root and microbial respired $CO_2$

Once rainwater or groundwater reaches the location where respiration occurs, whether from roots or microbes, bicarbonate is formed. This can be in the surface, or tens of meters deep (see model discussion below). It is important to note that while atmospheric $CO_2$ is increasing (from 310ppm in 1950 to 410 today), soil $CO_2$ can be many thousands of ppm, and we have measured over 2,500ppm at the Boyd Deep Canyon Reserve (see below).

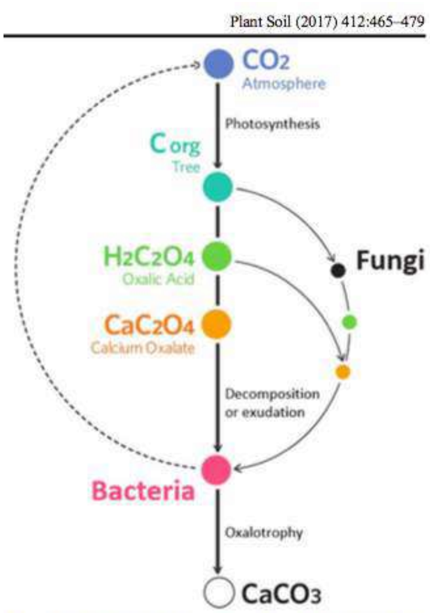



**Fig. 1** A simplified model of the Oxalate-Carbonate Pathway (OCP), a process that transfers carbon dioxide from atmosphere to secondary calcium carbonate. As described by Cailleau et al. (2014), the process commences when a calcium oxalate producing species (Tree) organically sequesters carbon during photosynthesis (Corg), converting it into oxalic acid and then calcium oxalate. Once released from organic material during decomposition or as exudes, calcium oxalate is subsequently catabolised by oxalotrophic bacteria (Bact.), converting one mol as carbonate and releasing another as respired carbon dioxide. Fungi also assist in the process by either breaking down oxalic rich matter and depositing calcium oxalate for catabolism by bacteria, or by fungal oxalotrophy

6) $Ca + HCO_3^-$ (in solution) <-> ***$CaCO_3$*** + $H^+$

**The critical step in Carbon Sequestration!**

In a comprehensive synthesis, Mike Rowley, in Lausanne, Switzerland, and his colleagues showed that the Ca-oxalate pathway concentrates Ca temporally and spatially, where C is sequestered through oxalotrophy through free Ca coupled with the high concentrations of $HCO_3^-$, forming $CaCO_3$ (Figure 2).

*Figure 2. A model showing biotically-controlled $CO_2$ sequestration focused on the Yucatán Peninsula, from Rowley et al. 2017.*

Rowley, M.C., H. Estrada-Medina, M. Tzec-Gamboa et al. 2017. Moving carbon between spheres, the potential oxalate-carbonate pathway of Brosimum alicastrum Sw.; Moraceae. *Plant and Soil 412*: 465-479.

**Time Scales:**

In our efforts to better understand the time scales of C dynamics, we undertook two types of studies. First, we analyzed the $\delta^{18}O$ signals (Delta-Oxygen-18 is an indication of groundwater/mineral interactions) of caliche across the Coachella Valley. These values showed that caliche was dynamic (Allen et al. 2013). This conclusion was collaborated by a subsequent study in the Mojave desert (Mills et al. 2020).

At Deep Canyon, my research group further re-ran the SLIC model (see model discussion below) using our empirical $CO_2$ sensor data to determine the $CaCO_3$ in solution (Allen et al. 2013, Swanson 2017, Swanson et al. in preparation). Importantly, soil $CO_2$ can reach as high as 2,500ppm, as compared with atmospheric $CO_2$ of 395ppm (during the measurements), as soil respiration increased following precipitation events. $CaCO_3$ in solution tracked the $CO_2$ and $H_2O$. As soils dried out, some of the $CaCO_3$ in solution again precipitated forming new caliche deeper in the profile. However, eddy covariance measurements show a large $CO_2$ flux from both undisturbed soils and from sites with no measureable organic C (Allen et al. 2013, Swanson 2017).

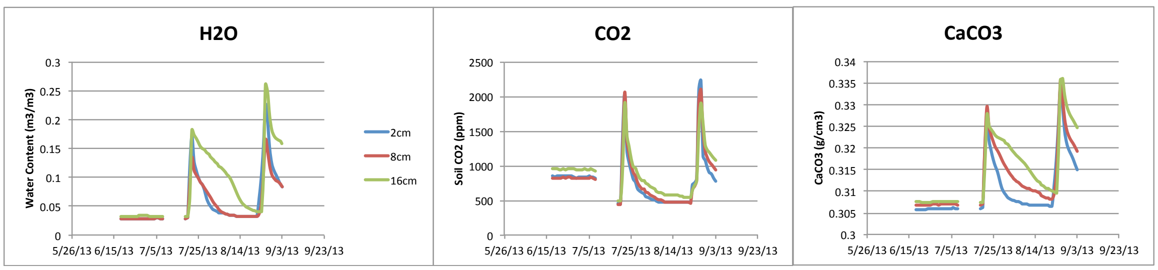



*Figure 3. Daily time scales of soil water, $CO_2$ and modeled solution $CaCO_3$ (SLIC model) following a precipitation event at Boyd Deep Canyon in July through September of 2013 (Allen et al. 2013, Swanson 2017).*

Allen, M. F., G. D. Jenerette, L. S. Santiago. 2013. Carbon Balance in California Deserts: Impacts of Widespread Solar Power Generation. California Energy Commission. Publication number: CEC-500-2013-063.

Swanson, AC. 2017. Disturbance, Restoration, and Soil Carbon Dynamics in Desert and Tropical Ecosystems. PhD. Dissertation. University of California-Riverside.

7) If exposed, with rainfall, $CaCO_3 + H+ + O_2 <-> CO_2 + H_2O + Ca$

$\delta^{18}O$ ratios show that in surface soils, $CaCO_3$ continually turns over (Allen et al. 2013, confirmed by Mills et al. 2020). We do not know where, or how much Ca is redistributed with erosion, but there is considerable wind erosion of Ca, especially as calcium sulphate (Frie et al. 2019).

Allen, M. F., G. D. Jenerette, L. S. Santiago. 2013. Carbon Balance in California Deserts: Impacts of Widespread Solar Power Generation. California Energy Commission. Publication number: CEC-500-2013-063.

Frie, A.L. A.C. Garrison, M. V. Schaefer, S. M. Bates, J. Botthoff, M. Maltz, S. C. Ying, T. Lyons, M. F. Allen, E. Aronson, and R. Bahreini. 2019. Dust Sources in the Salton Sea Basin: A Clear Case of an Anthropogenically Impacted Dust Budget.

*Environmental Science & Technology 53* (16), 9378-9388 DOI: 10.1021/acs.est.9b02137

Mills, Jennifer, Laura Lammers, and Ronald Amundson. 2020. Carbon Balance with Renewable Energy: Effects of Solar Installations on Desert Soil Carbon Cycle. California Energy Commission. Publication Number: CEC-500-2020-075

8) Ca + $HPO_4^-$ -> $CaPO_4$ (bound inorganic P, $CaSO_4$ (gypsum)

Even though in equilibrium, Ca tends to attach to -$CO_3$ but some can bind to phosphate or sulphate (forming gypsum), move in solution downstream, or even blow via wind erosion (Frie et al. 2019).

Frie, A, A Garrison, M Schaefer, S Bates, J Botthoff, M Maltz, S Ying, T Lyons, MF Allen, EL Aronson, R Bahreini. 2019. "Dust Sources in the Salton Sea Basin: A Clear Case of an Anthropogenically Impacted Dust Budget." Environmental Science & Technology. 53(16):9378-9388. doi: 10.1021/acs.est.9b02137.

**(3)** What we are missing is an overall synthesis of the rates of $CO_2$ exchange across the California deserts, both from landscape models, and from local validation measurements. These are crucial for a broad overview of C fluxes in the desert.

**The Models:** One modeling concept uses the assumption that the rates of transformations are on a geological time scale and not relevant to change models. These are the models that should be used and tested.

**DayCENT:** Parton, W. J., M. Hartman, D. Ojima, and D. Schimel. 1998. DAYCENT and its land surface submodel: description and testing. Global and Planetary Change 19:35–48.

The Century model was designed to estimate long-term soil C accumulation. DayCENT is a version of Century using a daily time-step to better understand short-term C dynamics. It is the most sophisticated model available appropriate to generate long-term understanding of soil C. But there are limitations that require a better incorporation of concepts described below and the data and model inputs specific to California's deserts.

Rao et al. 2010 used DayCENT for studying the impacts of Nitrogen deposition on Net Primary Productivity (NPP -or how much CO2 vegetation takes in during photosynthesis minus how much CO2 plants release during respiration) in deserts, mostly as related to fire. But there is one distinct limitation to the current generation of DayCENT models: the ability to access groundwater. During a year dominated by native forbs, simulated production was 20-40g $C/m^2$, but measured production was 60-80g$C/m^2$.

Rao, L.E., E.B. Allen and T. Meixner. 2010. Risk-based determination of critical nitrogen deposition loads for fire spread in southern California deserts. Ecological Applications 20: 1320-1335.

Using DayCENT, Joshua Tree National Park, the accumulated SOM-C (soil organic matter-carbon) ranged from 668 to 916g/m2, depending on N deposition. This compares with measurements ranging up to 2,000g/$m^2$ (USDA 2013).

United States Department of Agriculture, Natural Resources Conservation Service, and United States Department of the Interior, National Park Service. 2013. Soil survey of Joshua Tree National Park, California. (Accessible online at: http://soils.usda.gov/ survey/printed_surveys/)

Much of these production differences were probably due to accessing of deep-water sources. Furthermore, using DayCENT, we do not know inorganic C, the largest pool of C in California deserts.

***Regional expertise for DayCENT- Leelia Rao CARB, G. Darrel Jenerette UCR***

**Limits to DayCENT 1: Deep water.**
Our primary concern was an inability in the model to incorporate deep roots into organic C accumulation due to the model not integrating deep root dynamics. Many shrubs in the microphyll woodlands have deep roots and microbial associations (e.g., Virginia et al. 1986). Roots reaching deep and especially to groundwater level, allow the plant to continue growing and fixing carbon well into the dry periods (Ogle et al. 2004). For example, creosote bush sends horizontal roots through the shallow upland soils to find cracks in caliche. Then they dive deep, obtaining a large fraction of their water from within and below caliche layers (Ogle et al. 2004). In our estimates of deep-water use (Allen unpublished data), as much as 60 to 90% of the plant water in microphyll woodland plants came from the groundwater. Moreover, roots and the mycorrhizosphere (the region around a mycorrhizal fungus colonizing plant roots) contribute to increasing atmospheric $CO_2$, increasing the partial pressure pushing bicarbonate concentrations (see SLIC modeling below). These plant mycorrhizospheres are producing $CO_2$ for the creation of $HCO_3^-$, binding with Ca to form $CaCO_3$ deep in the profile at unknown rates.

Ogle, K., R.L. Wolpert, and J.F. Reynolds. 2004. Reconstructing plant root area and water uptake profiles. Ecology 85: 1967-1978.

Virginia, R.A., M.B. Jenkins, and W.M. Jarrell. 1986. Depth of root symbiont occurrence in soil. Biology and Fertility of Soils 2: 127-130.

In a California conifer-hardwood forest, we initially used DayCENT to characterize NPP (Allen et al. 2014). We also measured ET (EvapoTranspiration, or transpiration plus evaporation) and NEE using eddy-flux measurements (Michael Goulden data, UC Irvine) and our sapflow measurements of water transport. DayCENT failed to identify the extended summer water flux because it did not have a mechanism to acquire deep water (Figure 4).

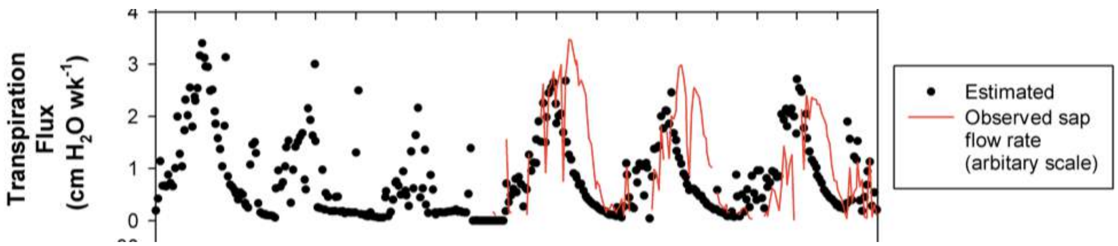



*Figure 4. Kitajima and Allen-output from a model run from 2005-2010, from Allen et al. 2014, showing the comparison in Transpiration flux measurements with DayCENT modeling (dots) versus measured sapflow rates (red line). The lag in transpiration (which affects $CO_2$ fluxes) does not show in DayCENT as there is no provision for access to deep-water sources. As long as there is transpiration, there is fixation.*

Allen, M.F., K. Kitajima, R.R. Hernandez. 2014. Mycorrhizae and global change. Pp. 37-59: in M. Tausz, N.E. Grulke (eds). Trees in a changing environment. Springer-Plant Sciences, Dordrecht, The Netherlands.

***Regional Expertise Eddy Covariance calibration measuring NEE: Ray Anderson USDA Salinity Lab (UCR campus), G. Darrel Jenerette UCR***

**HYDRUS:** Simunek, J., M. T. Van Genuchten, and M. Sejna (2005), The HYDRUS-1D software package for simulating the one-dimensional movement of water, heat, and multiple solutes in variably-saturated media, University of California, Riverside, Research Reports, 240.

For this reason, we shifted to HYDRUS 1D to study seasonal water flux and the role of deep water. Again, we compared modeled output to eddy covariance flux measurements and measured isotopic composition (δD = delta-deuterium, or hydrogen-2, and $\delta^{18}O$, or delta-oxygen-18) to confirm the sources of the water (Kitajima et al. 2013). We modified the HYDRUS 1D to acquire the deep moisture. By making these changes in the model, we could account for the added growing season length and summer water use. Given that the water isotopic composition of many desert species shows that a large fraction to the majority of the plant's water was from groundwater, making these adjustments was critical to overall C budgets, and will be invaluable for any estimates of C fluxes in desert soils.

Kitajima, K., M.F. Allen and M.L. Goulden. 2013. Contribution of Hydraulically Lifted Deep Moisture to the Water Budget in a Southern California Mixed Forest. Journal of Geophysical Research- Biogeosciences 118: 1561-1572

Suarez, D. L., and J. Šimůnek (1993), Modeling of carbon dioxide transport and production in soil: 2. Parameter selection, sensitivity analysis, and com- parison of model predictions to field data, Water Resources Research 29: 499–513, doi:10.1029/92WR02226.

***Regional expertise for HYDRUS: Jirka Šimůnek - UCR Environmental Sciences (author of Hydrus), Tom Harmon UC Merced.***

### Limits to DayCENT 2: Inorganic C

The inorganic C ($C_i$) in California deserts is very patchy, but can be quite high. Schlesinger (1985) undertook landmark studies in the alluvial plain outwash from the Eagle Mountains and the Coxcomb Mountains. He measured between 30 and 70 kg of $CaCO_3/m^2$, or between 4 to 8.4 $kgC/m^2$ of inorganic C or $C_i$. This would place the soil C in the range of C in the middle of the Great Plains, and even the lower end of the C-rich temperate forest soils.

Schlesinger, W. H. 1985. The formation of caliche in soils of the Mojave-Desert, California. Geochimica Et Cosmochimica Acta **49**:57-66.

The problem is that caliche is distributed in patches across the deserts, and larger regional measurements do not exist. Thus, there is a need to better determine where and how much caliche is present across the SoCal deserts (see above discussion).

### Inorganic C: Two models that should be used:

### HYDRUS 1D

The first step in understanding inorganic C is to determine the equilibrium between pore water gas and water. For this determination, we used sensor readings of temperature, water and $CO_2$ (Allen et al. 2007). Henry's law states that $[CO_2(aq)]=KHPCO_2$, where the $PCO_2$ reading (partial pressure of carbon dioxide, which reflects dissolved C02) is the sensor output converted to atmospheres. The second step is to determine local soil pH (how acidic or basic the soil is) that can be measured directly or determined from $CO_2(aq)$, aqueous carbon dioxide, or the gas dissolved in water, where: pH = 3.9 - 0.5log$P_{CO2}$.

Using pH and carbonate equilibrium, we can determine the other species,

$DIC_{total}$ - $[H_2CO_3^*] + [HCO_3^-] + [CO_3^{2-}]$

We can use these sensor data as an input to HYDRUS 1D to simulate the $HCO_3$ input and output from a known soil layer (Thomas Harmon and Michael Allen, unpublished data).

Allen, M.F., R. Vargas, E. Graham, W Swenson, M. Hamilton, M. Taggart, T.C. Harmon, A Rat'ko, P Rundel, B. Fulkerson, and D. Estrin. 2007. Soil sensor technology: Life within a pixel. BioScience 57: 859-867.

Once the $HCO_3^-$ (bicarbonate) and soil water is known, the soil $C_{inorganic}$ can be determined and converted to the form of caliche ($CaCO_3$) in a known soil layer using the SLIC model (Hirmas et al. 2010).

***Expertise: Thomas Harmon, UC Merced; Jirka Simunik, UC Riverside.***

**Soil Landscape Inorganic Carbon model (SLIC):** Hirmas, D.R., C. Amrhein, and R.C. Graham. 2010. Spatial and process-based modeling of soil inorganic carbon storage in an arid piedmont. Geoderma 154:486-494. doi: https://doi.org/10.1016/j.geoderma.2009.05.005

The SLIC model simulates soil $C_{inorganic}$ across the landscape. The strength is that the model simulates the exchanges between carbonate $HCO_3^-$ and $CaCO_3$, caliche. Caliche exists in a solid form when dry. Following water inputs, some of the $CaCO_3$ dissolves into $Ca^{2+}$, plus $CO_2$ plus protons. Depending upon the $CO_2$ concentration (using atmospheric $CO_2$), plus free Ca, $CaCO_3$ then reforms, the concentration of which depends on the equilibrium chemistry. The fact that dissolution occurs then $CaCO_3$ reforms means that as soil dries out, solid caliche is formed, deeper in the soil profile. As new Ca arrives from erosion, new $CaCO_3$ can form in the soil surface layers. Isotopic data using $\delta^{18}O$, show that there is a continual turnover of the surface layers of $CaCO_3$ when exposed (Allen et al. 2013, confirmed by Mills et al. 2020).

However, a critical missing element is that the SLIC model, as originally developed, is a chemical model only, building upon the soil atmosphere (~400ppm), and does not integrate biological soil respiration, which isotopic ratios have suggested are the source for deep caliche (Schlesinger 1985). $\delta^{18}O$ ratios of surface caliche materials clearly demonstrate continuous turnover in the surface layers, with the potential for loss. Those values, even at 16cm depth, can exceed 2,500ppm. We do not know the $CO_2$ concentrations deep at the groundwater level.

Hirmas, D.R., C. Amrhein, and R.C. Graham. 2010. Spatial and process-based modeling of soil inorganic carbon storage in an arid piedmont. Geoderma 154:486-494. doi: https://doi.org/10.1016/j.geoderma.2009.05.005

Allen, M. F., G. D. Jenerette, L. S. Santiago. 2013. Carbon Balance in California Deserts: Impacts of Widespread Solar Power Generation*.* California Energy Commission. Publication number: CEC-500-2013-063.

Mills, Jennifer, Laura Lammers, and Ronald Amundson. 2020. Carbon Balance with Renewable Energy: Effects of Solar Installations on Desert Soil Carbon Cycle. California Energy Commission. Publication Number: CEC-500-2020-075

***Regional expertise: Daniel Hirmas, Environmental Sciences, UCR***

For organic C cycling, an acceptable approach would be to run DayCENT, but integrating the length of C acquisition with access to deep water, extending the time for photosynthesis into each drought period. This requires collection of empirical data of the timing of active photosynthesis coupled with isotopic data on water sources, as per Ogle et al. 2014.

The best models for inorganic carbon would probably be the newest version of Hydrus 1D combined with SLIC, but again integrating empirical data of mycorhizosphere CO2 at the depths where water is acquired and CaCO3 deposited. Together these models coupled with empirical data, particularly for soil $CO_2$ and the current 3D spatial distributions of Ca, $CO_2$, and $CaCO_3$, should provide for a solid simulation of desert C and the impacts of anthropogenic and climate stressors on sequestration and fluxes.

# APPENDIX B

## CLIMATE MITIGATION IN CALIFORNIA:
## THE IMPORTANCE OF CONSERVING CARBON IN DESERTS

(content begins on next page)

Science Brief

# Climate Mitigation in California:

## The importance of conserving carbon in deserts

As climate change continues to accelerate, it is essential to protect natural habitats that act as carbon sinks. When these areas are developed and disturbed, additional carbon is released into the air and the plants and soils in those ecosystems are impacted, reducing their ability to absorb and store carbon. Studies around the world have shown that desert ecosystems can act as important carbon sinks. With desert ecoregions comprising 27% of California, protecting this biome can contribute to securing carbon stores in the state. By limiting development, excessive OHV use, livestock grazing and other activities that disturb desert soils, the state can help ensure these carbon reserves stay in the ground and out of the atmosphere.

### Quick take

- Desert ecosystems provide important carbon storage functions now and in the future given climate change.
- Conserving California deserts can help ensure that the stored $CO^2$ stays in the ground.
- Key results include:
  - Inland deserts account for 10% of the state's total stored carbon.
  - 7% of carbon-rich areas in California deserts may already be impacted by human activities.
  - Ensuring sufficient desert representation in conserved areas will protect unique species assemblages and ecosystem services.

## Carbon Capture in Deserts

There are several ways in which deserts store carbon. To start, desert plants store carbon in their biomass just as other plants do; through photosynthesis, plants take in $CO_2$ from the air and convert that into tissue. Many desert plants also have important relationships with underground fungi: roots bond with these fungi in a mutually beneficial relationship. As part of this relationship, the plants transfer carbon to the mycorrhizae, which also store carbon. The majority of stored and sequestered carbon, however, is in soils. Plant or animal excretion and decomposition releases some carbon, which reacts with calcium in the desert soil to create calcium carbonate crystals. Since some desert plants' roots grow to over a hundred feet, these crystals, called caliches, can be deep underground. Caliches build into larger chunks over time and create carbon sinks. Additionally, when the root fungi die, they leave behind their waxy coating, which aggregates and helps keep carbon in the soil. For their storage and sequestration potential, arid-semiarid soils are considered the third largest global pool of carbon (Emmerich 2003).

Read more about the desert carbon storage process here: http://www.desertreport.org/?p=2270

## California Carbon Sinks

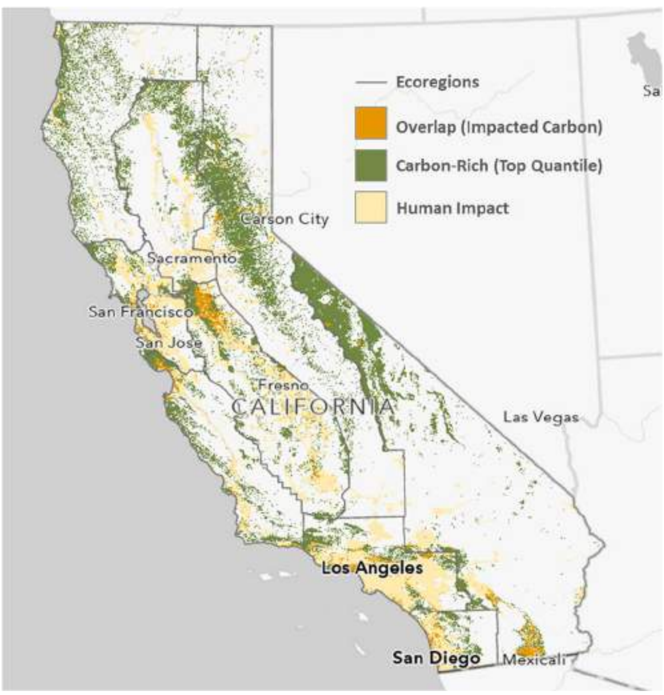
The most conclusive evidence of California desert carbon storage potential comes from a 10-year study in the Mojave Desert at the Nevada Desert Free-Air $CO_2$ Enrichment Facility (NDFF). This study compared plots of desert with current $CO_2$ levels to plots with projected 2050 $CO_2$ levels. To do this, they piped extra $CO_2$ over the plots. At the completion of the study, the researchers compared the carbon between the plots with current $CO_2$ levels and those with projected $CO_2$ levels. They found that the plots that received extra carbon were able to store significantly more carbon than those that received current carbon levels. This indicates that as atmospheric $CO_2$ levels rise, deserts will have increased capacity to sequester in response to projected elevated atmospheric $CO_2$. Deserts store 9.7% of California carbon and based on the NDFF experiment, and this amount may increase with climate change. A report by the National Parks Service shows that Death Valley and Joshua Tree National Parks and the Mojave National Preserve were within the top 10 park units with the highest annual net ecosystem carbon balance.

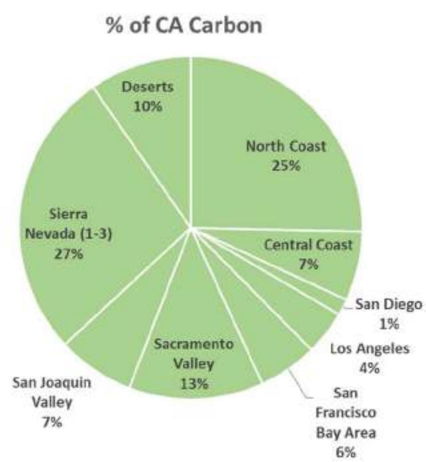
Read the full scientific article for this experiment here: https://doi.org/10.1038/nclimate2184

## Results

The data indicate that 27% of lands within the state of California fall within desert ecoregions (Inland Desert and Sierra Nevada-East). These lands alone account for nearly 10% of the total carbon stored in the state. Importantly, the top carbon-rich locations in deserts are less impacted by human activity compared to other ecoregions: 7% overlap with areas of higher human footprint compared to nearly one quarter of carbon-rich areas in the San Joaquin Valley. Currently, 42% of carbon-rich areas in desert regions fall into areas managed for conservation. An additional 35% fall on public lands managed for multiple uses (including extractive activities). Based on these results, California deserts sequester and store a significant amount of the state's carbon. Though desert environments have relatively low sequestration on a per area basis, they represent a large proportion of the state's area and are relatively undisturbed by human activity.

Carbon can be stored in a number of different reservoirs. Here we analyzed total ecoregion carbon in above- and belowground biomass and in soil (Soto-Navarro et al. 2020). We compared the top carbon-rich areas for each ecoregion with human footprint metrics and the protected areas database of the U.S.




*Map highlighting carbon-rich areas (top 20%) within each ecoregion and current coincidence with higher human disturbance. Sierra Nevada – East was combined with the Inland Desert ecoregion to represent California's deserts as a singular unit.*

## Recommended Actions

Given their carbon storage capabilities, conservation of large, intact desert areas could have a high return on investment for climate mitigation. Decision-makers will need to account for desert ecosystems in short- and long-term conservation planning efforts to ensure the persistence of these ecosystem services under future climate change scenarios. Great opportunity exists for desert protections on public lands, but some carbon-rich areas could benefit from private lands conservation, especially around the Salton Sea. Particular care should be taken in recognizing Death Valley (Sierra Nevada – East sub ecoregion) as a desert ecosystem that is unique and separate from others in the Sierra Nevada ecoregion. Failing to do so results in underestimation of Death Valley's carbon storage potential, which has been noted in other works. Finally, local stakeholders, Tribes and desert communities should be part of the decision-making process to ensure that those groups disproportionately impacted by conservation (or other) efforts in this ecoregion are well represented.

**Questions?**
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Basin and Range Watch

Western Watersheds Project

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Via email: BLM_CA_PS_OberonSolar@blm.gov

September 14, 2021

**RE: Comments on Oberon Solar Project Environmental Assessment. DOI-BLM-CA-D060-2020-0040-EA**

Dear Mr. Anderson:

Basin and Range watch and Western Watersheds Project (conservation groups) submit comments on the proposed Oberon Solar Energy Project Environmental Assessment (EA).

The Oberon Solar Project Environmental Assessment proposes to approve a 500 megawatt utility-scale solar photovoltaic electricity generating station, battery energy storage facility, electrical substation, possible on-site groundwater well, generation intertie (gen-tie) line, and associated access roads on 2,700 acres on public lands managed by the BLM. BLM would need to consider a project-specific Land Use Plan Amendment to the California Desert Conservation Area (CDCA) Plan, as amended, because the Oberon Renewable Energy Project does not comply with all of the Conservation and Management Actions (CMAs) to the CDCA Plan, as amended by the Desert Renewable Energy Conservation Plan (DRECP).

Basin and Range Watch is a 501(c)(3) non-profit working to conserve the deserts of Nevada and California and to educate the public about the diversity of life, culture, and history of the ecosystems and wild lands of the desert. Federal and many state agencies are seeking to open up millions of acres of unspoiled habitat and public land in our region to energy development. Our goal is to identify the problems of energy sprawl and find solutions that will preserve our natural ecosystems, open spaces, and quality of life for local communities. We support energy efficiency, better rooftop solar policy, and distributed generation/storage alternatives, as well as local, state and national planning for wise energy and land use following the principles of conservation biology. We have visited the site of the proposed Oberon Solar Project. We have taken photos of the region, hikes on the site and have observed unique flora and fauna on the site.

Western Watersheds Project is a non-profit conservation organization with more than 12,000 members and supporters. Our mission is to protect and restore western watersheds and wildlife through education, public policy initiatives, and legal advocacy.

Our organizations seek to conserve public lands and biodiversity, and support renewable energy placed on degraded lands, and in the built environment. We have never supported utilizing pristine desert on public lands for large scale utility development. Instead of massive bulldozing of desert ecosystems and fragmentation of rural communities, we proposed an alternative that would have utilized the California Energy Efficiency Strategic Plan, which is already state law. Enough rooftop and parking lot sites exist to more than fulfill the California electricity need combined with more energy efficiency. However, the BLM did not adopt our proposal. The BLM's Desert Renewable Energy Conservation Plan Land Use Plan (LUP"), which was developed in collaboration with other federal, state, and local agencies, tribal governments and the public, was approved by the BLM in 2016.

The DRECP LUP is supposed to provide a process for utility scale renewable energy while providing for the long-term conservation and management of special-status species and desert vegetation communities, as well as other physical, cultural, scenic, and social resources within the DRECP LUP Area through the use of "durable regulatory mechanisms" (DRECP LUP Executive Summary for the Record of Decision (ROD), page ES-2).

The Oberon Solar Energy Project (Project) seeks to completely destroy the premise of the DRECP LUP by violating the fundamental "durable regulatory mechanisms" upon which the long-term conservation of resources within the DRECP was based.

The Oberon Solar Energy Project as proposed has numerous problems associated with its application in this Development Focus Area:

1. **The EA grossly underestimates the acreage and quality of microphyll woodland on site.**
2. **Instead of completely avoiding microphyll woodlands as called for in the DRECP LUP, the project proposes to destroy approximately 80 acres of this protected habitat.**
3. **Instead of providing a 200 foot buffer from microphyll woodlands as called for in the DRECP LUP, the project proposes a mere 50 foot buffer in some locations.**
4. **Instead of causing only minor incursions into buffer areas, as required under the DRECP LUP habitat, the project would cause major incursions that amount to hundreds of acres of buffer.**
5. **Instead of avoiding on-site critical habitat for the desert tortoise, the project proposes to develop the critical habitat.**

6. **Instead of avoiding the on-site multi-species habitat linkage area as required by the DRECP LUP, the project proposes to develop within the linkage area.**
7. **Instead of minimizing impacts to the desert pavement on-site as required under the DRECP LUP, the project proposes to destroy most of the on-site desert pavement.**
8. **The EA fails to analyze several potentially significant adverse impacts.**
9. **The EA fails to include a clearly understandable and stable project description and analysis of impacts.**
10. **In failing to comply with the LUP, the project violates the entire premise of the Desert Renewable Energy Conservation Plan.**

Given all of the problems, we propose that the project be reviewed with an environmental impact statement, and that a new alternative be considered by the BLM that includes an amendment to the DRECP LUP for this property that designates this part of Chuckwalla Valley as a solar exclusion zone. However, because the proposal before the BLM is a request for issuance of a right-of-way with an EA, we explain our concerns to the Oberon Solar Energy project in more detail below.

## 1. The EA Threatens the Durability of Conservation Agreements in the CDCA Plan as Amended by the DRECP.

The DRECP has two primary goals. One is to provide a streamlined process for the development of utility-scale renewable energy generation and transmission in the deserts of southern California consistent with federal and state renewable energy targets and policies. The other is to provide for the long-term conservation and management of special-status species and desert vegetation communities, as well as other physical, cultural, scenic, and social resources within the DRECP Plan Area using durable regulatory mechanisms. (DRECP LUP Executive Summary for the ROD, page ES-2).

> *DRECP planning decisions are "designed to both provide effective protection and conservation of important desert ecosystems, while also facilitating the development of solar, wind and geothermal energy projects in those unique landscapes*." (DRECP LUP ROD, page 1)

Amending the CDCA Plan and DRECP Plan and compromising the CMAs would be a precedent setting action that could result in several more requests from solar developers to amend the plan. Other solar projects to date have complied with the DRECP LUP, including the adjacent Victory Pass Project. Because the project is proposed on environmentally sensitive BLM lands and would have significant impacts to these resources, combined with the potential for the approval to set a precedent that could undermine the entire DRECP LUP, we believe the Oberon solar application should have been reviewed utilizing a full Environmental Impact Statement ("EIS"). The Oberon Project should not qualify for streamlined review under the LUP that it seeks to undermine. The proposed amendment should not qualify for streamlined review and should be subject to a full EIS which analyses the impact of the proposed amendment. To date, the amendment has not been made available for public review.

## 2. The Project Needs To Be Reviewed With an Environmental Impact Statement.

This utility-scale solar project has several concerning proposals: the applicant is seeking to construct an industrial solar energy project with storage in Federally Threatened Mojave Desert tortoise Critical Habitat, in a Multispecies Wildlife Connectivity Corridor designated in the Desert Renewable Energy Conservation Plan, and on approximately 80-plus acres of microphyll woodland that would be inconsistent with Conservation Management Actions (CMAs) listed in the DRECP, the latter requiring a Land Use Plan Amendment (LUPA).

For this reason, we requested an Environmental Impact Statement (EIS) in our scoping comments in order to fully analyze the specific significant impacts to this location. BLM is currently proposing to analyze this massive energy project with simply an Environmental Assessment (EA), tiering to the DRECP EIS of 2015. But the level of specific detail was not analyzed in that earlier EIS, which assumed compliance with the CMAs. We doubt whether the DRECP EIS for the Riverside East DFA included significant impacts analysis of solar projects overlapping with Critical Habitat to this unprecedented extent.

The large and new impacts, not previously analyzed, require an EIS with 45-day comment period, and not a brief EA with 30-day comment period. This would better match the more detailed analysis under the California Environmental Quality Act (CEQA) of a proposed Environmental Impact Report being undertaken by the Colorado River Basin Regional Water Quality Control Board. The project will require a waste discharge permit from the water board, and significant impacts were admitted to require a full EIR with 45-day public comment.

The direct and cumulative impacts from the Oberon Solar Project justify a full Environmental Impact Statement review. According to BLM's NEPA Handbook:

> 7.2 ACTIONS REQUIRING AN EIS Actions whose effects are expected to be significant and are not fully covered in an existing EIS must be analyzed in a new or supplemental EIS (516 DM 11.8(A)). You must also prepare an EIS if, after preparation of an EA, you determine that the effects of the proposed action would be significant and cannot be mitigated to a level of nonsignificance (see section 7.1, Actions Requiring an EA). If you determine during preparation of an EA that the proposed action would have significant effects and cannot be mitigated to a level of nonsignificance, you do not need to complete preparation of the EA before beginning preparation of an EIS (516 DM 11.7(E)) (See section 8.4.1, Significant Impacts – Transitioning from an EA to an EIS)

Significance is defined as effects of sufficient context and intensity that an environmental impact statement is required. The CEQ regulations refer to both significant effects and significant issues (for example, 40 CFR 1502.2(b)).

Intensity. This refers to the severity of effect. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action…." (40 CFR 1508.27). The Oberon Solar Project meets some of the ten considerations defining "Intensity" and justifying an EIS. These include:

- **Public health and safety (40 CFR 1508.27(b)(2)):** Fugitive dust from the project could compromise the public health of the community of Desert Center. Dust can cause respiratory problems, Valley Fever and complicate health issues associated with Covid 19.

- **Unique characteristics of the geographic area (40 CFR 1508.27(b)(3)). "Unique characteristics" are generally limited to those that have been identified through the land use planning process or other legislative, regulatory, or planning process;** The site has old growth microphyll woodlands containing desert ironwood trees over 1,000 years old.

- **Degree to which effects are likely to be highly controversial (40 CFR 1508.27(b)(4)):** Amending the CDCA and DRECP are very controversial. Developing desert tortoise Critical Habitat is very controversial. Destroying microphyll woodlands is very controversial.

- **Degree to which effects are highly uncertain or involve unique or unknown risks (40 CFR 1508.27(b)(5)):** Big risks are associated with fugitive dust and public health. There is also a risk of extirpating local populations of plant and animal species.

- **Consideration of whether the action may establish a precedent for future actions with significant impacts (40 CFR 1508.27(b)(6)):** Amending the DRECP to reduce the requirements of the CMA's and allowing solar developers to access a Critical Habitat will set the precedent of other developers making similar requests.

- **Consideration of whether the action is related to other actions with cumulatively significant impacts (40 CFR 1508.27(b)(7)):** Development and removal of wildlife connectivity corridors could impact the desert tortoise, burro deer, bighorn sheep and other wildlife. Furthermore, this disturbance will cause a spike of invasive weed proliferation such as Sahara mustard. This will cause a weed invasion to adjacent microphyll woodlands and the Chuckwalla Critical Habitat.

- **Scientific, cultural, or historical resources, including those listed in or eligible for listing in the National Register of Historic Places (40 CFR 1508.27(b)(8)):** This entire region is considered a "Cultural Landscape for all of the Native American Tribes in the area.

- **Threatened or endangered species and their critical habitat (40 CFR 1508.27(b)(9)):** The proposed action would develop 600 acres of the Chuckwalla Critical Habitat for the Desert Tortoise!

- **Any effects that threaten a violation of Federal, State, or local law or requirements imposed for the protection of the environment (40 CFR 1508.27(b)(10)):** Surface hydrology altercations would violate the Clean Water Act. Fugitive dust would violate the Clean Air Act and developing a Critical Habitat for the Desert Tortoise would violate the Endangered Species Act.

3. **<u>The Project Grossly Underestimates The Acreage And Quality Of Microphyll Woodland On Site.</u>**

Basin and Range Watch has previously visited this site, but in the context of its review of the EA, Basin and Range Watch visited the proposed Oberon Project site on September 4, 2021. Kevin Emmerich of Basin and Range Watch hiked through the proposed project site and observed extensive areas of dense and abundant microphyll woodland, as the southern portion of the project site is a higher alluvial fan pouring off the Chuckwalla Mountains to the south, and slopes downward to the north towards Palen Dry lake. Emmerich recorded a high diversity of plants along these washes, including desert ironwood (*Olneya tesota*) and Blue palo verde (*Parkinsonia florida*). In an ocular estimate, he observed that parts of the project site could have up to 30 trees per acre. The microphyll woodland was widespread across the project site, and not confined to washes. He found very high quality habitat, with dense and lush desert ironwoods, palo verdes, and smoke trees. Photos demonstrating the quality of the habitat are included in an Appendix. This woodland is relatively undisturbed, old-growth, with large trees to 40 feet tall, and hundreds of years old. This plant community is uncommon in California, and the site presents a unique example of dense Dry Desert Wash Woodland. The destruction of this habitat cannot be replaced by off-site compensation, as the habitat cannot be simply replanted elsewhere.

These ironwood-rich microphyll habitats are excellent bird habitat for nesting and wintering habitat. The area is excellent wildlife connectivity corridor habitat, and herds of burro deer, bobcats, and other wildlife have been photographed in trail cameras on the Project site (see EA Plan of Development ("POD" Appendix F).

4. **<u>Instead Of Completely Avoiding Microphyll Woodlands As Called For In The DRECP LUP, The Project Proposes To Destroy Approximately 80 Acres Of This Protected Habitat.</u>**

The DRECP is clear on impacts to desert dry wash woodland:

> ***LUPA-BIO-SVF-6:*** *Microphyll woodland: impacts to microphyll woodland (see Glossary of Terms) <u>will be avoided, except for minor incursions</u> (see Glossary of Terms).* (DRECP BLM LUP. Page 111, emphasis added)
>
> *"Impacts to riparian vegetation would be **<u>avoided</u>** under the Preferred Alternative through application of the riparian CMAs (LUPA-BIO-RIPWET-1 through LUPA-BIO-RIPWET-7, LUPA-BIO-13). In addition, setbacks from riparian vegetation would be required that range from 200 feet for Madrean warm semi-desert wash woodland/scrub, Mojavean semi-desert wash scrub, and Sonoran-Coloradan semi-desert wash woodland/scrub to 0.25 mile for Southwestern North American riparian evergreen and deciduous woodland and Southwestern North American riparian/wash scrub. Compensation CMAs would offset any impacts determined to be unavoidable (LUPA-BIO-COMP-1, DFA-VPL-BIO-COMP-1, DFA-VPL-BIO-COMP-2).*
>
> *(*DRECP LUP and Final EIS for the DRECP LUPA, CHAPTER IV.7. BIOLOGICAL RESOURCES*,* Vol. IV of VI, page IV.7-116; see also Table IV,7-18)

Impacts are to be avoided "to the maximum extent practicable or feasible", which means that they are to be avoided unless there is no reasonable or practicable means of doing so that is consistent with the basic objectives of the activity[1]. The Biological Opinion for the DRECP relied on the CMAs and incorporated all of the CMAs by reference. (Biological Opinion, page 23). Unavoidable impacts[2] are limited to minor incursions. The Oberon project is only avoiding microphyll woodlands "to the extent feasible" instead of the to the maximum extent feasible.

> *The Oberon Project would maximize retention of microphyll woodlands to the extent feasible.* LUPA-BIO-13: General Siting and Design (POD, Appendix C, emphasis added)

Adjacent solar projects are avoiding all impacts to desert dry wash woodland except for necessary infrastructure "required to serve an activity," and are proceeding simultaneously without the need to amend the DRECP. For example, the Arica and Victory Pass Projects are adjacent to the Oberon Solar Project and are completely avoiding microphyll washes.

> *The Arica and Victory Pass Projects were redesigned to entirely avoid the desert dry wash woodland with a 200 foot buffer, reducing the projects from 4,000 acres to 2,700 acres. The access roads and gen-tie line ROW, which are considered minor incursions, would cross desert dry wash woodland but Clearway is engineering the gen-tie lines to avoid siting the poles within the desert dry wash woodland almost entirely and using existing roads for both the gen-tie line with new spur roads and the main access road with some widening and improvement. The Projects will comply with this CMA.* (Arica and Victory Pass Solar Projects POD Appendix I, Page 15)

**5. Instead Of Providing A 200 Foot Buffer From Microphyll Woodlands As Called For In The DRECP LUPA, The Project Proposes A Mere 50 Foot Buffer In Some Locations.**

However, the impacts do not stop with the destruction of microphyll woodland. The DRECP required setbacks from microphyll woodlands specifically to avoid impacts:

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[1] M**aximum extent practicable or feasible (as utilized in the LUPA CMAs).** A standard identified in the LUPA CMAs and applied to implementation of activities. Under this standard, implementation of the CMA is required unless there is no reasonable or practicable means of doing so that is consistent with the basic objectives of the activity. The term "maximum extent practicable" as used here in the DRECP LUPA is applicable only to its use in the CMAs; it does not apply to the term as it is used in the Endangered Species Act of 1973 (DRECP LUP, page xviii)

[2] **Unavoidable impacts to resources.** Small-scale impacts to sensitive resources, as allowed per specific CMAs, that may occur even after such impacts have been avoided to the maximum extent practicable (see definition). Unavoidable impacts are limited to minor incursions (see definition), such as a necessary road or pipeline extension across a sensitive resource required to serve an activity. (DRECP LUP, page xxiv)

*DRECP LUPA-BIO-RIPWET-1: The riparian and wetland DRECP vegetation types and other features listed in Table 17 will be avoided to the maximum extent practicable, except for allowable minor incursions… with the specified setbacks*[3].

**Table 17**
**Riparian and Wetland Avoidance and Setbacks**

| | |
|---|---|
| *Madrean Warm Semi-Desert Wash Woodland/Scrub* | *200 feet* |
| *Mojavean Semi-Desert Wash Scrub* | *200 feet* |
| *Sonoran-Coloradan Semi-Desert Wash Woodland/Scrub* | *200 feet* |

*(DRECP LUPA, page 106)*

The DRECP Setbacks were identified to avoid and minimize the adverse effects to specific biological resources. (DRECP LUPA, page 106). Only minor incursions into the setback area are permitted. The DRECP definition of Minor Incursion: "Small-scale allowable impacts to sensitive resources, as per specific CMAs, that do not individually or cumulatively compromise the conservation objectives of that resource or rise to a level of significance that warrants development and application of more rigorous CMAs or a DRECP LUPA amendment. Minor incursions may be allowed to prevent or minimize greater resource impacts from an alternative approach to the activity. Not all minor incursions are considered unavoidable impacts." (DRECP LUPA, pages xviii and xix)

The Oberon Solar Project proposes to reduce the setbacks to the remaining microphyll woodland not destroyed during construction to, in some cases 50 feet, instead of the required 200 feet.

While the BLM can consider modifications to the CMAs, the modifications must result in lesser impacts, not greater impacts, as in this case:

> *The BLM California State Director will review such requests, in collaboration with USFWS, CEC, and CDFW, and may analyze, as appropriate, whether any proposed alternative approach or design feature to avoid, minimize, or mitigate impacts: (i) meets the goals and objectives for which the CMA was established, (ii) and provides for a similar* ***or lesser*** *environmental impacts* (EA, page 100, emphasis added)

Impacts to microphyll woodlands do not meet the goals and objectives for which the CMA was established, and certainly do not result in similar or lesser environmental impacts compared to the analysis in the EIS for the DRECP LUPA.

> *When evaluating the project in the EA, if the BLM determines that the project or an alternative would result in any new significant impact not disclosed in the DRECP FEIS,*

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[3] **Setback:** A defined distance, usually expressed in feet or miles, from a resource feature (such as the edge of a vegetation type or an occupied nest) within which an activity would not occur; otherwise often referred to as a buffer. The purpose of the setback is to maintain the function and value of the resource features identified in the DRECP LUPA CMAs. (DRECP LUPA, page xxii)

*then the BLM would prepare a project-specific EIS before authorizing the project.* (EA, page 2)

In fact, the EA conceded that impacts will be greater than those assumed under the DRECP, but failed to identify the impacts as significant and adverse.

*Because the project would not be in compliance with DRECP CMA LUPA-BIO-SVF-6, CMA LUPA-BIO-RIPWET-1, and CMA LUPA-BIO-3 related to desert dry wash woodland, cumulative impacts to habitat and species would be* ***relatively greater than those described in the FEIS****….* (EA, page 113, emphasis added)

The fact that the Oberon project proposes to destroy microphyll woodland and reduce the buffer area beyond a minor incursion, resulting in greater impacts than those described in the FEIS for the DRECP LUPA, should be enough to trigger the need for an EIS for the Oberon Solar Project.

The DRECP states that for minor incursions to the DRECP riparian vegetation types, wetland vegetation types, or encroachments on the setbacks listed in Table 17, the hydrologic function of the avoided riparian or wetland communities will be maintained. (DRECP LUP, page 106)

The EA concedes that ground disturbance can impact microphyll woodlands.

*Ground disturbance undermines the stability of soil and biotic crusts, leading to greater potential for erosion; affects soil density and water infiltration, cutting off water supplies to plant roots; and promotes invasion by exotic plant species. These factors contribute to habitat quality for native wildlife and plant species, and disturbance can affect the ability of an area to support these species.* (EA, page 100).

The EA also concedes that microphyll woodlands will have no habitat value if surrounded by solar arrays:

*CMA LUPA-BIO-RIPWET-1, project design includes an average 134-foot buffer and minimum 50-foot buffer around the desert dry wash woodland, with the exception of a limited amount of small "finger" areas determined to have* ***little to no habitat value once surrounded by the solar development.*** (EA, page 123, emphasis added)

However, the EA also claims the opposite, that the reduced buffer distance would not result in impacts to microphyll woodlands.

*The proposed smaller buffer may offer the same functional protection to the woodlands as the CMA's 200-foot buffer, because (1) the distance is great enough to protect beds and banks****, preserve hydrologic function****, and avoid disturbance to vegetation (including roots) and wildlife, and (2) additional protections specific to this project, including exclusion of recreational access (including OHVs) to the protected habitat and specific project conditions to avoid O&M disturbance within the protected habitat. (EA, pages 100-101)*

*… but would not affect the overall function of the desert dry wash woodland in the area for the reasons described in Section 3.12.2. (EA, page 113)*

However, there is no scientific data to confirm that a distance of 50 feet is great enough to preserve hydrologic function. Subsurface water is an important consideration for microphyll woodlands:

***Colorado Desert: ….. <u>Subsurface moisture in desert washes</u>*** *supports stands of microphyll woodlands with old-growth stands of blue paloverde and ironwood.* (DRECP LUP, Colorado Desert Area, Pages 38-39)

A discussion of the connectivity of wash plant communities needs to be included in the EA, because the solar field would block flow of flood waters in washes, potentially cutting off water-dependent microphyll woodland and killing patches on the other side of the proposed solar fields. This area receives monsoonal summer thunderstorms that are at times heavy, with flash floods flowing down washes into basin playas. Analysis of stormwater runoff needs to be undertaken related to the connectivity of microphyll habitats in ephemeral washes. The washes often change course over the years as distributaries shift in unpredictable but natural ways. The EA needs to provide this analysis.

In fact, the Joshua Tree National Park comment letter was concerned that ground disturbance at this project and other nearby projects could cause significant adverse impacts:

*Current research suggests that microphyll woodlands provide essential ecosystem services. The woodlands and their seasonal washes (streams) transport water, seeds, and other nutrients to nearby desert ecosystems. Microphyll woodlands comprise only a small portion of desert acreage but account for a much larger portion of the habitat for migrating birds.*

*Concern: The surface alteration related to this project and nearby solar projects may divert water from microphyll woodlands or otherwise affect the hydrology and survival of these vital migratory bird support areas.*

*Recommendation: The NPS recommends* ***<u>analysis of changes in water flow</u>*** *resulting from nearby solar projects, as well as hydrological surface modeling to determine how water flow and erosion will affect microphyll woodlands on the project site and downstream.*

(JT National Park Comment Letter, page 2 in Scoping Report, POD Appendix I, emphasis added)

The EA has failed to provide the requested analysis regarding how the project will impact water flow and stormwater connectivity and therefore has no scientific support for the claim that the function of the microphyll woodlands will continue after project development.

The EA claims that there was no science behind the selection of the 200-foot buffer size.

• *The DRECP does not cite a scientific basis for the 200-foot buffer nor describe the reasoning for this distance; however, a buffer area is important.* (EA, page 101)

The failure of the DRECP to describe the reasoning behind the buffer in the context of microphyll woodlands does not mean that there is no science behind the selection buffer size. In fact, the DRECP Team studied differing buffer sizes within the context of impacts to Areas of Critical Concern (ACEC):

> *To evaluate how potential allowable ground disturbance caps might impact ACEC management goals and objectives, simulations of theoretical levels of different amounts of ground disturbance and applied **differing buffer sizes** were visually evaluated to estimate area of potential effect (direct and indirect). Based on literature for a variety of species and vegetative communities (e.g., riparian, sand dunes), buffers of edge effect ranged from 100 feet to 1 mile. When incorporating potential edge (indirect) effects into consideration of what would be meaningful disturbance to the biological and ecological systems, the higher level of disturbance caps (10-15-20%) rapidly resulted in potential impacts (direct and indirect) to 30-80% of the conservation areas. These higher disturbance caps were determined to not be sustainable, and not being able to achieve the conservation goals of the specific ACEC units or the DRECP conservation strategy in total. At this point in the evaluation process, only 5% or less disturbance levels were forwarded to the next level of evaluation.*
>
> (DRECP BLM Record of Decision APPENDIX 2. AREA OF CRITICAL ENVIRONMENTAL CONCERN RESPONSES TO COMMENTS, Appendix 2, page 20)

The research for ACEC buffer size no doubt informed the selection of buffers for the entire DRECP LUP.

## 6. The EA Fails To Include A Clearly Understandable And Stable Project Description and Analysis of Impacts

In numerous areas, the EA is vague and fails to provide adequate data to understand the project. For example, although the EA indicates that only 60 acres of microphyll woodlands are impacted (EA, page 7 and Page 27), or alternately, 81.2 acres (EA, page 99 and 100), there is no quantification of the acreage of buffer area that would be lost as a result of the project. The EA claims that it is avoiding approximately 2,100 acres of desert dry wash woodland in the project area. (EA, page 102) However, the POD Appendix F: Biological Technical Report indicates that Area A only contains 1,182 acres of Desert Dry Wash Woodland, and Area G contains another 17 acres, bringing the total area of Desert Dry Wash Woodland to be 1,199 acres. This number does not match with the EA assertion that the project is avoiding 2,100 acres of desert dry wash woodland.

Using the numbers in the EA only leaves one frustrated and unsure about what is exactly the impact to microphyll woodland. For example, if we assume the difference between 2100 and 1199 is the additional acreage for the buffer area, then the buffer area that that should be provided is approximately 901 acres. Since the land use plan compliant alternative removes 600 acres from development, the assumption must be that at least 600 acres out of the total 900 acres of buffer is being lost/impacted by the project. (EA, Page 111). That amounts to more than half of the buffer that should be provided. Certainly 600 acres of impact cannot be determined to be a minor incursion[4] and are not unavoidable impacts. Mitigating for the additional 600 acres of lost buffer at 5:1 would mean that an additional 3000 acres should be set aside for off-site preservation. However, the EA is only proposing off-site preservation of 406 acres of desert dry wash woodland. (EA, page 102) Because the DRECP assumed compliance with the CMA except for minor incursions, no amount of offsite compensatory mitigation can reduce this adverse significant impact to a level of insignificance.

The EA indicates that the BLM has separated the impacts from the solar arrays from the 24.6 acres of impacts from the collector lines, gen-tie line and access roads, which are apparently to be considered minor incursions. (EA, page 100) Although we do not take issue with the EA's quantification of the impacts for individual segments of the project, all of the project's impacts, including the collector lines, gen-tie line and access roads, must still be attributed to the Applicant, and given the total number of acres impacted, cannot be considered minor incursions. In addition, we note that the project is negotiating in ways that could increase the project impacts, and we question why the project gen-tie line is not co-locating with the Eagle Crest Gen-Tie Line.

> *The proposed project would be located near Desert Center and would interconnect to SCE's existing Red Bluff Substation via a new 500 kV gen-tie line. The Applicant plans to collocate the Oberon gen-tie line with the proposed **Easley Solar** and Green Hydrogen project gen-tie line. Pursuant to 43 CFR §§ 2805.15(b) and 2805.14(b), the BLM may require other ROW holders to collocate with the Oberon solar facilities, should the BLM decide to issue IP Oberon, LLC, a ROW. Construction of the project would occur over approximately 15 to 20 months, concluding in or before the fourth quarter of 2023* (EA, page 9, emphasis added)

> *The Applicant is in negotiations to purchase a private inholding within the center of the project site. Should the property be acquired in advance of project construction, the current property owner would not need separate dedicated access east from SR-177 to the property. If the portion of the approved gen-tie ROW for the Eagle Mountain Pumped Storage Project that overlaps the Oberon Project application area is moved outside of the Oberon application area, then solar panels may be developed in this area* (see Figure 2-1, Project Area). (EA, page 14)

> *Should the southeastern substation location be developed, then the unused 500 kV gen-tie corridor from the central substation option (approximately 80 acres) would be developed with solar panels. Likewise, should the Eagle Crest gen-tie line be relocated outside of the*

[4] Minor incursion**.** Small-scale allowable impacts to sensitive resources, as per specific CMAs, **that do not** individually or cumulatively compromise the conservation objectives of that resource or rise to a level of significance that **warrants** development and application of more rigorous CMAs or a **DRECP LUPA amendment**. Minor incursions may be allowed to prevent or minimize greater resource impacts from an alternative approach to the activity. Not all minor incursions are considered unavoidable impacts. (DRECP BLM Land Use Plan Amendment xix September 2016)

*Oberon application area, then this area (approximately 60 acres) may also be developed with solar panels.* (EA, page 21)

Another area in which the EA is vague is the location and quality of the mitigation lands. The EA claims that the mitigation lands have been selected and are of higher quality than the existing site.

*Compensation for impacts to desert dry wash woodland and desert tortoise critical habitat would be mitigated at a ratio of 5:1 (MM BIO-6a and MM BIO-6b). In compliance with DRECP CMA LUPA-BIO-COMP-1, approximately 6,800 acres of habitat would have long-term protection to offset the habitat impacts under this alternative. The proposed compensation lands are within designated critical habitat and are of much higher quality than the designated critical habitat on the Oberon site, as described in the offsite habitat mitigation package. (EA, page 99)*

*POD Appendix AA in EA Appendix F (POD) presents the proposed compensatory mitigation*
*lands that would be permanently conserved under a durable conservation easement with an*
*endowment and management plan. Therefore, the quality of the habitat, including the microphyll woodlands, is evaluated in the EA. The quality of microphyll woodlands at the project site are of substantially inferior quality to those proposed to be protected at a 5:1 ratio,*
*so the conservation value of the impacts would be mitigated at a higher value than anticipated by the DRECP. (EA, page 102)*

However, the offsite habitat mitigation package in POD Appendix AA, at least the version available to the public, only mentions "Potential Mitigation Properties" without any description of the properties at all. The map indicates numerous disjointed properties separated by several miles may be selected (POD Appendix AA, pages 1 and 2)

**7. BLM's Stated Purpose And Need In The EA Do Not And Should Not Include Achieving An Applicant's Specific Megawatt Goal. In Fact, The BLM Expressly Has Discretion To Reject A Non-DRECP-Conforming Project.**

*BLM's purpose is to respond to the IP Oberon, LLC, a subsidiary of Intersect Power, LLC, request …for a right-of-way (ROW) grant to construct, operate, maintain, and decommission a solar PV facility on public lands, while taking into consideration BLM's multiple-use mandate, and otherwise complying with FLPMA, the BLM ROW regulations, Energy Act of 2020 … and other applicable federal laws, as well as the need to promote the policy objectives (Executive Order 14008) described below.* (EA, page 3)

The purpose and need statement should prioritize protecting microphyll woodlands, wildlife connectivity corridors, and tortoise habitat, and minimize the need for large-scale solar projects on public lands.

The NEPA Handbook, page 46, recommends *that "the purpose and need statement be brief, unambiguous, and as specific as possible. Although the purpose and need statement cannot be arbitrarily narrow, you have considerable flexibility in defining the purpose and need for action. To the extent possible, construct the purpose and need statement to conform to existing decisions, policies, regulation, or law. The purpose and need for the action is usually related to achieving goals and objectives of the LUP; reflect this in your purpose and need statement."*

Because the region has unique resources, the Purpose and Need statement is too vague and does not encourage the conservation of these resources, nor does it encourage following the guidelines of the DRECP.

The statement should focus on the need to follow the CMAs of the DRECP. The statement should make stronger commitments to adhering to the Land Use Plan without amending it, and without significantly impacting natural resources such as desert tortoise critical habitat and high-value microphyll woodland vegetation communities.

Alternative 2 (the Applicant's proposed project) is not a reasonable alternative under NEPA because it conflicts with the purpose of the DRECP. According to the DRECP LUPA ROD:

> *"BLM-authorized activities on public land must conform to the applicable land use plan. If the BLM receives an application for a project that does not conform to the land use plan, it may reject the application without additional analysis."* (ROD, page 16)

The Oberon Project proposes to destroy microphyll woodland habitat, multiple species habitat linkage area, desert tortoise critical habitat and desert pavement. What habitat is not destroyed will not be adequately buffered, and the "alleged" mitigation lands are undefined within the current documentation. Rather than rejecting the Oberon application for failure to comply with the DRECP LUP, BLM allowed Oberon's developer, Intersect Power, to relinquish 1500 acres of the original application to a separate Intersect Power application and also acquiesced to process Oberon's non-conforming application.

After relinquishing 1500 acres of its original application, the applicant now claims that compliance with the 200 foot buffer is *"infeasible"*.

> *The project cannot achieve a 200 foot setback across the entire site, because Sonoran-Coloradan Semi-Desert Wash Woodland occurs throughout the project site making complete avoidance of its buffer area infeasible. (POD, Appendix C)*[5]

> *The panels have been designed to avoid desert dry wash woodland with the exception less than 60 acres of solar panel development in areas deemed to have little or no residual*

[5] This supports our claim that the EA does not adequately map the resources on site. We believe that the extensive Sonoran-Coloradan Semi-Desert Wash Woodland on site qualifies this area to be considered as a renewable energy exclusion zone to protect the resources, rather than an amendment that increases impacts to the resources.

*habitat value. If BLM determines that the small impact does not qualify as minor incursion, then a Land Use Plan Amendment would be required. (POD, Appendix C)*

However, it is clear that the Oberon Solar Energy Project has been designed by Intersect Power to make the reduction in the 200 foot buffer appear necessary. The Oberon Project as presented in the EA, has gone through multiple permutations and manipulations before becoming the configuration presented in the EA. According to the EA:

*The original POD for the Oberon Renewable Energy Project (CACA-58539) encompassed approximately 6,500 acres of BLM-administered land and was submitted to BLM in May 2020. Concurrently, biological resource surveys were conducted, as well as other feasibility constraint analyses (i.e., ROW acquisition, utility corridor needs, sensitive receptors,* ***<u>DRECP CMA compliance</u>****, etc.). This process resulted in revisions to the project as it is now defined in Section 2.3, Alternative 2: Proposed Action. (EA, Page 10, emphasis added)*

The assumption from the above EA text is that the project was revised to remove areas that were undevelopable for various reasons, including DRECP CMA compliance. In fact, the EA states the following:

*2.7.3 Full Build Alternative*

*Most often, when an agency is considering a utility solar project, the agency reviews the location proposed for the project, identifies the most substantial impacts, and develops a reduced footprint alternative to avoid these locations. To meet the requirements of the CDCA Plan, as amended by the DRECP, this process was completed prior to defining the Proposed Action and* ***<u>resulted in the removal of approximately 3,800 acres from the original ROW application</u>*** *(see Section 2.1, Back-ground). The larger sized project would have allowed for additional flexibility when siting the 500 MW project within the project site or could have accommodated more MW. While the amount of MW proposed for construction at the project site has not changed with the smaller footprint, the MW hours are fewer than originally proposed. This is because the proximity of the solar panels under the smaller footprint increases shading and other technical constraints compared with a more widespread layout.*

*The full build alternative would have greatly increased impacts to desert dry wash woodland, desert tortoise habitat, and wildlife connectivity habitat. Additionally, solar panels would be developed adjacent to I-10 further restricting the utility corridor in desert tortoise critical habitat, and a greater number of prehistoric cultural resources would be directly affected.* ***<u>Given that this alternative would have much greater environmental impacts and would comply with the DRECP CMAs to a less extent than the project, this alternative was eliminated from consideration.</u>*** *(EA, page 31, emphasis added)*

However, the truth is that the Intersect Power removed the northern property from this application so that the property could be added to a different Intersect Power development application[6]. The EA lists this separate project as "H" in the cumulative project list. It is called the "Easley Solar & Green Hydrogen Project".

> *"The project on BLM land adjacent and north-northeast of the Oberon site would generate and store up to 650 MW of solar PV energy. The project would include a green hydrogen electrolyzer to convert water into hydrogen gas and oxygen."*
> (EA, Table 3.1-2)

The Applicant has an objective of constructing a 500MW facility, but gave up 1500 acres that it could have used towards reach its objective. By the EA's own admission "*The larger sized project would have allowed for additional flexibility when siting the 500 MW project within the project site or could have accommodated more MW." (EA, page 31, emphasis added.* The application is non-conforming because Intersect wants to squeeze 500 MW out of the smaller site, and lacks enough DRECP-compliant acreage to do so; yet Intersect relinquished 1500 acres that it could have used towards its megawatt goal for Oberon.

The EA deliberately misleads the public into believing that the northern portion of the project would not have met the applicant's goal, when in fact, there is already another application on file to develop the northern portion as another solar project. The fact that Intersect Power is still proposing to develop the northern portion at some point is made clear in the Plan of Development Mitigation Package, Appendix AA, which clearly identifies that there are two projects (Oberon I and Oberon II):

> The applicant proposes a mitigation plan which includes approximately 6,800-acres of pre-identified private lands ("Preserve") (See attached map) selected as suitable to meet the **Oberon I** Solar Energy Project & **Oberon II** Solar Energy Project (POD, Appendix AA, emphasis added)

The reality is that the Applicant has piecemealed the project and manipulated the acreage of the proposed project described within the EA in order to claim that it cannot comply with the CMA's. Furthermore, the Applicant deliberately added microphyll woodland "fingers" to the project footprint:

> *Therefore, in coordination with BLM and USFWS, the Applicant refined the development footprint to avoid desert dry wash woodland areas by imposing a minimum 50-foot and average of 134-foot (rather than 200-foot) buffer between such areas and the nearest solar panels. After the 50-foot buffer was imposed, the Applicant combined some of the nearby avoidance areas to create larger swaths of higher quality dry wash woodland. To offset this acreage,* ***less than 60 acres of the smaller "fingers" of DDWW were added to the solar panel development footprint.*** (EA, page 10, emphasis added)

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[6] The original application, which was filed under a different name in 2019 was for 3470 acres as BLM Application Number CACA 58539. The application was amended, and the project acreage became 6920. In April of 2020, the acreage was reduced from 6920 acres to 4579.84 acres. Finally, the Application was again amended in November of 2020 to be 4584.84 acres. At this time, the northern segment became part of a distinct separate and larger project, called the Easley Project with Application Number CACA 57822. (See also, Figure 3.1-1)

While both the Land Use Plan Compliant alternative (Alternative 3) and the Resource Avoidance alternative (Alternative 4) would result in less land being available for power generation (375 MW or 300 MW respectively, compared to 500 MW), the alternatives would still be consistent with the basic objective of the activity, which is for the BLM to respond to the ROW grant. The applicant may prefer to have a 500 MW facility, but there is nothing magic about the number 500 MW, and the BLM must make its decision to allow the facility on public land based on a variety of competing factors, including compliance with the DRECP LUP.

The EA cites the need to promote the policy objectives of Executive Order 14008.

> *Executive Order 14008, issued January 27, 2021, "Tackling the Climate Crisis at Home and Abroad" directs the Secretary of the Interior to identify steps that can be taken to increase renewable energy production on public lands and manage federal lands to support robust climate action (see sections 204 and 207).* (EA, Page 3, Purpose and Need)

The actual text of Executive Order 14008 reads as follows:

> ***Sec. 207. Renewable Energy on Public Lands*** *and in Offshore Waters. The* ***Secretary of the Interior*** *shall review* ***siting and permitting processes on public lands*** *and in offshore waters to identify to the Task Force steps that can be taken, consistent with applicable law,* ***to increase renewable energy production on those lands*** *and in those waters, with the goal of doubling offshore wind by 2030* ***<u>while ensuring robust protection for our lands, waters, and biodiversity</u>*** *and creating good jobs.* (Executive Order 14008, Emphasis added)

It is very clear that the Policy Objectives of Executive Order 14008 require that the Secretary of the Interior "<u>ensure robust protection</u>" for our lands and biodiversity. Therefore, Executive Order 14008 cannot be used as justification for issuing a right of way grant that violates the DRECP Land Use Plan despite the desire to increase renewable energy production on public lands. Furthermore, compliance with the DRECP LUP would also further the following BLM policy objectives:

> ***BLM's objectives for the DRECP, as reflected in the LUP, are to:***
>
> ⏩***<u>Conserve</u>*** *biological, physical, cultural, social, and scenic resources.*
>
> ⏩ *Promote renewable energy and transmission development, consistent with federal renewable energy and transmission goals and policies, in consideration of state renewable energy targets.*
>
> ⏩*Comply with all applicable federal laws, including the BLM's obligation to manage the public lands consistent with the FLPMA's multiple use and sustained yield principles, unless otherwise specified by law.*
>
> ⏩*Comply with Congressional direction regarding management of the CDCA in Section 601 of FLPMA, including to "****<u>[p]reserve the unique and irreplaceable resources,</u>*** *including archaeological values, and conserve the use of the economic resources" of the*

*CDCA (FLPMA 601[a][6]; 43 United States Code [U.S.C.]1781(a)(6).*

⏩ *Identify and incorporate public lands managed for* ***conservation*** *purposes within the CDCA as components of the National Landscape Conservation System (NLCS), consistent with the Omnibus Public Land Management Act of 2009 (Public Law 111-11) ("Omnibus Act").*

⏩ *Amend land use plans consistent with the criteria in FLPMA and the CDCA Plan. (DRECP ROD, page 8, emphasis added)*

The EA also alludes to the Energy Act of 2020 as another facture regarding the decision to implement the DRECP LUP Change**:**

*Energy Act of 2020, Subtitle B (Natural Resources Provision), section 3104. National goal for renewable energy production on Federal land. Requires the Secretary to set national goals for wind, solar, and geothermal energy production on Federal land no later than September 1, 2022. The Secretary shall seek to permit at least 25 GW of electricity from wind, solar, and geothermal projects by 2025.* (EA, Page 3, Purpose and Need, Footnote 2)

However, the Energy Act of 2020 specifically excludes lands from solar development if the land has already been excluded from solar development by a Land Use Plan[7], such as the DRECP LUPA. Because the LUPA CMA excludes the 200 foot buffer lands from development, those lands are not "covered lands" under the Act:

***SEC. 3101. DEFINITIONS.***
*In this subtitle:*
*(1) COVERED LAND.—The term ''covered land'' means land that is—*
*(A) Federal lands administered by the Secretary concerned;*
*and*
*(B)* ***not excluded from the development*** *of geothermal, solar, or wind energy* ***under—***
***(i) a land use plan****; or (ii) other Federal law.* (Energy Act of 2020, emphasis added)

Furthermore,, it is not necessary to amend the Land Use Plan CMAs to meet the requirements of the Energy Act of 2020, as the Development Focus Areas in the DRECP LUP in California alone could meet the requirements for 25 gigawatts:

***(****b) MINIMUM PRODUCTION GOAL.—The Secretary shall seek to issue permits that, in total, authorize production of not less than* ***25 gigawatts*** *of electricity from wind, solar, and geothermal energy projects by not later than 2025, through management of public lands and administration of Federal laws. (Energy Act of 2020, emphasis added)[8]* (Energy Act of 2020)

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[7] (A) for public land, a land use plan established under the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 et seq.)

[8] 25 gigawatts = 25000 megawatts

According to the DRECP, the development focus areas are capable of providing enough area for 27 gigawatts in California alone (DRECP ROD, page 32). However, the Energy Act of 2020 is nationwide, and the Secretary is not limited to California when approving projects to comply with the Act.

**8. <u>Instead Of Avoiding On-Site Critical Habitat For The Desert Tortoise, The Project Proposes To Develop The Critical Habitat</u>**

The applicant is seeking to construct an industrial energy facility and solar field in approximately 600 acres of US Fish and Wildlife Service-designated Critical Habitat for the Federally Threatened Agassiz's desert tortoise on the north side of Interstate-10 in Chuckwalla Valley.

When questioned about this unprecedented overlap, the applicant's contractor Aspen Environmental stated that the consulting company Ironwood Consulting was looking at the "value" of this tortoise habitat. Our field visits indicate this is excellent desert tortoise habitat, as it is on a slightly higher rise close to the adjacent Chuckwalla Mountains on the south side of the highway. It is higher elevation Colorado Desert with abundant ironwood trees, compared to lower portions of the DFA in Chuckwalla valley. The Critical Habitat site contains numerous washes flowing out of the nearby Chuckwalla Mountains, with desert ironwood trees (*Olneya tesota*)—the seed pods of which are a favored food item for tortoises. During rainy years, spring wildflower displays here are excellent, providing more sources of tortoise forage species. The current extreme drought in the southwestern deserts will bias any surveys in spring 2021, and will only show a snapshot of poor forage conditions on this usually biodiverse Colorado Desert ecosystem.

Simply eyeing a map of GIS layer will not be able to show the "value" of tortoise habitat, and tortoises often prefer habitats that to the untrained human eye appear low in value.

Building a large solar field inside and on top of a 600-acre block of Critical Habitat would set an example for future solar developers to disregard this important land management designation, one of the best tools for conserving the California Desert from further encroachment and disturbance. A precedent should not be set.

The EA cites to the Biological Opinion for the DRECP LUPA, which concluded that allowing renewable energy development to overlap the Critical Habitat designation

> *would not have a measurable effect on the ability of the [critical habitat unit] …to support viable populations or to provide or movement, dispersal, and gene flow… because the [BLM] (2015c, page II.3-169,* ***<u>CMA LUPA-BIO-13</u>****) will maintain substantial wildlife corridors in this region, the actual amount of disturbance to Chuckwalla CHU would be substantially less."* (EA, pages 99-100, emphasis added)

The EA claims that the Oberon Project design supports general wildlife movement through the area, consistent with CMA LUPA-BIO-13.

In fact, the project violates CMA LUPA-BIO-13, General Siting and Design which requires projects to avoid impacts to the maximum extent practicable to "*occupied habitat and suitable habitat for Focus and BLM Special Status Species (see "avoid to the maximum extent practicable" in Glossary of Terms).*" (DRECP LUP. Page 100)

The Oberon Biological Technical Report (POD Appendix F), documented that the project site is occupied by desert tortoise. (See Figure 7). The proposed project (Alternative 2) does not avoid occupied desert tortoise habitats. The Resource Avoidance Alternative (Alternative 4) does.

Even though CMA LUPA-BIO-COMP-1 allows compensation acreage requirements to be fulfilled through non-acquisition (i.e., restoration and enhancement), land acquisition (i.e., preservation), or a combination of these options, the non-acquisition methods have failed to actually mitigate anything. Mojave desert tortoises continue to decline range wide, despite attempts to fence roads, close illegal routes, put of signs warning drivers of tortoises crossing roads, and other mitigation measures which are not efficacious in recovering the tortoise.

| Recovery Unit: Designated Critical Habitat Unit/Tortoise Conservation Area | Surveyed area (km$^2$) | % of total habitat area in Recovery Unit & CHU/TCA | 2014 density/km$^2$ (SE) | % 10-year change (2004–2014) |
|---|---|---|---|---|
| **Western Mojave, CA** | **6,294** | **24.51** | **2.8 (1.0)** | **–50.7 decline** |
| Fremont-Kramer | 2,347 | 9.14 | 2.6 (1.0) | –50.6 decline |
| Ord-Rodman | 852 | 3.32 | 3.6 (1.4) | –56.5 decline |
| Superior-Cronese | 3,094 | 12.05 | 2.4 (0.9) | –61.5 decline |
| **Colorado Desert, CA** | **11,663** | **45.42** | **4.0 (1.4)** | **–36.25 decline** |
| Chocolate Mtn AGR, CA | 713 | 2.78 | 7.2 (2.8) | –29.77 decline |
| Chuckwalla, CA | 2,818 | 10.97 | 3.3 (1.3) | –37.43 decline |
| Chemehuevi, CA | 3,763 | 14.65 | 2.8 (1.1) | –64.70 decline |
| Fenner, CA | 1,782 | 6.94 | 4.8 (1.9) | –52.86 decline |
| Joshua Tree, CA | 1,152 | 4.49 | 3.7 (1.5) | +178.62 increase |
| Pinto Mtn, CA | 508 | 1.98 | 2.4 (1.0) | –60.30 decline |
| Piute Valley, NV | 927 | 3.61 | 5.3 (2.1) | +162.36 increase |
| **Northeastern Mojave** | **4,160** | **16.2** | **4.5 (1.9)** | **+325.62 increase** |
| Beaver Dam Slope, NV, UT, AZ | 750 | 2.92 | 6.2 (2.4) | +370.33 increase |
| Coyote Spring, NV | 960 | 3.74 | 4.0 (1.6) | + 265.06 increase |
| Gold Butte, NV & AZ | 1,607 | 6.26 | 2.7 (1.0) | + 384.37 increase |
| Mormon Mesa, NV | 844 | 3.29 | 6.4 (2.5) | + 217.80 increase |
| **Eastern Mojave, NV & CA** | **3,446** | **13.42** | **1.9 (0.7)** | **–67.26 decline** |
| El Dorado Valley, NV | 999 | 3.89 | 1.5 (0.6) | –61.14 decline |
| Ivanpah, CA | 2,447 | 9.53 | 2.3 (0.9) | –56.05 decline |
| ***Upper Virgin River*** | ***115*** | ***0.45*** | ***15.3 (6.0)*** | ***–26.57 decline*** |
| *Red Cliffs Desert* | *115* | *0.45* | *15.3 (6.0)* | *–26.57 decline* |
| **Range-wide Area of CHUs - TCAs/Range-wide Change in Population Status** | **25,678** | **100.00** | | **–32.18 decline** |

Table 1.

The area of each Recovery Unit and Tortoise Conservation Area (TCA), percent of total habitat, density (number of breeding adults/km2 and standard errors = SE), and the percent change in population density between 2004 and 2014. Populations below the viable level of 3.9 breeding individuals/km2 (10 breeding individuals per mi2) (assumes a 1:1 sex ratio) and showing a decline from 2004 to 2014 are in red (after Desert Tortoise Council).

Note that the Chuckwalla Critical Habitat Unit has declined 37.43% from 2004 to 2014, when the last population monitoring surveys were completed. Oberon Solar Project would pose a significant threat to this habitat and the desert tortoise. Mitigation Measure MM BIO-6b in the EA Appendix H-25 states that as compensation for desert tortoise habitat impacts, the Applicant will provide compensation to offset loss of 6,808.03 acres desert tortoise habitat. This figure uses a 5:1 multiplier for the acres of Critical Habitat impacted by proposed solar development. However, given the results above, there is no adequate assurance is given that mitigation measures will help stave off continued declines in this highly imperiled species.

In addition, the application of herbicides along will significantly impact tortoise Critical Habitat, reducing and elimination important food plants such as annual forbs and grasses. The disturbance of heavy machinery, solar panel installation, construction and operation activities will significantly impact soil surfaces, burrows, and vegetation important to tortoises, on Critical Habitat, setting a very bad precedent for the incursion of development into designated protected habitat zone.

Therefore, we request that a LUPA be included in the EIS to amend the DRECP and remove the existing overlaps of the DFA with all Critical Habitat units. This defect in the DFA boundary should be fixed during this federal action opportunity, sooner, rather than later.

9. **Instead Of Avoiding The On-Site Multi-Species Habitat Linkage Area As Required By The DRECP LUP, The Project Proposes To Develop Within The Linkage Area.**

The EA at page 97 states that the project is located within the Palen McCoy Mountains–Chocolate Mountains linkage (see DRECP FEIS Figure III.7-26). Approximately 1,479 acres of the eastern portion of the project overlaps with the multiple-species linkage area identified in the DRECP LUP. The DRECP addressed the need to maximize microphyll woodlands and maintain the function of linkage connectivity.

> *The siting of projects along the edges (i.e. general linkage border) of the biological linkages identified in Appendix D (Figures D-1 and D-2) will be configured (1) to maximize the retention of microphyll woodlands and their constituent vegetation type and inclusion of other physical and biological features conducive to Focus and BLM Special Status Species' dispersal, and (2) informed by existing available information on modeled focus and BLM Special Status Species habitat and element occurrence data, mapped delineations of vegetation types, and based on available empirical data, including radio telemetry, wildlife tracking sign, and road-kill information. Additionally, projects will be sited and designed to maintain the function of F Special Status Species connectivity and their associated habitats in the following linkage and connectivity areas.*
>
> *Within a 1.5-mile-wide linkage across Interstate 10 to connect the Chuckwalla*

*Mountains to the Chuckwalla Valley east of Desert Center.*

(DRECP LUP, pages 100 to 101, emphasis added)

The Biological Technical Report appears to conflict with the EA. The POD Appendix F, written by Ironwood Consulting, states:

*The DRECP identifies a wide multi-species linkage area that partially overlaps with the southern parcel of the Project site on its eastern boundary. (Figures 1 and 12). The final design of the Project will follow all CMA requirements and may avoid or have a reduced footprint within the multi-species linkage boundaries.* (POD Appendix F at 28).

However, the EA states:

*The project would have a long-term impact on approximately 598 acres of the western portion of the 3,480-acre multiple-species linkage. The proposed project would not impact approximately 881 acres of the biological linkage within the project area, including habitat leading to freeway underpasses to maintain connectivity under the I-10. The project would be setback 300 feet from I-10 to preserve the Section 368 utility corridor. This would also support wildlife movement north and south of the freeway and between the I-10 underpass crossings north of I-10, where the value of linkage habitat for some terrestrial wildlife species is dependent on its width.*

We see no evidence that BLM actually undertook an environmental review of how the loss of 598 acres of multi-species linkage will impact desert tortoise, Burro deer, bighorn sheep, and other species, much less did the EA demonstrate how the function of the corridor would be maintained. The narrowing of the linkage, in combination with other projects that also narrow the linkage would result in blocking and fragmenting genetic linkages, and indirectly causing impacts due to edge effects, construction and operation disturbance, altered surface hydrology of washes, invasive species, and facilitating raven predation.

In our scoping comment letter, we asked that all I-10 underpasses be mapped, and impacts of the solar project analyzed to wildlife connectivity. Desert tortoises and other wildlife, including desert bighorn sheep, have been photographed in camera trap surveys as using freeway underpasses. This connectivity should be maintained in both the wildlife corridor and Critical Habitat.

Furthermore, “Wildlife permeable” fencing of solar fields in certain alternatives of the Project design are completely experimental, and have not been shown to successfully allow free passage of wildlife through a developed industrial energy project with mechanized activity, disturbed ground and vegetation.

Finally, we know of no scientific support for the use of alleged "strategic avoidance" to maintain the function and value of the wildlife linkage.

> *The Applicant is proposing to maintain wildlife linkage functionality, and the Project would not compromise the long-term viability of the linkage through* ***strategic avoidance****. Therefore, the Oberon Project would comply with the CMA. The Resource Avoidance Alternative (Alternative 4) is being analyzed in the NEPA document and would avoid the wildlife linkage corridor. LUPA-BIO-IFS-1: Individual Focus Species (IFS): Desert Tortoise* (POD, Appendix C, emphasis added

**10. Instead Of Minimizing Impacts To The Desert Pavement On-Site As Required Under The DRECP LUP, The Project Proposes To Destroy Most Of The On-Site Desert Pavement.**

The EA does not adequately disclose that all of the on-site Desert Pavement is to be destroyed, in violation of the DRECP LUP. On our site visit, Basin and Range Watch found Desert Pavement natural soil types commonly interspersed with microphyll wash vegetation communities on portions of the project site. This important soil type in the California Desert district sequesters carbon in large quantities, in association with Biological Soil Crusts. DRECP LUP has a CMA for desert pavement which is intended to cap the amount of disturbance:

> *LUPA-SW-9*
> *The extent of desert pavement within the proposed boundary of an activity shall be mapped if it is anticipated that the activity may create erosional or ecologic impacts. Mapping will use the best available standards as determined by BLM. Disturbance of desert pavement within the boundary of an activity shall be limited to the extent possible. If disturbance from an activity is likely to exceed 10% of the desert pavement mapped within the activity boundary, the BLM will determine whether the erosional and ecologic impacts of exceeding the 10% cap by the proposed amount would be insignificant and/or whether the activity should be redesigned to minimize desert pavement disturbance.*

However, the Oberon Solar Project intends to impact approximately 71 acres[9] of desert pavement or 41% of the 175 acres of total desert pavement within the total project area, which is a violation of the DRECP LUP (EA, page 84)

**11. The EA Fails To Analyze Several Potentially Significant Adverse Impacts.**

**a. Mitigation for Emory's Crucifixion Thorn is Deferred.**

The project violates CMA LUPA-BIO-13, General Siting and Design, in not avoiding impacts to unique plant assemblages such as Emory's crucifixion thorn (*Castela emoryi*)

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[9] Development of the Eagle Crest gen-tie line area with solar panels would add an additional 10 acres of disturbance
to desert pavement depending on final design.

communities.). This unique plant assemblage is classified as Crucifixion Thorn Stand in Sawyer et al. (2008), scattered in the Colorado and Mojave Deserts, and the authors say more information is needed about this plant community. The EA in Appendix H-27-28 lists Mitigation Measures for the species that includes experimental procedures that have no guarantee of success (See MM BIO-7):

> *Salvage. The Applicant will consult with Rancho Santa Ana Botanic Garden (RSABG) regarding the success of salvage efforts for this species at the Desert Sunlight Solar Farm project site. If the strategy has been shown to be feasible and certain individuals have been judged suitable for relocation, then the Applicant will prepare and implement an Emory's Crucifixion representative), CDFW, and BLM prior to disturbance of any occupied Emory's crucifixion thorn habitat. Emory's crucifixion thorn on private lands may also be subject to the provisions of the California Desert Native Plants Act. The Applicant will contract with RSABG or another entity with comparable experience and qualifications, to salvage at minimum 75 percent of Emory's crucifixion thorn individuals from the proposed project site and transfer them to a suitable off-site location.*
>
> *Horticultural propagation and off-site introduction. If salvage and relocation is not believed to be feasible for Emory's crucifixion thorn, then the Applicant will consult with RSABG or another qualified entity, to develop and implement an appropriate experimental propagation and relocation strategy*. (EA Appendix H, page 27)

BLM gives no assurance that any private lands with Emory's crucifixion thorn are even available, and could be purchased in this 1:1 mitigation scheme. As we have commonly seen with desert tortoise compensatory mitigation private land purchasers, there are vanishingly small opportunities to locate good quality habitat for species to purchase and protect, in order to compensate for the destruction of habitat on the solar project sites in the California Desert district.

BLM presents no analysis that Emory's crucifixion thorn salvage from other solar projects was successful, nor any reports from Rancho Santa Ana Botanic Garden (now California Botanic Garden) regarding success or failure of salvage and relocation efforts.

If these mitigation measures are based on failed past salvage attempts, and deferred future experimental strategies, this is again violating CMAs in the DRECP designed to conserve special desert resources. This is not balancing solar development with conservation, but defers analysis until a vague future date, in violation of NEPA.

**b. Significant Impacts to Mojave Fringe-toed Lizard Are Not Avoided Or Mitigated.**

Kevin Emmerich, an expert in California desert herpetology, observed an adult Mojave fringe-toed lizard (*Uma scoparia*) on the Oberon Project site, on September 4, 2021. The lizard ran into a burrow. The substrate was not fine loose sand or dune habitat, as is typical for this species, but was former sand with more gravel and desert pavement. The metapopulation in Chuckwalla Valley may have differing habitat requirements than other populations of this species, and this needs more study. Maps, impacts of fences and sand piling up on fences, and impacts to the sensitive species Mojave fringe-toed lizard (*Uma scoparia*) should be analyzed. Cumulative impacts to this sand endemic lizard have been considerable in the Chuckwalla Valley, with the construction of the Desert Sunlight Solar Farm, Desert Harvest Solar Project, Palen Solar Project, Genesis Solar Energy Project, Blythe Solar Project, McCoy Solar Project, and proposed Crimson Solar Project, Arica and Victory Solar Projects, and Desert Quartzite Solar Project, along with new transmission and substation infrastructure.

The cumulative significant impacts of these developments on removing fringe-toed lizard habitat, disturbance and blockage of sand flows, and the increase of invasive weeds, needs to be analyzed, as this group of populations could be a new undescribed taxon when finer genetic studies are undertaken in the future.

POD Appendix F indicated that the likelihood of observing this species was low, and that none were observed. Accordingly, no mitigation was provided. Therefore, impacts have not been analyzed and mitigation measures are wholly inadequate for this species.

**c. Significant Impacts to Wildlife Are Not Adequately Analyzed or Mitigated.**

The EA at 96 discusses sensitive bat species found on the project site, including Townsend's big-eared bat, western mastiff bat, western yellow bat, California leaf-nosed bat, big free-tailed bat, and pocketed free-tailed bat. The EA claims that while any of these bat species may fly over the site to foraging or roosting sites, there is only limited roosting potential on the project site in the dry wash woodland habitat and in nearby areas such as freeway under-passes, yet the EA mentions that one inactive bat roost was observed in an Ironwood tree cavity with guano staining.

Concerning bats on the proposed Oberon Solar Project:

> **Special-status bats.** Seven special-status bat species may forage on or near the Project sites and gen-tie line, as described below and discussed further in Appendices E-1 and E-2. While any of these species may fly over the site to foraging or roosting sites, there is limited roosting potential on the sites for two special- status bat species in the dry wash woodland habitat. No active bat roosts were documented on the sites during surveys. Suitable bat roosts (e.g., rock ledges, cliffs, large tree hollows, mine shafts) occur a few miles from the Project sites in the mountain ranges surrounding the Chuckwalla Valley. Many bats, including special-status species, forage primarily on large insects such as moths, and tend to concentrate foraging activity around water sources such as the irrigation sources around nearby active agricultural areas. Suitable foraging habitat for common and special-status bats is found on the sites.
> **Draft EIR** 3.4-16 **August 2021**

Yet different information is presented about special status bats in adjacent solar project environmental eviews:

**Arica Solar Project and Victory Pass Solar Project**

**3.4 Biological Resource**

[W]ithin desert dry wash woodland and near adjacent agricultural parcels where water may be available year-round. One live unidentified bat species was observed within an Ironwood tree cavity during surveys of the Victory Pass site. Acoustic surveys for the Palen Solar Power Project, 1 mile east of the Project sites, detected five special-status bats in the projects' vicinity.

❑*Townsend's big-eared bat (Corynorhinus townsendii); SSC, BLM S*. Foraging habitat in desert dry wash woodland. No roosting habitat.

❑ *California leaf-nosed bat (Macrotus californicus); SSC, BLM S*. Suitable foraging habitat, but no roosting habitat. ❑*Pallid bat (Antrozous pallidus); SSC, BLM S*. Marginal foraging habitat in desert dry wash woodland. No roosting habitat. Surveys for Palen Solar (1 mile east) detected pallid bat in project vicinity.

❑*Western mastiff bat (Eumops perotis californicus); SSC, BLM S*. Suitable foraging habitat, but no roosting habitat. Surveys for Palen Solar (1 mile east) detected western mastiff bat in project vicinity.

❑*Western yellow bat (Lasiurus xanthinus); SSC*. Potential marginal roosting habitat in desert dry wash woodland. Suitable foraging habitat. Surveys for Palen Solar (1 mile east) detected western yellow bat in project vicinity.

❑*Big free-tailed bat (Nyctinomops macrotis); SSC*. Marginal foraging and roosting habitat in desert dry wash woodland. Surveys for Palen Solar (1 mile east) detected big free-tailed bat in project vicinity.

❑*Pocketed free-tailed bat (Nyctinomops femorosaccus); SSC*. Suitable foraging habitat, but no roosting habitat. Surveys for Palen Solar (1 mile east) may have detected presence, but the result was not definitive[10].

Couch's spadefoot toad was not observed during surveys, but eight areas were identified as potential breeding habitat where water may accumulate after rainfall. Golden eagles could forage at the site at any time of year, and one eagle was observed flying over the project site. Three burrowing owl burrows were observed; two of the burrows had a live individual and whitewash was observed at the third burrow.

Additional notable CDFW special-status wildlife present in the project site include burro deer (CPGS) and desert kit fox (CPF). Suitable burrows for American badger (SSC) were identified, but no badgers were observed.

Impacts to the California state endangered Gila Woodpecker were not well analyzed or mitigated. On page 18 of the bird and bat conservation strategy, the EA states that Gila woodpecker numbers would be low on the site due to the lack of palo verdes. There are some very

[10] https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=193734&inline

large palo verde trees on the site. We also have data that confirms Gila woodpeckers nest in ironwood trees. The BBCS also states that potential nesting cavities were located on the project site.

Gila woodpecker numbers have declined drastically in southern California. Breeding habitat consists of Columnar cactus, especially saguaro; less common in cottonwood, willow, paloverde, ironwood, mesquite, and residential shade trees, trees > 10 inches DBH, riparian patches > 50 acres (Arizona Bird Conservation Initiative and Sonoran Joint Venture. 2020). Softer woods are preferred for excavating nest cavities, such as saguaro and palo verde. We found several large palo verde trees on the Oberon site. Loss and fragmentation of riparian woodland is one of the main threats facing Gila woodpeckers (CDFW no date).

The bird diversity in this microphyll habitat has not been analyzed or mitigated. The importance of this intact habitat for Colorado Desert birds needs more study. Appendix D to the Biological Resources Technical Report, POD Appendix F lists over 80 species of birds observed at the Project site. Breeding birds may include Black-tailed gnatcatcher, Ladderback woodpecker, Verdin, Ash-throated flycatcher, Black-throated sparrow, Burrowing owl, Cactus wren, Common poorwill, Lesser nighthawk, Coast'a hummingbird, Gambel's quail, House finch, Lesser goldfinch, Loggerhead shrike, Mourning dove, Northern mockingbird, Say's phoebe, Western kingbird, and Vermilion flycatcher. This is important because the EA claims that the loss of microphyll woodland is not significant because the area does not support

> *The microphyll woodlands in the Desert Center area are not identified as Important Bird Areas*
> *in the DRECP or elsewhere (DRECP FEIS Figure III.7-15), whereas many of the other DRECP*
> *areas with microphyll are identified as important bird areas, and the environmental setting in*
> *the DRECP FEIS was focused on the value of these important bird areas as they relate to microphyll woodlands.* (EA, page 101)

**d. The EA Fails to Adequately Analyze and Mitigate Avian-Solar Impacts.**

As other large-scale solar projects in the DFA have resulted in the mortality due to "lake-effect" impacts, resulting in collisions, this important concern should be fully analyzed and mitigation measures enumerated, including those not tiered to in the DRECP. This is a growing concern with waterbirds that fly across the desert from the Salton Sea and Gulf of California, to Colorado River water bodies.

The EA briefly discusses bird collision and monitoring studies of mortality done elsewhere in California. Yet Argonne National Laboratory (2016) summarized multiple agency findings of widespread impacts to birds from utility-scale solar projects. Mortality monitoring and reporting is required by lead agencies on many projects. Data from 7 projects in Southern California (4 Photovoltaic, 2 Solar Trough, 1 Power Tower), reported from 2012-April 2016 showed that significant bat and insect mortality, including Monarch butterflies was occurring on solar projects. A total of 3,545 mortalities from 183 species (2012-April 2016) were recorded, from a mix of reports from incidental finds and systematic surveys. Many mortalities occur due to dehydration/heat stress after initial injury/stranding.

Mortality to birds of Conservation Concern and Federal Endangered/Threatened species (including California Desert solar projects) impacted Yuma Ridgeway's (Clapper) Rail, Willow Flycatcher, Yellow-billed Cuckoo, Peregrine Falcon, Bank Swallow, Western Grebe, Horned and Eared Grebes, American White Pelican, Burrowing Owl, and Calliope Hummingbird. The environmental assessment admits that more of the common species could die from collision or Lake Effect. This is obvious. While the numbers of more sensitive species would be lower, they are recognized as sensitive for a reason. It is obvious that more common species will have greater numbers, but because Endangered and Species if Special Concern have traditionally lower numbers, the mortality of fewer individuals is significant. The EA concludes that the risk to avian populations is "minimal" while admitting that "uncertainty remains"(POD Appendix K, page 25)The Environmental Assessment and the Bird and Bat Conservation Strategy (BBCS) list no mitigation measures for avian collisions with solar panels, even though uncertainty remains. Why not? The EA should include required mitigation measures such as requiring the applicant to create a bigger space between solar panels, create an uneven, wavy surface for the panels to break up the lake effect and finally, surround each panel with a white rim to break up this lake effect.

On Page 22 of the BBCS:

> Bat roosts that occur in the vicinity of the project site include McCoy Mountains, Eagles Nest Mine approximately 20 miles east of the project site, within the Little Maria Mountains approximately 20 miles north east of the project site), and Paymaster Mine within the Pinto Mountains approximately 30 miles north west of the project site (Gannon, 2003; CEC, 2010). No active bat roosts were documented on the project site during any of the surveys to date. It is not expected that any special status bat species would have a substantial roost on the project site since habitat features most associated with these species (e.g., rock ledges, cliffs, large tree hollows, mine shafts) do not occur on the project site.

It appears that the Chuckwalla and Eagle Mountains were overlooked in this survey, and thus the survey cannot be used as a basis to conclude there are no bat roosts nearby. The Chuckwalla Mountain are about 3-4 miles from the project site while the Eagle Mountains are about 8 to 10 miles from the site. It is unlikely that these two ranges would have no bat roosts. A better study and analysis is needed.

**e. Alternatives Are Not Fully Analyzed.**

The EA claims that development is a foregone conclusion:

> *Because the project site is located within a DFA near an existing substation with available capacity for additional energy transmission, if the project were not constructed, a different solar developer may apply to for a right-of-way to construct a similar solar project at this location*. (EA, page 11)

This can easily be corrected by adding an alternative and by making the project site a Solar Exclusion Area with a land use plan amendment. The benefits of this would be a guarantee that microphyll woodlands, Critical Habitat, wildlife linkage and sand transport would be protected. Please consider a Solar Exclusion Zone alternative for the entire site in a Land Use Plan Amendment.

The EA at 12 states that in the Proposed Alternative:

> *On-site electric substation yard located within a 20-acre area centrally located on the project site. Electrical transformers, switchgear, and related substation facilities would transform 34.5 kV medium-voltage power from the project's delivery system to the 500 kV gen-tie system.*

How much microphyll habitat would be removed in this 20 acres and the 25 acre battery storage system? These types of facilities would both need 100 percent grading.

Nighttime security lighting is proposed to be constructed in coordination with California Department of Transportation (Caltrans) to ensure compliance with exterior lighting regulations along I-10. How would night lighting be mitigated for bat species, insects and migrating songbirds? Being this close to the Interstate would cause vehicle kills.

Herbicide use: The applicant proposes to use 6 herbicides. How will this impact microphyll woodlands, desert tortoise, migrating birds, insects and human health?

The Resource Avoidance Alternative would still impact 1,800 acres. This would still create a collision risk for birds, Birds could be attracted to adjacent microphyll woodlands and this could represent a collision trap. Avoiding microphyll with a buffer is the best way to protect it. That would be a No Action Alternative with an LUPA keeping solar out of the area. This would also alter the surface hydrology and create an influx of weeds like Sahara mustard. The applicant would have to use more herbicides to control the weeds.

Rejected Alternatives include the Distributed Energy alternative. The EA at 32 and following states that:

> *Although there is potential to achieve up to 500 MW of distributed solar energy throughout the greater California area, the limited number of existing facilities and location of BLM administered lands make it unlikely to be feasible or present environmental benefits.*

We did not ask for a distributed generation alternative on BLM lands. We asked for a No Action Alternative based on the vast distributed potential in California. It is not factual to state that California can only generate 500 MW of distributed energy. (*Rooftop Solar Photovoltaic Technical Potential in the United States: A Detailed Assessment*, Technical Report, National Renewable Energy Laboratory TP-6A20-65298, January 2016). This would eliminate the Need for the Oberon Solar Project. Under the National Environmental Policy Act, agencies are required to consider alternatives outside of the lead agency jurisdiction (Section 1506.2(d)).

State officials assume that California will nearly quadruple its current rooftop solar capacity – from 10.5 gigawatts to 39 gigawatts (GW) – as it seeks to reach its 2045 climate and clean energy goals. This is in addition to even larger amounts of utility-scale solar[11]. The entire nation of Vietnam generated 9 GW of rooftop solar in the year of 2020[12]. Distributed Generation is a viable alternative to best avoid significant resource impacts.

### f. Visual Resources Are Not Adequately Analyzed.

There are not enough KOP visual contrast simulations with this landscape. We asked for KOPs from nearby Wilderness Areas, as well as night-time visual impact assessments that could harm night-sky viewing. A KOP from Joshua Tree National Park should also be included. These were not included in the EA, and therefore the Visual Resources were not adequately analyzed.

### g. Environmental Consequences Not Analyzed.

The Heat Island Effect was not analyzed in the EA. A recent study (Lu et al. 2020) showed that covering 20 percent of the Sahara Desert with solar farms raises local temperatures in the desert by 1.5 degrees Celsius, according to a model. At 50 percent coverage, the temperature increase is 2.5 degrees Celsius. This warming is eventually spread around the globe by atmosphere and ocean movement, raising the world's average temperature by 0.16 degrees Celsius for 20 percent coverage, and 0.39 degrees Celsius for 50 percent coverage. The global temperature shift is not uniform, though — the polar regions would warm more than the tropics, increasing sea ice loss in the Arctic. This could further accelerate warming, as melting sea ice exposes dark water which absorbs much more solar energy.

The Oberon Solar Project would be 2,700 acres or 4 square miles. A possible temperature increase could impact the public health of Desert Center. It could also impact the microphyll ecosystem. Temperatures are already on the increase due to climate change. Geoengineering the landscape with millions of solar panels could make the area's average temperatures even hotter.

## Conclusion:

The BLM must conclude that the Oberon project will result in new significant impacts not previously analyzed and disclosed in the previous DRECP FEIS, as conceded in the EA. Accordingly, the BLM cannot issue a Finding of No New Significant Impact (FONNSI). We urge the BLM to require an EIS for review of this right of way request in order to analyze the significant adverse impacts that would result if the project is implemented. We ask that the EIS include an alternative that designates this area as an exclusion zone in order to protect the valuable resources onsite.

---

[11] https://environmentcalifornia.org/reports/cae/environmental-case-rooftop-solar-energy#:~:text=State%20officials%20assume%20that%20California,amounts%20of%20utility%2Dscale%20solar.

[12] https://www.pv-magazine.com/press-releases/scaling-up-rooftop-solar-in-vietnam-more-than-9gw-installed-in-2020/#:~:text=Vietnam%20installed%20a%20record%206.71,in%20the%20country%20in%202020.

Thank you for considering these comments. Western Watersheds Project and Basin and Range Watch thank you for this opportunity to assist the BLM by providing scoping comments for this project. Please keep Western Watersheds Project and Basin and Range Watch informed of all further substantive stages in this and related NEPA processes and documents by contacting us at lcunningham@westernwatersheds.org and atomicquailranch@gmail.com.

Sincerely,

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John Sawyer, John, Todd Keeler-Wolf, and Julie Evens. 2008. A Manual of California Vegetation, Second Edition. California Native Plant Society and California Department of Fish and Wildlife. ISBN 978-0-943460-49-9 (chapter)

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Appendix—Photographs September 4, 2021, by Kevin Emmerich.

Figure 1. Desert ironwood on site of proposed Oberon Solar Project. September 4, 2021, by Kevin Emmerich.

Figure 2. Large desert ironwood on the project site, September 4, 2021. Photo: Kevin Emmerich.


Figure 3. Large desert ironwoods on the project site, September 4, 2021. Photo: Kevin Emmerich.


Figure 4. Desert ironwoods and palo verde on the project site, September 4, 2021. Photo: Kevin Emmerich.

Figure 5. Large desert ironwood on the project site, September 4, 2021. Photo: Kevin Emmerich.

Figure 6. Dense microphyll and desert ironwoods on the project site, September 4, 2021. Photo: Kevin Emmerich.

Figure 7. Desert ironwoods and palo verde trees on the project site, September 4, 2021. Desert Harvest Solar farm/Desert Sunlight Solar Farm projects can be seen lower in Chuckwalla valley in the distance. Photo: Kevin Emmerich.

Figure 8. Scattered microphyll trees and wash woodlands are widespread and common on the project site, September 4, 2021. Photo: Kevin Emmerich.

Figure 9. Undercrossings with wash, I-10, September 4, 2021. Photo: Kevin Emmerich.

Figure 11. View of wildlife connectivity across Chuckwalla Valley blocked and fragmented by Desert Sunlight and Desert Harvest Solar Farm projects, in operation. The cumulative impacts to wildlife connectivity were not touched on at all by the BLM. View looking northwest at Oberon Project site, September 4, 2021. Photo: Kevin Emmerich.

Figure 12. View of wildlife connectivity across Chuckwalla Valley blocked and fragmented by Desert Sunlight and Desert Harvest Solar Farm projects, in operation. View looking northwest at Oberon Project site, September 4, 2021. Photo: Kevin Emmerich.

Figure 13. A large palo verde tree on the site of the proposed Oberon Solar Project in microphyll woodland, field visit September 4, 2021.

Figure 14. Very large, old-growth palo verde tree on the project site—good nesting habitat for Gila woodpeckers. September 4, 2021.

SPECIES ACCOUNT ● GILA WOODPECKER *Melanerpes uropygialis*

*Gila Woodpecker, photo by ©George Andrejko*

## Conservation Profile

| Species Concerns | |
|---|---|
| Increasing Fire Frequency | |
| Climate Change (drought) | |
| **Conservation Status Lists** | |
| USFWS [1] | No |
| AZGFD [2] | Tier 1B |
| DoD [3] | No |
| BLM [4] | No |
| PIF Watch List [5b] | No |
| PIF Regional Concern [5a] | Reg. Concern and Stewardship Species-BCR 33 |
| **Migratory Bird Treaty Act** | |
| Covered | |
| **PIF Breeding Population Size Estimates [6]** | |
| Arizona | 560,000 ◑ |
| Global | 1,500,000 ◑ |
| Percent in Arizona | 37.67% |
| **PIF Population Goal [5b]** | |
| Maintain | |
| **Trends in Arizona** | |
| Historical (pre-BBS) | Unknown |
| BBS [7] (1968-2013) | -1.2/year ● |
| **PIF Urgency/Half-life (years) [5b]** | |
| > 50 | |
| **Monitoring Coverage in Arizona** | |
| BBS [7] | Adequate |
| AZ CBM | Adequate |
| **Associated Breeding Birds** | |
| White-winged Dove, Elf Owl, Gilded Flicker, Brown-crested Flycatcher, Verdin, Black-tailed Gnatcatcher, Phainopepla, Lucy's Warbler | |

## Breeding Habitat Use Profile

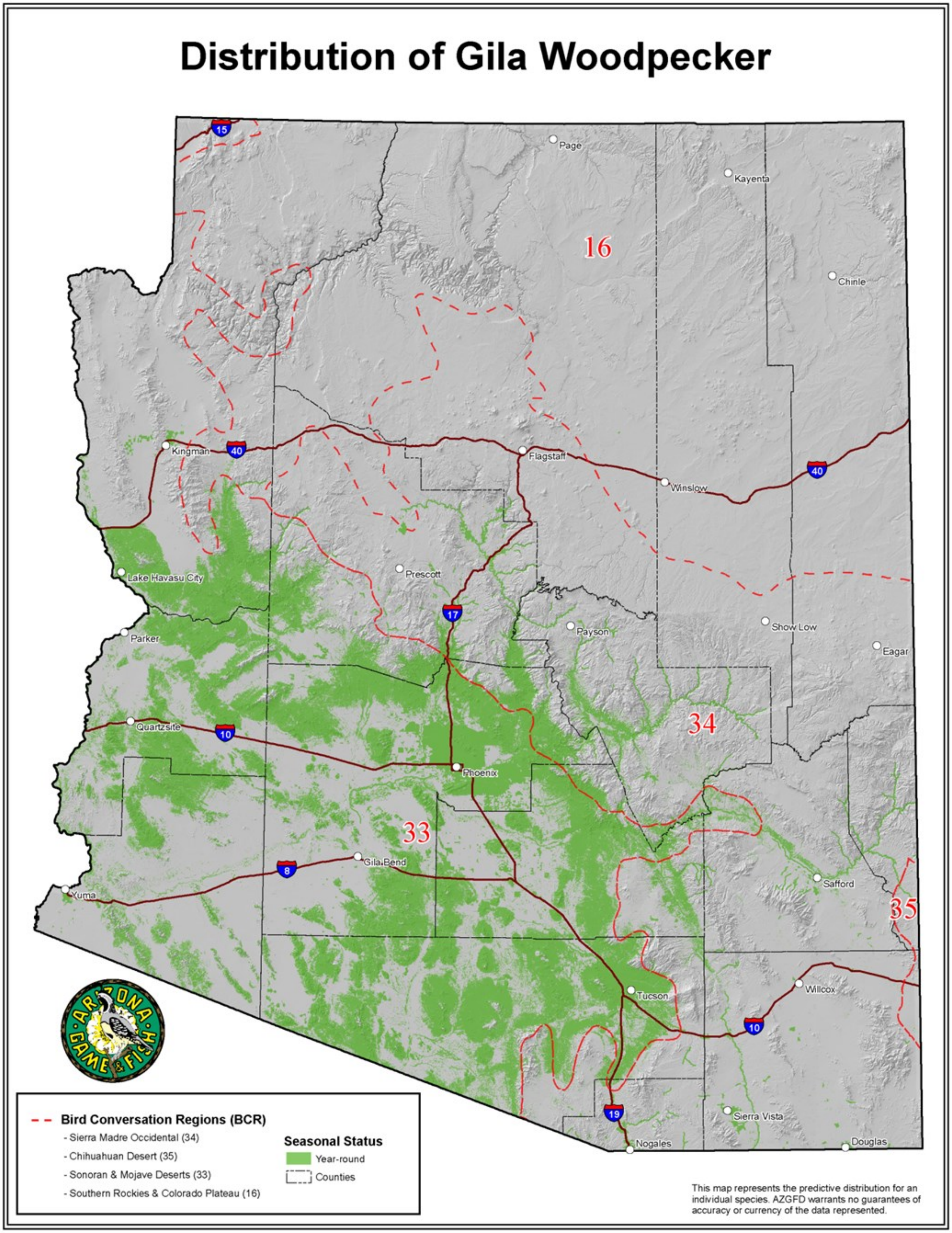
| Habitats Used in Arizona | |
|---|---|
| Primary: Sonoran Desertscrub | |
| Secondary: Lowland Riparian Woodlands [8,9,10] | |
| **Key Habitat Parameters** | |
| Plant Composition | Columnar cactus, especially saguaro; less common in cottonwood, willow, paloverde, ironwood, mesquite, and residential shade trees [8,9] |
| Plant Density and Size | Saguaros > 15 feet tall and branching, or softwood snags [9]; preferred plant densities unknown |
| Microhabitat Features | Cactus or riparian trees > 10 inches DBH, fruit-bearing cacti and trees, mistletoe infections |
| Landscape | Saguaros in arroyo settings preferred but others also used, riparian patches > 50 acres |
| **Elevation Range in Arizona** | |
| 150 – 4,800 feet [8] | |
| **Density Estimate** | |
| Territory Size: 11 – 25 acres [9] | |
| Density: 4 – 10 (up to 20 – 25)/100 acre [9] | |

## Natural History Profile

| Seasonal Distribution in Arizona | |
|---|---|
| Breeding | early March – late July [8,9] |
| Migration | Year-round resident |
| Winter | Some wander to adjacent higher elevations in fall and winter [9] |
| **Nest and Nesting Habits** | |
| Type of Nest | Excavates tree or cacti cavity |
| Nest Substrate | Saguaro, cottonwoods, willows, sycamore, paloverde, exotic trees in urban areas [8,9] |
| Nest Height | 12 – 35 feet [8,9] |
| **Food Habits** | |
| Diet/Food | Insects; saguaro fruits and other fruits [9] |
| Foraging Substrate | Tree bark; saguaro [9] |

Confidence in Available Data: ● High ◑ Moderate ○ Low ^ Not provided

Publication Date: 2020


Distribution of Gila Woodpecker
Page
Kayenta
16
Chinle
Kingman
Flagstaff
Winslow
Prescott
Lake Havasu City
Payson
Show Low
Eagar
Parker
34
Quartzsite
Phoenix
33
Gila Bend
Yuma
Safford
35
Tucson
Willcox
Sierra Vista
Nogales
Douglas
15
40
17
10
8
19
Bird Conversation Regions (BCR)
- Sierra Madre Occidental (34)
- Chihuahuan Desert (35)
- Sonoran & Mojave Deserts (33)
- Southern Rockies & Colorado Plateau (16)
Seasonal Status
Year-round
Counties
This map represents the predictive distribution for an individual species. AZGFD warrants no guarantees of accuracy or currency of the data represented.

## General Information

### Distribution in Arizona

Similar to the Gilded Flicker, the Gila Woodpecker's distribution in Arizona largely matches the distribution of the Sonoran Desert biome, reaching from the southwest-central region to the far southeastern corner of the state (Bradley 2005). The species occupies lowland areas with saguaros or riparian gallery woodlands. Gila Woodpeckers are year-round residents in Arizona (Edwards and Schnell 2000).

### Habitat Description

Most Gila Woodpeckers nest in Sonoran Desertscrub uplands that have tall saguaros or in arroyos with paloverde, mesquite, and ironwood. The remainder of the population nests in riparian and riparian-transitional woodlands with mature cottonwood, willow, mesquite, or Arizona sycamores, and some nest in residential areas with palms and mature shade trees (Edwards and Schnell 2000, Bradley 2005). Wintering habitat and habitat use is similar to nesting habitat, although some individuals wander to adjacent habitats (Philips et al. 1964, Edwards and Schnell 2000).

### Microhabitat Requirements

Gila Woodpeckers excavate nest cavities most often in saguaros, but they also regularly use mature native trees, such as cottonwoods, willows, sycamore, ash, and paloverde (Edwards and Schnell 2000, Bradley 2005). Harder woods, such as mesquite, are used less often. In urban and rural settings, Gila Woodpeckers also excavate nesting cavities in palms, eucalyptus, athel tamarisk, mulberry, and other exotic shade trees (Rosenberg et al. 1991, Bradley 2005). Saguaros used for nesting are tall (> 12 feet) and often have arms. Microhabitat details in riparian woodlands have not been studied in detail (Edwards and Schnell 2000). Data on diameters of nesting trees are absent, but based on cavity diameter data (Edwards and Schnell 2000), we estimate a DBH of ≥10 inches for nesting trees or cactuses. During nesting, foraging microhabitats include bark of large trees with large branches, particularly thorn trees, and cactus tops that have ripe fruits. In winter, mistletoe berries on mesquite and acacia are a frequent food source when available (Edwards and Schnell 2000).

### Landscape Requirements

Gila Woodpeckers nest most often in taller saguaros that are located near wooded arroyos that also provide foraging habitat. Hillsides, ridgetops, and desert flats are also used when saguaro stands are present nearby (Edwards and Schnell 2000). Riparian, xeroriparian, and riparian-transitional areas are also used, if they have mature trees with large branches.

Area requirements of Gila Woodpeckers in saguaro landscapes need further study, but one study determined that riparian woodland patches along the lower Colorado River are only suitable if they are 50 acres or larger (Edwards and Schnell 2000). They are tolerate of low- and medium-density residential areas, particularly if native vegetation is still present; they also readily use taller exotic trees in urban settings (Edwards and Schnell 2000).

## Conservation Issues and Management Actions

### Threats Assessment

This table is organized by Salafsky et al.'s (2008) standard lexicon for threats classifications. Threat level is based on expert opinion of Arizona avian biologists and reviewers. We considered the full lexicon but include only medium and high threats in this account.

| Threat | Details | Threat Level |
|---|---|---|
| ***Residential and Commercial Development***<br>• Housing and urban areas<br>• Commercial and industrial areas | | Medium |
| ***Agriculture***<br>• Livestock farming and ranching | Unsustainable livestock grazing | Medium |
| ***Natural System Modifications***<br>• Fire and fire suppression | Desert wildfires kill saguaros and palo verde | High |
| ***Invasive and Problematic Species***<br>• Invasive non-native/alien plants and animals | Invasive grasses, forbs, and tamarisk, European Starlings compete for cavities | Medium |
| ***Climate Change***<br>• Ecosystem encroachment<br>• Changes in temperature regimes<br>• Changes in precipitation and hydrological regimes | | High |

In the following section we provide more detail about threats, including recommended management actions. Threats with similar recommended actions are grouped.

**Residential and Commercial Development:**

- Housing and urban areas
- Commercial and industrial areas

**Natural System Modifications:**

- Other ecosystem modifications

Gila Woodpeckers tolerate low- and medium-density residential settings if native vegetation is left intact or larger shade trees and palms are incorporated into landscaping.

*Recommended Actions:*

1. Encourage developers to leave large tracts of saguaro landscapes as green-belts and open space.
2. Encourage homeowners to plant native paloverde, mesquite, and saguaros.

3. Increase public understanding and appreciation of Gila Woodpeckers and their unique ecological needs, as well their important role in creating cavities for other native species, particularly where native landscapes are adjacent to urban areas.
4. Discourage urban development in saguaro forest.

**Agriculture**

- Livestock farming and ranching

Across the west, loss of riparian gallery woodlands from alteration of flood regimes and loss of surface water in lower elevation reaches of rivers and streams undoubtedly has affected Gila Woodpecker populations. Unsustainable livestock grazing of riparian areas and invasion of exotic trees can greatly reduce cottonwood, willow, and other native tree recruitment.

*Recommended Actions:*

1. Reduce livestock grazing activities in perennial and intermittent drainages that affect cottonwood, willow, and other native riparian tree densities and recruitment. This could include fencing, providing alternative water sources, or adopting a "winter-only" grazing regime.

**Natural System Modifications:**

- Fire and fire suppression

**Invasive and Problematic Species:**

- Invasive non-native/alien plants and animals

The spread of non-native grasses and forbs into desertscrub habitats has introduced fire into an ecosystem where plants are not fire-adapted. This causes habitat conversion, loss of microhabitats, and mortality of saguaros, paloverde, ironwood, mesquite, cottonwoods, and willows. Conversion of cottonwood-willow riparian habitat to agriculture and invasion of exotic tamarisk have also reduced riparian habitats available to Gila Woodpeckers, especially along the lower Colorado River. The spread of European Starlings is problematic because they can out-compete Gila Woodpeckers for cavities, particularly in and near rural and urban areas.

*Recommended Actions:*

1. Develop and implement fire management strategies, including invasive grass and weed control, that prevent catastrophic fires.
2. Reduce fuel loads along roadways to reduce wildfire risk.
3. Protect large tracts of saguaro landscapes to reduce fire risk.
4. Restore native gallery riparian forests.

**Climate Change:**

- Ecosystem encroachment
- Changes in temperature regimes
- Changes in precipitation and hydrological regimes

Prolonged droughts are a concern to Gila Woodpecker populations and other saguaro-dependent species because they reduce vigor and fruit-bearing potential of saguaros. Droughts can also lead to greater mortality of mature trees and cacti.

*Recommended Actions:*

1. Delineate strongholds of Gila Woodpeckers for strategic conservation planning.
2. Determine risks from land uses that may compound the effects of prolonged droughts on cactus.

## Research and Monitoring Priorities

1. Use multi-species protocols to conduct periodic ongoing population monitoring surveys of Gila Woodpeckers to determine population trends and status.
2. Determine Gila Woodpecker diet and where they obtain food in both urban and natural settings.
3. Determine long-term effects of open range livestock grazing in desert landscapes, particularly regarding recruitment of saguaros, paloverde, and other desert trees and the spread of invasive grasses and forbs .

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[4]Arizona Bureau of Land Management Sensitive Species List – March 2017.

[2]Arizona Game and Fish Department. 2012. Arizona's State Wildlife Action Plan: 2012-2022. Arizona Game and Fish Department, Phoenix, AZ.

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[1]U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp.

**Recommended Citation**

Arizona Bird Conservation Initiative and Sonoran Joint Venture. 2020. Gila Woodpecker (*Melanerpes uropygialis*) Species Account. Available at https://sonoranjv.org/accounts/gila-woodpecker.pdf

# A Manual of California Vegetation

**Second Edition**

John O. Sawyer, Humboldt State University
Todd Keeler-Wolf, Department of Fish and Game
Julie M. Evens, California Native Plant Society

*California Native Plant Society*

In collaboration with

*California Department of Fish and Game*

Sacramento, California

# *Castela emoryi* Shrubland Special Stands
## Crucifixion thorn stands

***Castela emoryi*** **grows as individual shrubs or in** stands with *Ambrosia dumosa, Brickellia incana, Encelia farinosa, E. virginensis,* and *Larrea tridentata*. Shrubs < 4 m; canopy is open to intermittent.

**Habitats:** Plains, alluvial bottom lands, sand fields; rarely on rocky slopes. Soils are fine-textured silts and sands. **Elevation:** 100–650 m.

**Rarity ranking:** G2 S1.1. **MCV:** Crucifixion thorn stands. **NVCS:** Not treated. **Calveg:** Not treated. **Holland:** Crucifixion thorn woodland. **Munz:** Creosote bush scrub. **WHR:** Desert scrub.

### Remarks

*Castela emoryi* (a CNPS list 2.3 plant) is a large, leafless shrub that grows to 4 m in height; it has rigid, light green stems that end in stout thorns. Clusters of hard capsules, first yellowish then drying to black, persist on plants for up to 7 years. Seeds apparently require scarification of the seed coat to initiate germination (Shreve and Wiggins 1964, Turner at al. 1995). Regional manuals also use the name *Holacantha emoryi*. This plant is easily confused with *Ziziphus obtusifolia,* with its gray branches, and *Koeberlinia spinosa,* with its dark green branches and black berries.

Stands typically associate with fine substrate in washes or basins and are associated with *Ambrosia dumosa, Brickellia incana, Encelia virginensis, Ephedra californica, Larrea tridentata,* or other species of low-energy wash environments. Plot data are available from CNDDB (2008).

### Observations

*Castela emoryi* grows in the Colorado Desert (322Cb), Sonoran Desert (322Ba–Be), and southern Mojave Desert (322Al–m, Ao). The best-known stand is near the corner of Coyote Road and State Route 98 in Imperial Co. The Bureau of Land Management has fenced this large stand and designed it as the Crucifixion Thorn Natural Area. It is located in a small playa within the Yuha Desert, where it grows with scattered shrubs of *Ambrosia dumosa* and *Larrea tridentata* and an understory of herbs such as *Hoffmannseggia glauca*. The other 19 known occurrences (CNPS 2001) are scattered in California's deserts, where summer rainfall is common, summer temperatures are hot, and frost is rare. We need further information to understand the relationships of this species in the state's desert vegetation.

### References


Shreve and Wiggins 1964, Turner et al. 1995.

# Multiagency Avian-Solar Collaborative Working Group: Stakeholder Workshop

## *Welcome and Overview of Workshop Objectives*

*Dan Boff*

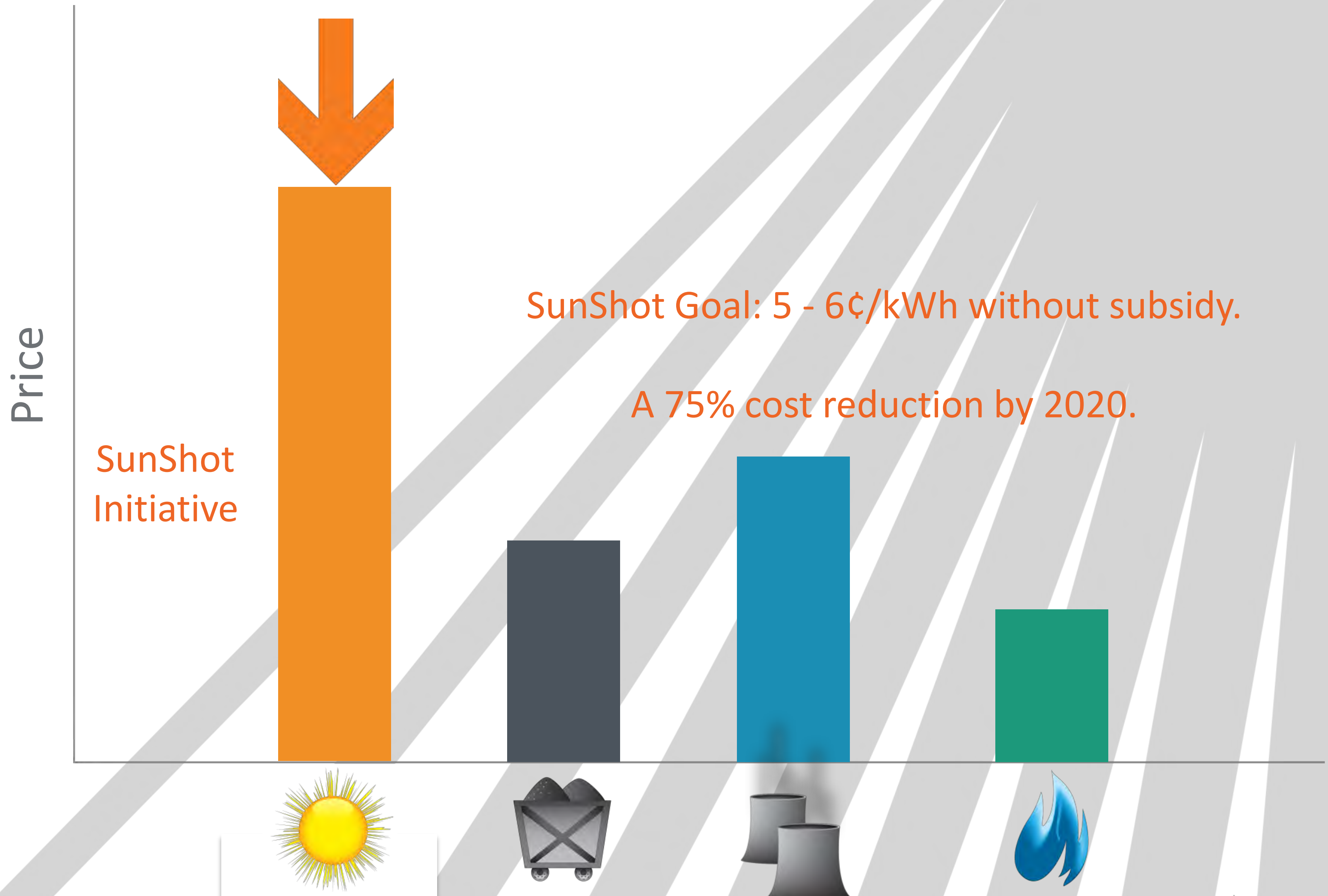
*U.S. Department of Energy*

*SunShot Initiative*

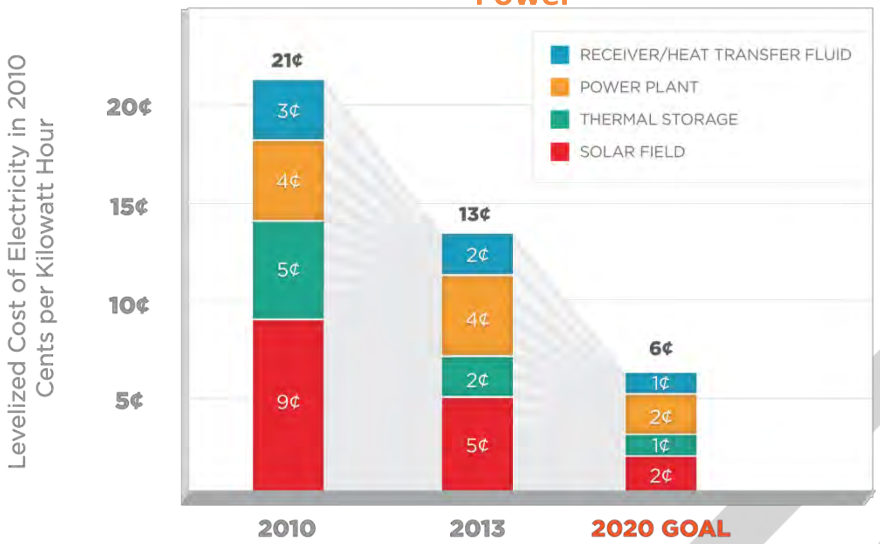
*May 10-11, 2016*

*Sacramento, California*

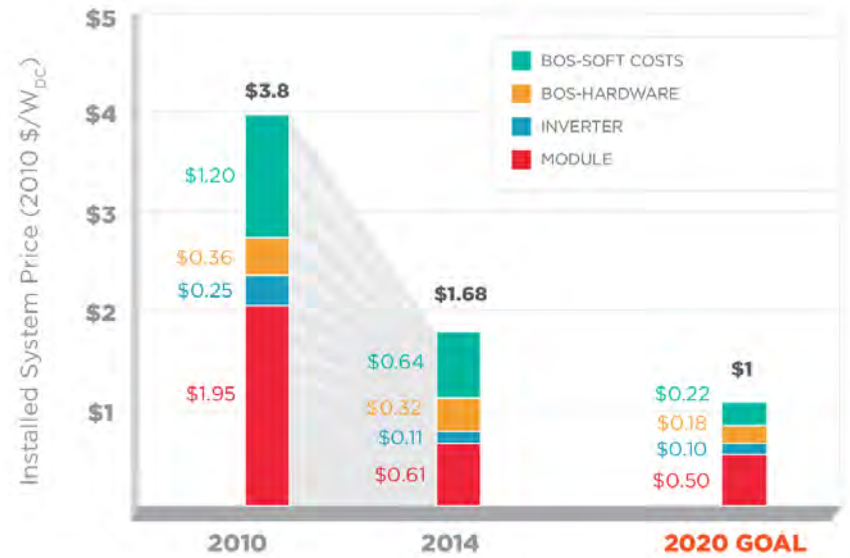
# SunShot


Price
SunShot
Initiative
SunShot Goal: 5 - 6¢/kWh without subsidy.
A 75% cost reduction by 2020.

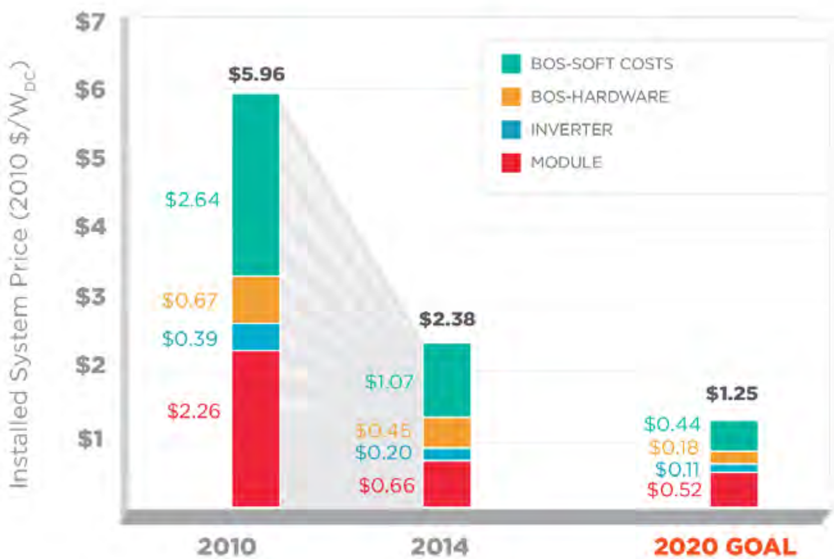
## The Falling Cost of Concentrating Solar Power



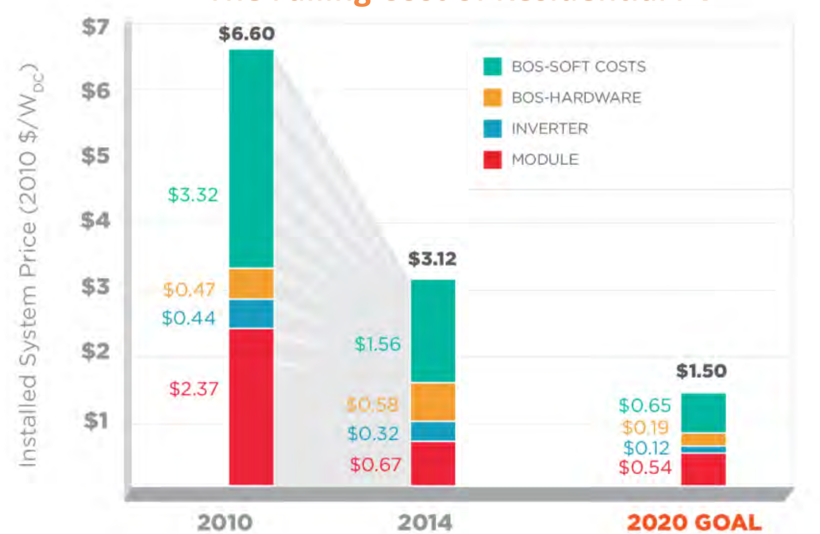

## The Falling Cost of Utility PV



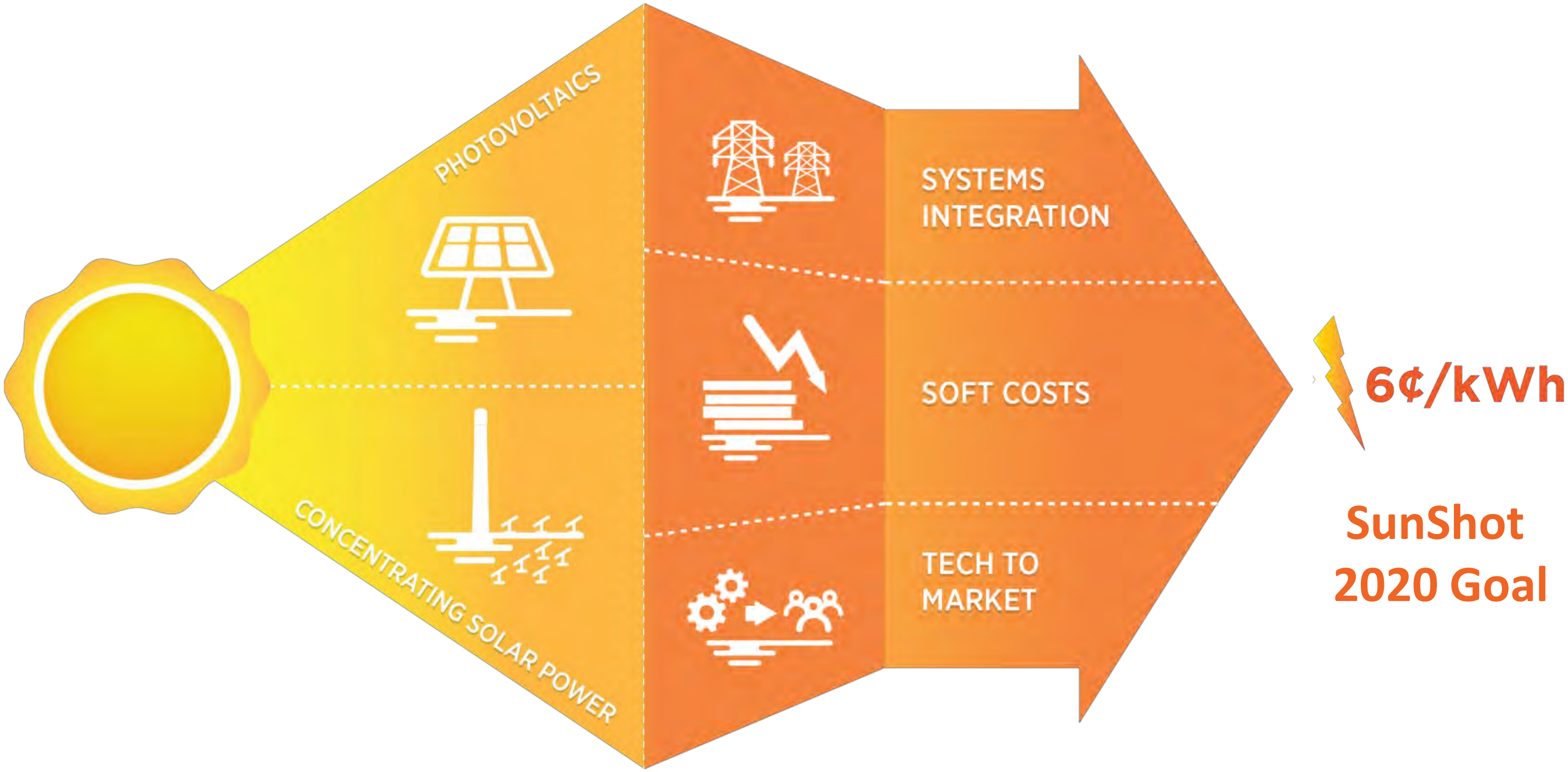

## The Falling Cost of Commercial PV




## The Falling Cost of Residential PV



# SunShot Program Structure



# Balance of Systems (Soft Costs)

## NETWORKING AND TECHNICAL ASSISTANCE

Empowering state and local decision-makers through timely and actionable resources, peer networks, and technical assistance

## BUSINESS INNOVATION

Developing solar finance and business solutions to expand access to capital and accelerate market growth

## DATA ANALYSIS

Harnessing big data analysis and technical solutions to support the many stakeholders involved in solar deployment

## TRAINING

Training an innovative solar workforce to enable the solar industry to meet growing demand

# Objectives of this Meeting

Bring together CWG members and stakeholders to:

- Share information about the CWG objectives, scope, activities, and timeline
- Provide a forum for stakeholders to provide comments relevant to the CWG efforts:
  - Concerns about avian-solar issues
  - Relevant existing data and studies
  - Understanding of avian-solar interactions
  - Focus of future research
  - Priorities for research needs
  - Future activities of the CWG

# Agenda - Day 1

| Time Slot | Topic |
|---|---|
| 9:30-10:00 | Welcome & Workshop Objectives |
| 10:00-10:30 | Information About the Multiagency CWG |
| 10:30-10:45 | Break |
| 10:45-11:00 | Summary of Available Avian-Solar Information |
| 11:00-12:30 | Lunch |
| 12:30-2:15 | Ongoing Related Initiatives |
| 2:15-2:30 | Break |
| 2:30-4:30 | Break-out Discussions |
| 4:30-5:00 | Wrap Up |

# Agenda - Day 2

| Time Slot | Topic |
| --- | --- |
| 9:00-9:15 | Recap of Day 1 |
| 9:15-9:45 | Conceptual Framework of Avian-Solar Interactions |
| 9:45-10:15 | Agency Management Questions & Related Research Needs |
| 10:15-10:30 | Break |
| 10:30-12:30 | Break-out Discussions |
| 12:30-1:00 | Wrap Up & Next Steps |

# Logistical Details

- All handouts and presentations will be available on the CWG webpage: http://blmsolar.anl.gov/program/avian-solar/
- If you want to continue to receive information about the CWG efforts, subscribe for email updates
  - Send request to rollins@anl.gov
- Using the microphone ensures everyone can hear you
- Identify yourself and your affiliation when you speak
- Please mute or turn off cell phones

# Information About the Multiagency Avian-Solar Collaborative Working Group (CWG)

*Greg Helseth*

*Bureau of Land Management*

*Multiagency CWG Stakeholder Workshop*

*May 10-11, 2016*

# Background

- Avian-solar concerns that have emerged in the past 2-3 years present potential barriers to utility-scale solar development
- Existing data are inadequate to define the magnitude and extent of potential avian impacts and causal factors
- Research is underway by multiple parties, including federal and state agencies, industry, and academics
- There is a growing consensus regarding the value of collaborating on defining research objectives and data needs, and on allocation of funding

# Goal and Objectives

***To develop better information to support future agency decisions regarding potential avian impacts at utility-scale solar facilities***

**<u>OBJECTIVES</u>**

- Establish collaborative working group among federal and state agencies
- Develop multiagency avian-solar science plan
  - Document current and planned research activities
  - Identify cost implications and information gaps
  - Identify agency roles in funding and oversight
  - Develop feasible mitigation measures, if warranted
- Prepare education and outreach materials

# CWG Members

## *Representatives of federal and state agencies with relevant missions and/or project authorization responsibilities*

| Federal Agencies | State Wildlife and Energy Agencies * |
|---|---|
| DOE Solar Energy Technologies Office | AZ Game and Fish Dept. |
| Bureau of Land Management | CA Dept. Fish and Wildlife |
| U.S. Fish and Wildlife Service | CA Energy Commission |
| U.S. Geological Survey | NV Dept. Wildlife |
| DOI Solicitor's Office | |
| U.S. Department of Defense | |

** Other state energy agencies have been invited to participate*

# Scope and Organization of the CWG

**Scope**

- Utility-scale solar technologies
  - All technologies
  - All facility components
- Initial geographic focus: Arizona, California, and Nevada

**Organization**

- CWG is led by a chair and co-chair
- Technical support and facilitation is provided by Argonne National Laboratory and the National Renewable Energy Laboratory

# CWG Tasks, Deliverables, and Timeline

| Task | Activities | Milestone(s) / Deliverable(s) |
|---|---|---|
| **1 Establish the CWG and conduct meetings** | Formalize CWG. Conduct quarterly CWG and stakeholder meetings. | Establish CWG charter, quarterly CWG meetings, and stakeholder events |
| **2 Develop an Avian-Solar Science Plan** | Summarize current activities, information gaps, and research needs; consolidate data and mitigation measures/BMPs. Develop hypothesis-based science plan applicable to all solar technologies and sites. | Avian-solar science plan by end of Oct. 2016 |
| **3 Prepare education and outreach materials** | Prepare fact sheets or news items to inform the public of CWG activities, avian-solar data, and clarify information. | At least two in FY16:<br>• Fact sheet<br>• News item<br>• Public webinar |

# Timeline & Progress in 2016

Red – complete; Black - anticipated

**January**
- Recruited agency participation
- Held CWG kickoff meeting

**February**
- Finalized Charter
- Assembled existing information

**March**
- Published 1st fact sheet
- Launched CWG website
- Developed conceptual framework

**April**
- Finalized workshop agenda
- Developed CWG MQs

**May**
- Hold 1st public workshop
- Incorporate stakeholder input
- Finalize MQs & research needs

**June**
- Draft science plan

**July-Oct**
- Revise & finalize science plan
- Hold public workshop or webinar
- Release final public outreach publication

CWG = collaborative working group, MQ = management question

# Avian-Solar Science Plan

## Kirk LaGory, Argonne National Laboratory

***Purpose:*** *Provide a consistent framework for research and monitoring of avian-solar interactions*

***Objectives***

- Define research questions and future research needs;
- Support development of monitoring protocols, evaluation of avian risk, and development of effective mitigation measures;
- Qualitatively discuss potential associated costs; and
- Define agency roles and processes for implementation.

# Elements of an Avian-Solar Science Plan

- Executive Summary
- Introduction
  - Describe current solar energy development and trends, observed avian-solar interactions
  - Describe objectives of the plan, desired outcomes, CWG
  - Identify agency-specific management questions
- Conceptual Framework of Avian-Solar Interactions
  - Provides framework for science plan
  - Impacting factors
  - Technology-specific impacts
  - Direct, indirect, and cumulative effects
  - Factors that contribute to risk, including location, seasonality, type of birds
  - Local and population-level effects

# Elements of an Avian-Solar Science Plan (Cont.)

- Summary of Existing Information
  - High-level summary with focus on published DOE “rapid report” and subsequent findings, technical reports, and communications with researchers
  - Which portions of the conceptual model are best understood?
- Information Gaps Related to Avian-Solar Interactions
  - Identify the information gaps that impede development of effective avoidance, minimization, and mitigation strategies
  - Which portions of the conceptual model are poorly understood?

# Elements of an Avian-Solar Science Plan (Cont.)

- Research and Monitoring Needs
  - Based on management questions, conceptual model, and information gaps, identify research and monitoring that is needed to understand avian-solar interactions
  - Identify priorities for research and monitoring activities based on relative risk to birds
- Program Implementation
  - Identify best approaches to research and monitoring
  - Agency roles
  - Collaboration with ASWG and other stakeholders to ensure consistency and complementary activities
  - Role of adaptive management
  - Tiering from the plan
  - Approximate costs of activities

# Stakeholder Engagement

- Agencies are seeking input from stakeholders on all matters relevant to the CWG objectives:
  - Concerns about avian-solar issues
  - Relevant existing data and studies
  - Understanding of avian-solar interactions
  - Focus of future research
  - Priorities for research needs
  - Future activities of the CWG

- Stakeholders can comment during this meeting and/or in writing following the workshop (target due date of June 1, 2016)

- A stakeholder webinar will be hosted to present and take comments on the draft avian-solar science plan (late summer 2016)

- For more information:
  - Subscribe for email updates: send request to rollins@anl.gov
  - CWG webpage: http://blmsolar.anl.gov/program/avian-solar/

# QUESTIONS?

# A Review of Avian Monitoring and Mitigation Information at Existing Utility-Scale Solar Facilities

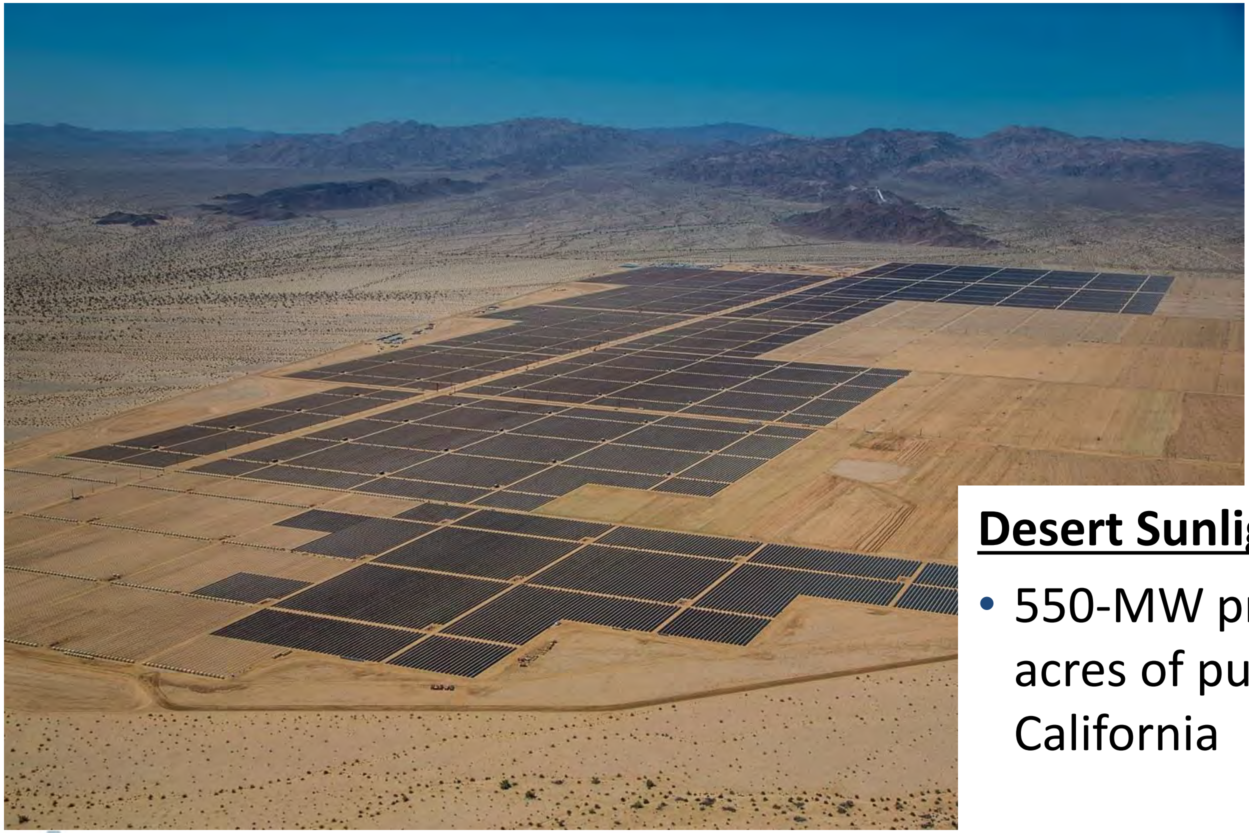
**Lee Walston***, Katherine Rollins,
Karen Smith, and Kirk LaGory
Environmental Science Division
Argonne National Laboratory

Karin Sinclair, Craig Turchi,
Tim Wendelin, and Heidi Souder
National Renewable Energy Laboratory

* lwalston@anl.gov

# What is Utility-Scale Solar Energy Development?

- Large solar fields – 10+ megawatt (MW); requires 5-10 acres per MW
- Three main technologies: 1) photovoltaic (PV) and concentrated solar power (CSP) technologies – 2) parabolic trough and 3) power tower



**Desert Sunlight Solar Farm (PV)**

- 550-MW project on over 4,000 acres of public land in southern California

# What is Utility-Scale Solar Development? (cont'd)

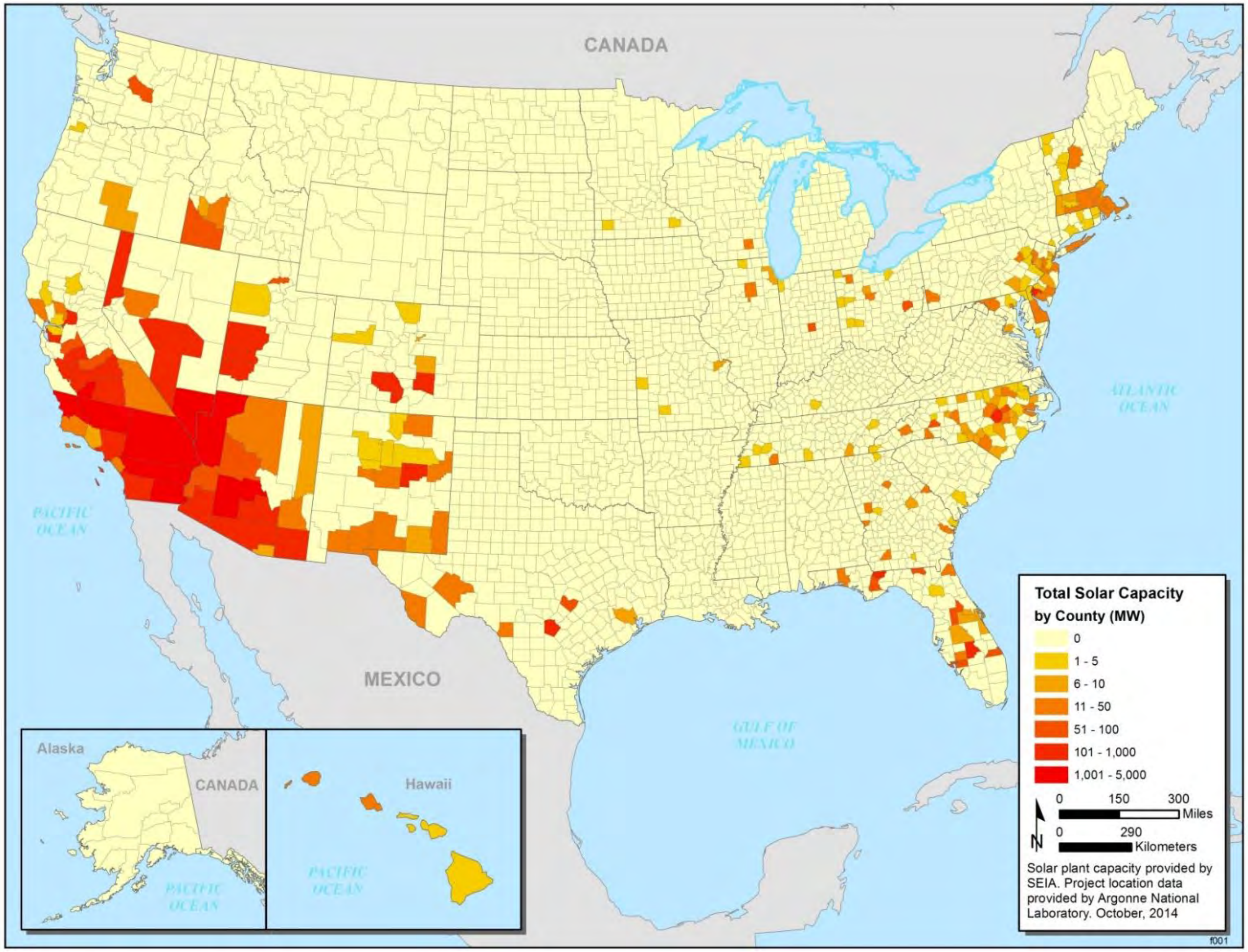
# What is Utility-Scale Solar Development? (cont'd)

**Ivanpah Solar Energy Generation Station (SEGS)**

- 3 Solar power towers (377 MW)
- >3,400  acres of public land

# Utility-Scale Solar Energy Development in the U.S.

- >14 GW utility-scale solar capacity (in operation or under construction)
- >1,200 facilities (>1 MW)
- >50% of this electric capacity in southern CA, NV, and AZ.




Source: Walston et al. 2015

# Avian Impacts of Solar Development

2 direct sources of solar-avian fatalities

- Collision-related: documented at solar projects of all technology types.
- Solar flux-related: resulting from the burning/singeing effects of exposure to concentrated sunlight. Observed only at facilities employing power tower technologies.

Photo Credit: Robert Sullivan, Argonne National Laboratory

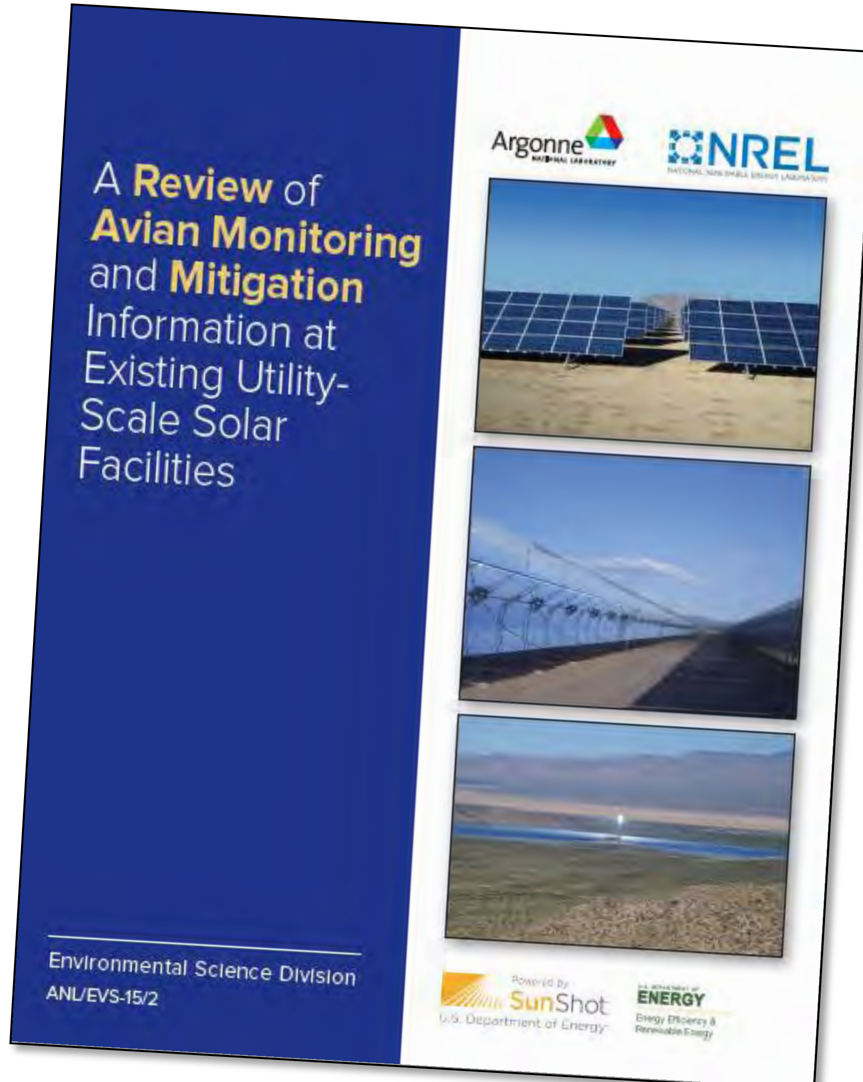
# Factors that Affect Mortality Risk

- Project location
  - Near aquatic/riparian areas, stopover sites, etc.
- Project size
- Project technology / design
  - PV vs CSP
  - Evaporation ponds
  - Ancillary infrastructure

Copper Mountain PV facility in southern Nevada. Example for the “lake effect” hypothesis.
Photo Credit: Robert Sullivan, Argonne National Laboratory

# "A Review of Avian Monitoring and Mitigation Information at Existing Utility-Scale Solar Facilities"

- Objectives:
  - Summarize avian fatality issues at solar facilities
  - Summarize current monitoring and reporting activities
  - Evaluate mitigation measures and BMPs used for other industries
  - Examine solar technology-specific aspects of avian fatality
  - Identify information gaps and next steps



# Avian Fatality Information at Solar Facilities (updated)

- 16 Facilities with available avian monitoring information.
- Collection of avian fatality information:
  - Incidental or unknown survey effort at 6 facilities
  - Systematic survey effort at 10 facilities

**Summary of Current Avian Monitoring Activities at Utility-Scale Solar Facilities as of May 2016**

| Project Name | Location | Technology Type and MW (in Parentheses) | Current Status | Land Type | Available Avian Monitoring Plan | Known Collection of Avian Fatality Data |
|---|---|---|---|---|---|---|
| Blythe Solar | Riverside County, CA | PV (485) | Under Construction | Public | Yes | Yes – Incidental and systematic |
| California Solar One | Daggett, CA | CSP – Power Tower (10) | Decommissioned in 1987 | Private | NA | Yes – Systematic |
| California Valley Solar Ranch | San Luis Obispo County, CA | PV (250) | Operational – Oct 2013 | Private | Yes | Yes – Systematic |
| Campo Verde | Imperial County, CA | PV (139) | Operational – Oct 2013 | Private | NA | Yes – Incidental |
| Centinela Solar Energy | Imperial County, CA | PV (170) | Operational – August 2013 | Private | Yes | NA |
| Crescent Dunes | Nye County, NV | CSP – Power Tower (110) | Construction completed | Public | Yes | Yes – Systematic |

# Avian Monitoring at Solar Facilities

- Fatality monitoring (and reporting) at very few solar facilities
  - Not required at all facilities
- Differences in monitoring designs and survey effort
  - Affects the ability to compare and integrate data
- Systematic vs. incidental fatality information
  - Systematic information allows hypothesis testing
  - Incidental observations may still be useful in understanding patterns of fatalities

Barn swallow with singed feathers observed at the California Solar One demonstration facility (Source: McCrary et al. 1986).

# Avian Monitoring at Solar Facilities, Cont'd

- Variation in factors influencing mortality rate estimation and evaluation
  - **Search effort and searcher efficiency**
  - **Feather spots**
  - **Predation and scavenging**
    - Potential for predators to influence mortality rates by transporting carcasses to the project footprint from offsite locations
  - **Background mortality**
    - Mortality estimates at some solar facilities include adjustments for background mortality

# Conclusions & Recommendations

- Avian monitoring
  - Not all utility-scale solar facilities are required to prepare and comply with project-specific avian monitoring protocols

- Existing avian fatality data
  - Standardization is important for integration and comparison

- Flux-related factors (power tower technologies)
  - Various approaches to heliostat standby aiming could significantly reduce flux levels and their impact on avian fatality

- Better collaboration among agencies, industry, and stakeholders to (1) collect scientifically rigorous and comparable data; (2) identify research priorities; and (3) identify appropriate mitigation measures.

# Questions?

Photo Credit: http://cleaneasyenergy.com/

# Presentations on Ongoing Related Initiatives

*1. Tom Dietsch – U.S. Fish and Wildlife Service*

*2. Mona Kahlil – U.S. Geological Survey*

*3. Avian Solar Work Group Representatives: Julie Falkner, Defenders of Wildlife and Laura Abram, First Solar*

*4. Tim Wendelin – National Renewable Energy Laboratory (NREL)*

*5. Elise DeGeorge - NREL*

U.S. Fish & Wildlife Service

# Update on Solar-Avian Interactions in Southern California

Thomas Dietsch
Migratory Bird Division
US Fish and Wildlife Service
CWG Public Meeting
Sacramento, CA
May 10, 2016

# Objectives for Presentation

- Provide a review of solar-avian interactions in Southern California
- Discuss hypotheses for avian interactions
- Provide update on actions being taken

# Avian Impacts

## Direct Effects: Collisions

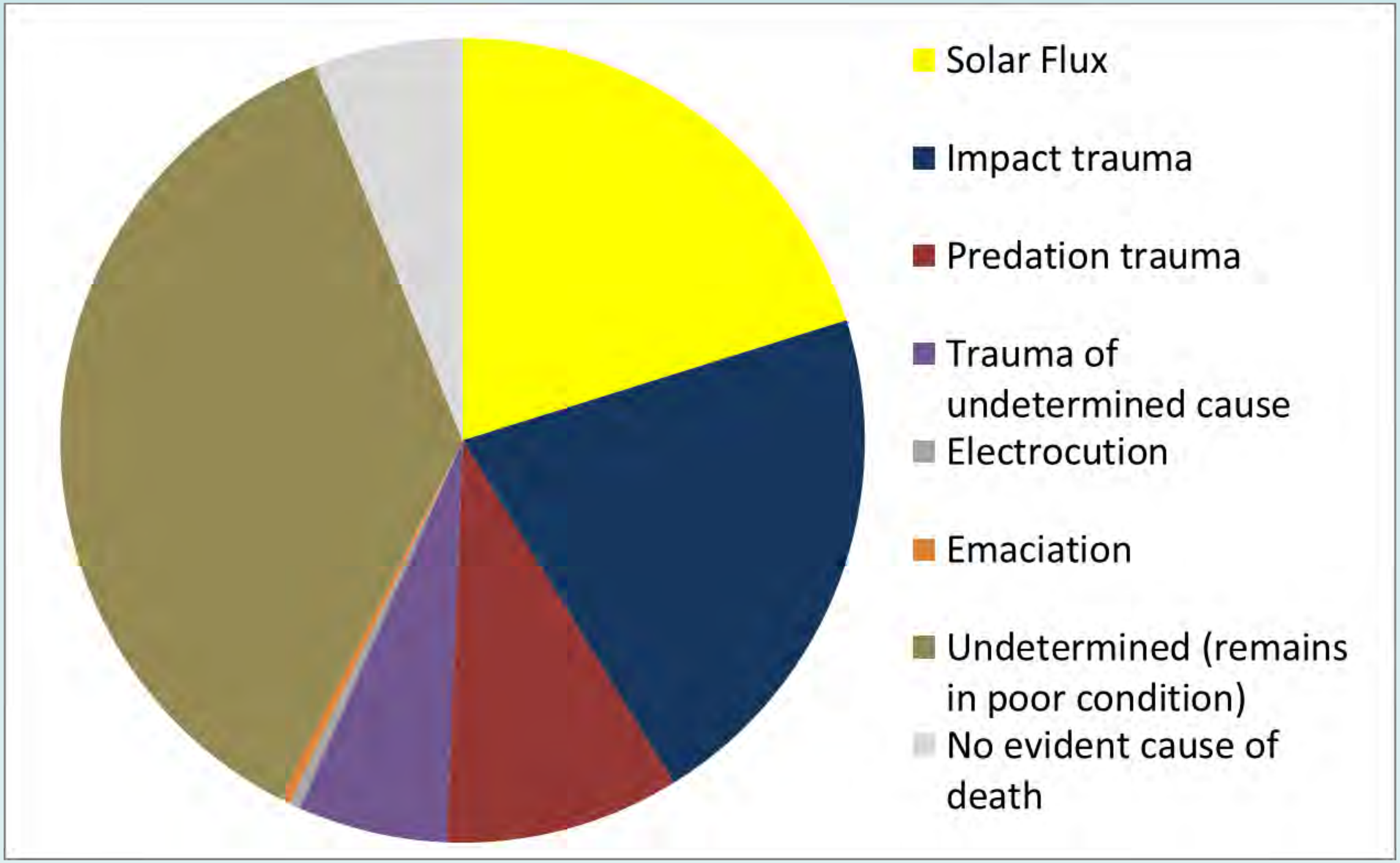

# Collisions with panels are common

# Concentrated Solar Technologies

Direct Effects

Solar Flux (power tower)

# Cause of Death from National Fish and Wildlife Forensics Lab Report (Kagan et al. 2014)




**From 3 solar projects, 233 carcasses from 71 species.**

# Data for Today's Presentation

- Mortality monitoring and reporting is required by lead agencies on many projects.
- Data from 7 projects in Southern California
  (4 Photovoltaic, 2 Solar Trough, 1 Power Tower)
- Data reported from 2012-April 2016.
- Each species was categorized by habitat, migratory group, and foraging guild.

# Caveats on Solar Avian Mortality data

- Data are from a mix of incidental reports and systematic surveys on several projects.
- Magnitude of mortalities are not reported here.
- Only projects in Southern California are included in this presentation.
- Data can provide information on which species or taxonomic groups may be at risk.
- Project features and types of injuries also indicated.

# Initial Findings

- National Fish and Wildlife Forensics Lab Report (Kagan et al. 2014)
  - "Significant Bat and Insect Mortality, including Monarch Butterflies".
- 3545 mortalities from 183 species (2012-April 2016)
  - Only mortalities found and reported included, no estimation.
  - Mix of reports from incidental finds and systematic surveys.
  - Many mortalities occur due to dehydration/heat stress after initial injury/stranding.
- Birds of Conservation Concern

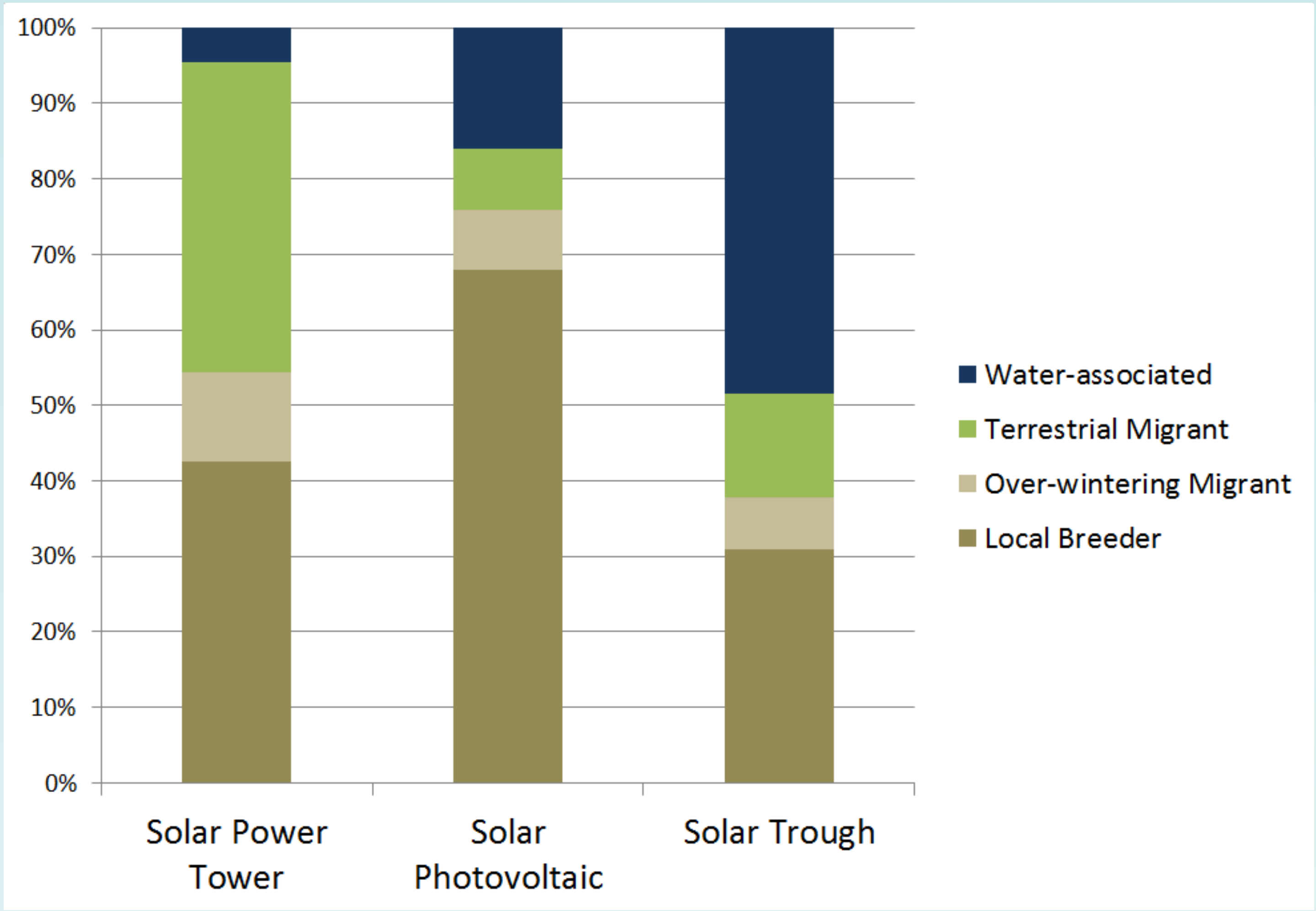
# Species of Concern

- Federal Endangered/Threatened
  - Yuma Ridgeway's (Clapper) Rail
  - Willow Flycatcher
  - Yellow-billed Cuckoo
- State-listed/Fully Protected
  - Peregrine Falcon
  - Bank Swallow
- 19 Birds of Conservation Concern
  - Western Grebe
  - Horned and Eared Grebes
  - American White Pelican
  - Burrowing Owl
  - Calliope Hummingbird

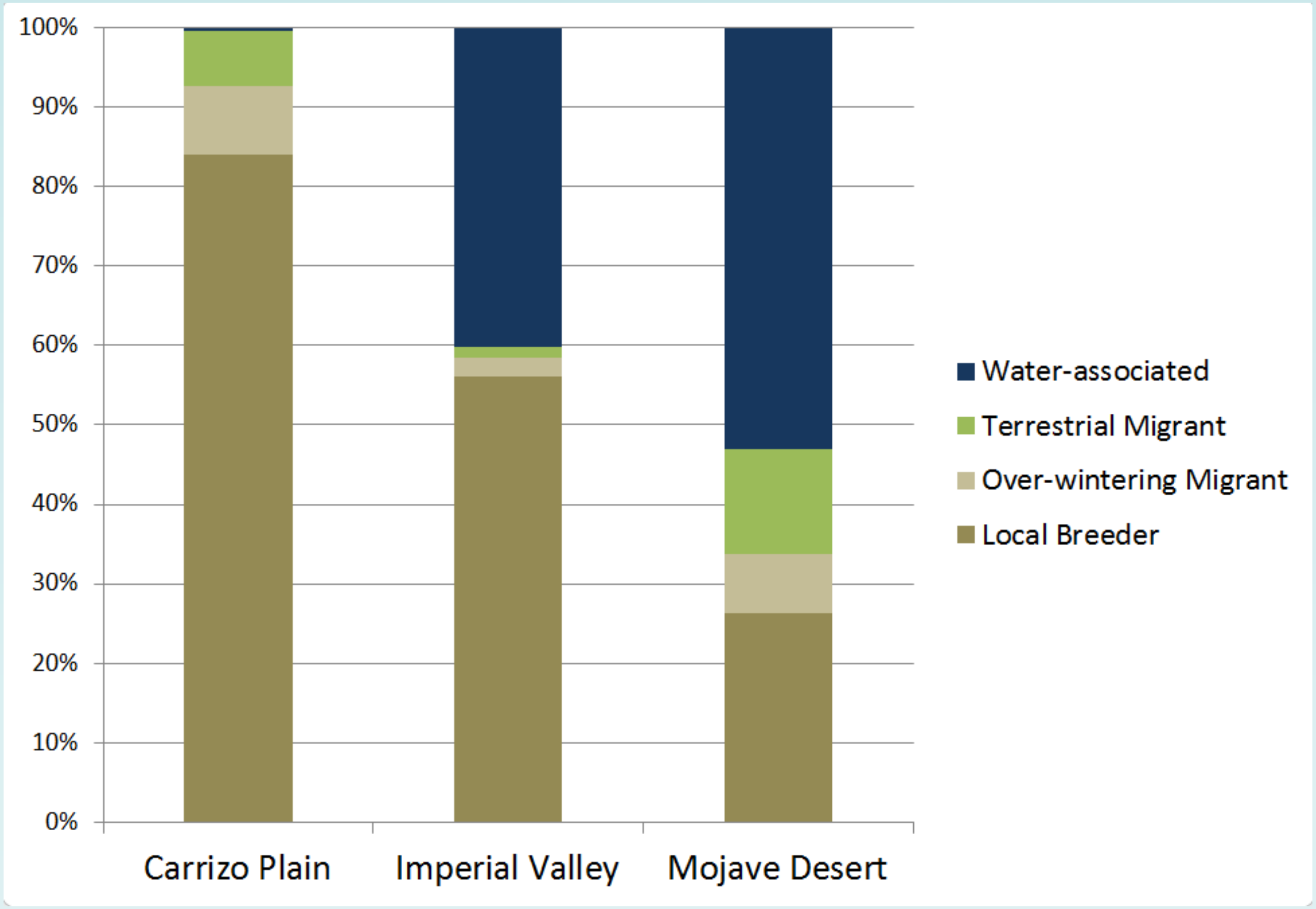
# Hypotheses

- Mortalities represent background mortality.
- Mortalities occur during normal bird movements (Anthropogenic, no landscape-scale attraction).
- Polarized light may attract birds and insects to solar projects in the Mojave Desert (Horvath et al. 2009).
- Other resources attract birds to solar projects (Insects and Ponds).

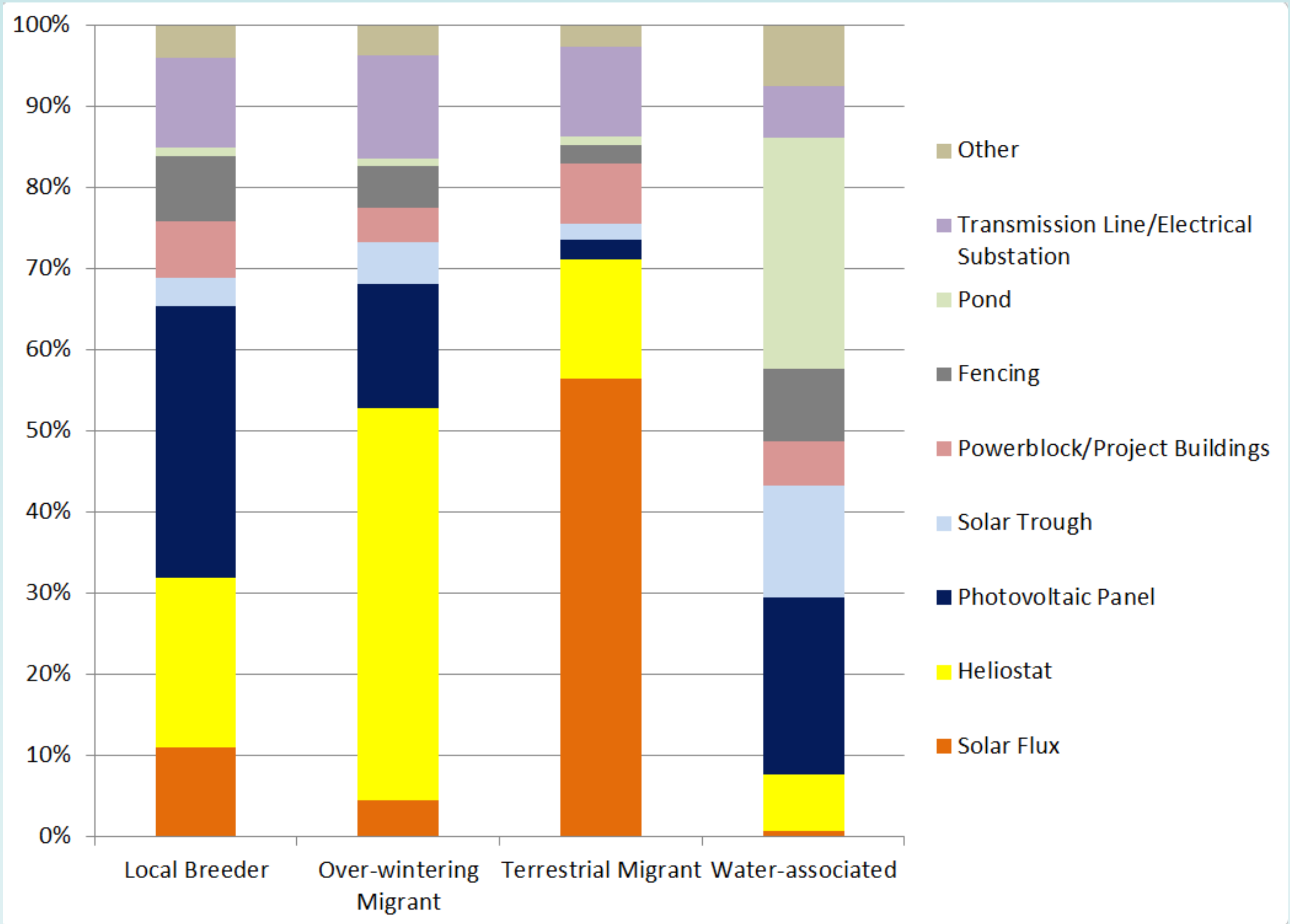
# Habitat/Migratory Status of Birds found injured on Solar Projects



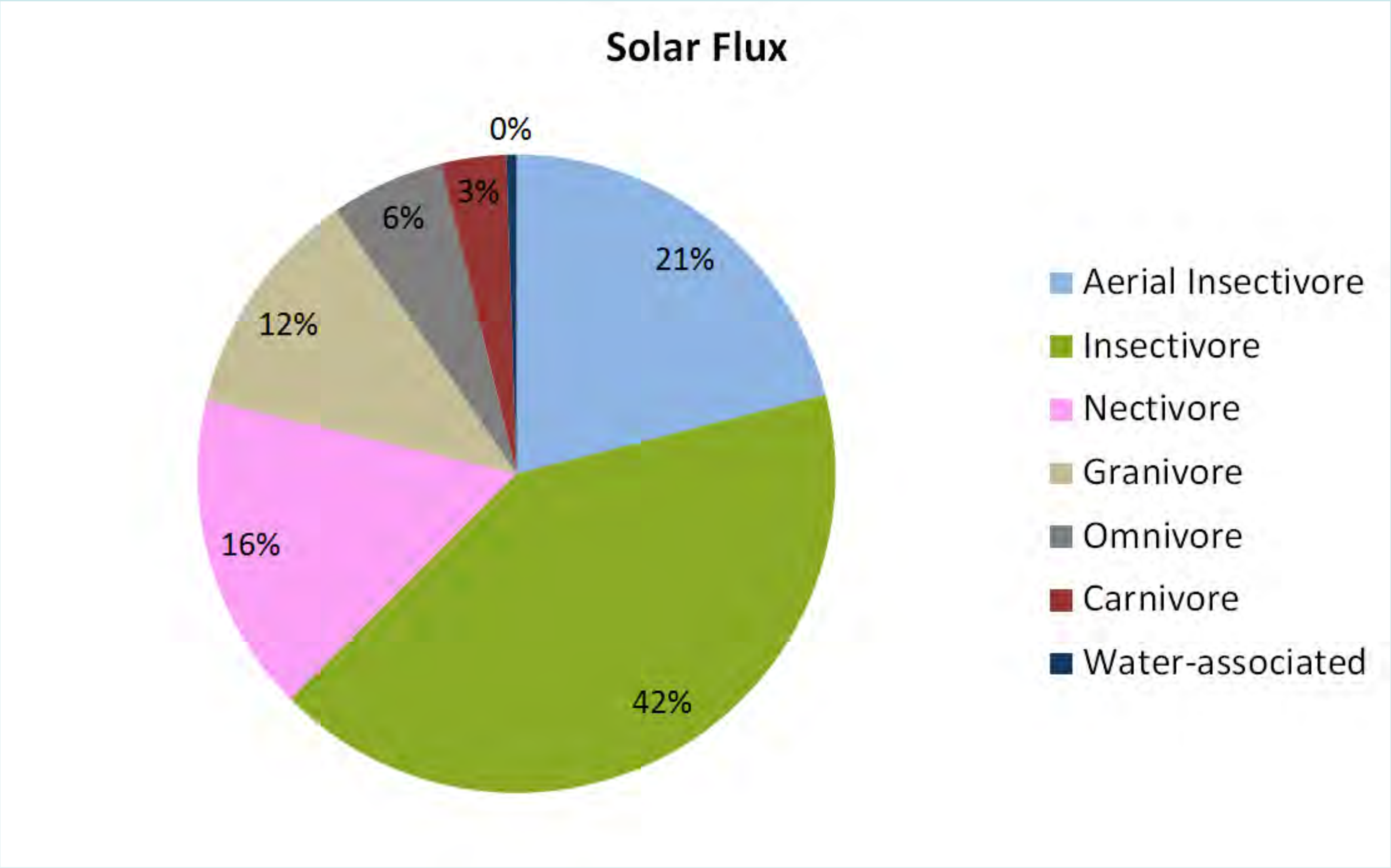
# Regional Differences for Photovoltaic



# Solar Project Features Associated with Mortalities



# Foraging Guilds of Birds with Solar Flux Injuries



# Findings

- There may be a “lake effect” associated with utility-scale solar projects similar to that described by Horvath et al. 2009.
- Many birds of conservation concern may be at risk.
- Regional (and site-specific) differences may affect which species are at risk.
- Insects may be attracting some birds to areas with elevated levels of solar flux.
- Many species affected are long-distance migrants, thus population level effects may be difficult to determine.
- Robust monitoring needed to better understand these phenomena and to support adaptive management.

# Mortality Monitoring Objectives

- Estimate the total number of birds and bats killed at a facility within a specified time period.
- Determine whether there are spatial or temporal/ seasonal patterns of total bird fatality.
- Evaluate species composition and which taxonomic groups may be at risk.
- Provide results that allow comparisons with other solar sites and to evaluate changes in fatality due to adaptive management.

# Research Needs

- Project-scale information needs
- Mojave and Sonoran Desert Migratory Pathways
- Migratory Connectivity Research to identify populations affected
  - Populations affected may be distant from the source of mortalities
  - Stable Isotopes (USGS)
  - Genotypes (UCLA)
  - Telemetry of appropriate-sized birds
- Avian Behavior related to projects
  - Perception and Settling Response
  - Technological Fixes
- Identify Best Management Practices and Deterrent Methods

# Update on actions being taken

- Working with solar industry to implement robust mortality monitoring.
  - Searcher Efficiency and Carcass Persistence Trials.
- Solar Bird and Bat Conservation Strategy Guidelines in development.
  - Public meeting on June $22^{nd}$ in Sacramento.
- Collaborated with USGS to develop Mortality Monitoring Protocols for Solar
  - Protocols for monitoring at each technology type.
- Coordinating with other agencies to find ways to avoid and minimize avian mortalities.
- Coordinating with Avian Solar Working Group (industry and other stakeholders)
- Supporting ongoing research efforts by USGS and UCLA

# Questions?

# Research to Address Wildlife Interactions with Solar Energy Facilities

**Avian-Solar Collaborative Working Group**

May 10, 2016

USGS Ecosystems Mission Area

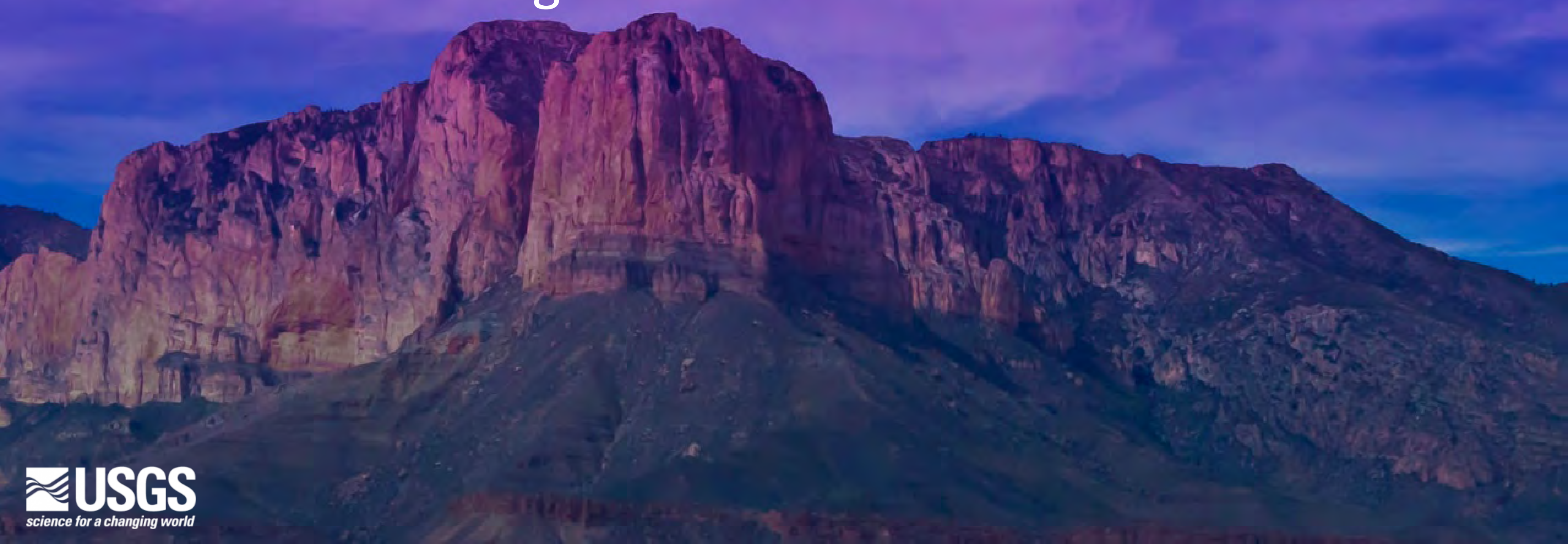
# U.S. Geological Survey

**Ecosystems**

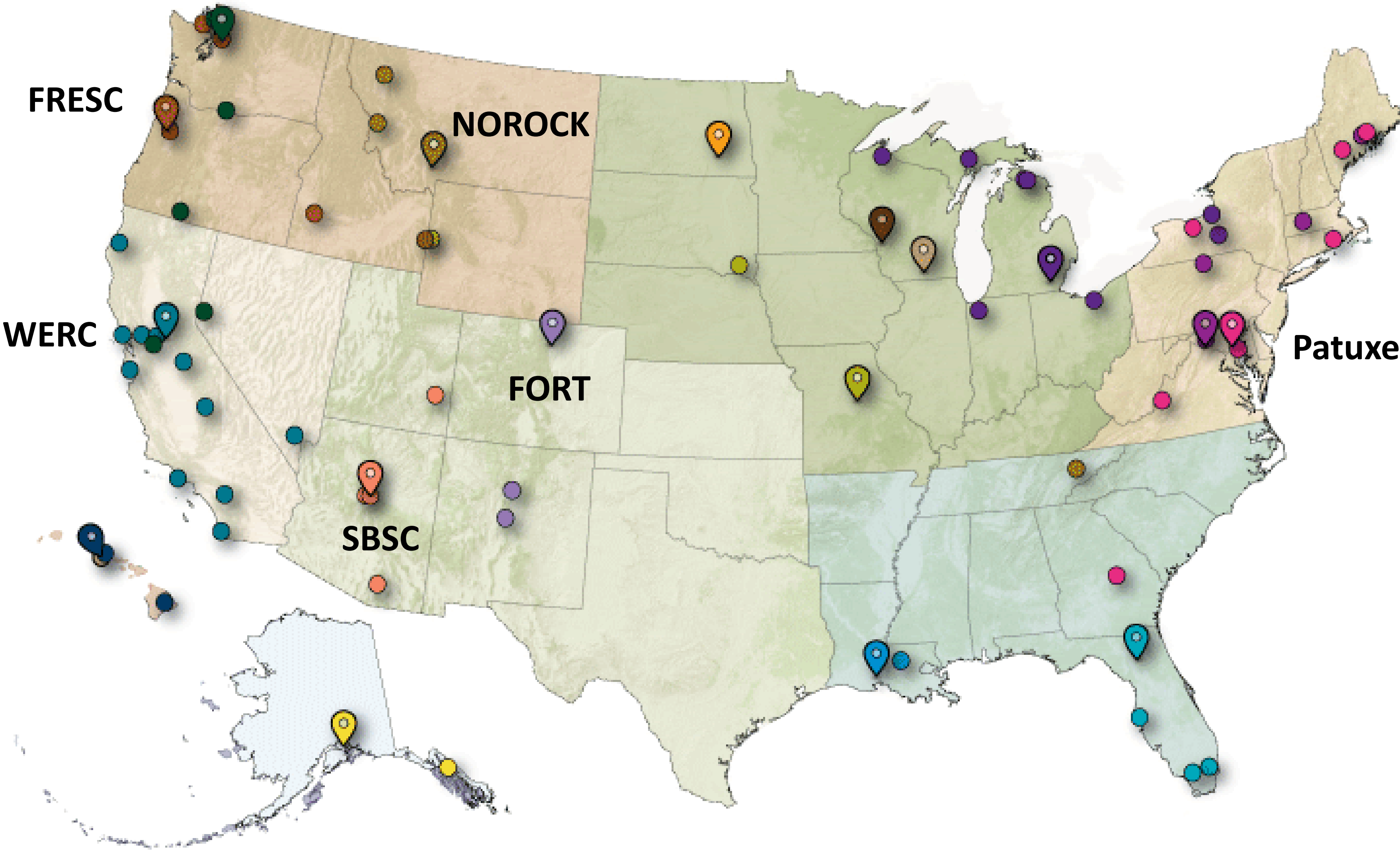
**Natural Hazards** **Energy and Minerals** **Core Science Systems**

**Environmental Health** **Water** **Climate and Land Use Change**

Provide the scientific information required for sound natural resource management and conservation decisions



# USGS Ecosystems Mission Area
# 17 Science Centers

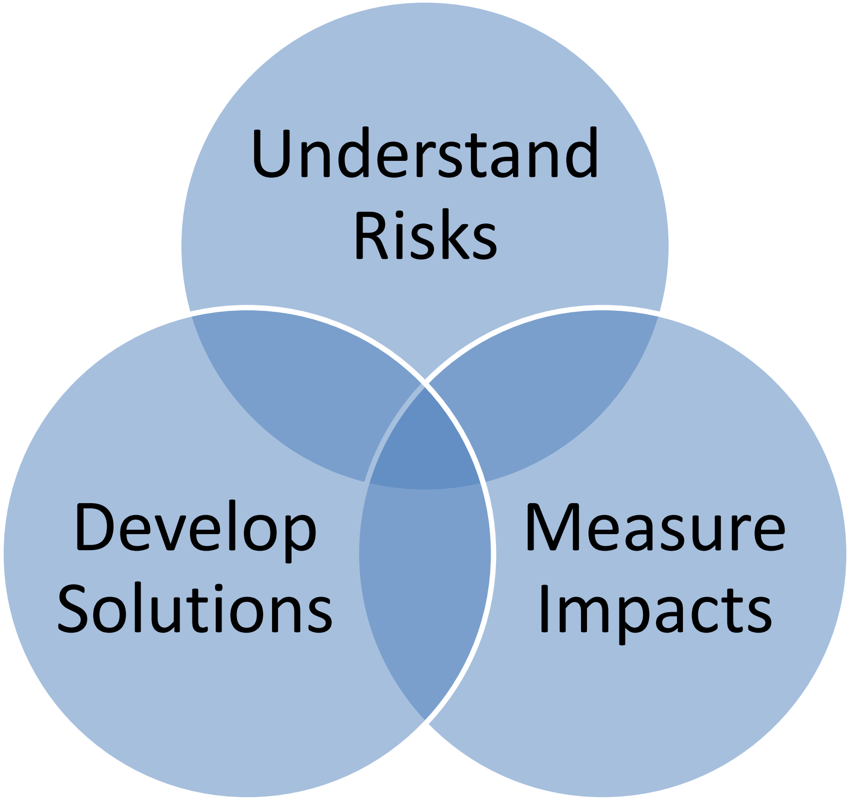



+ 40 Cooperative Research Units

# Energy and Wildlife Research

## Goals

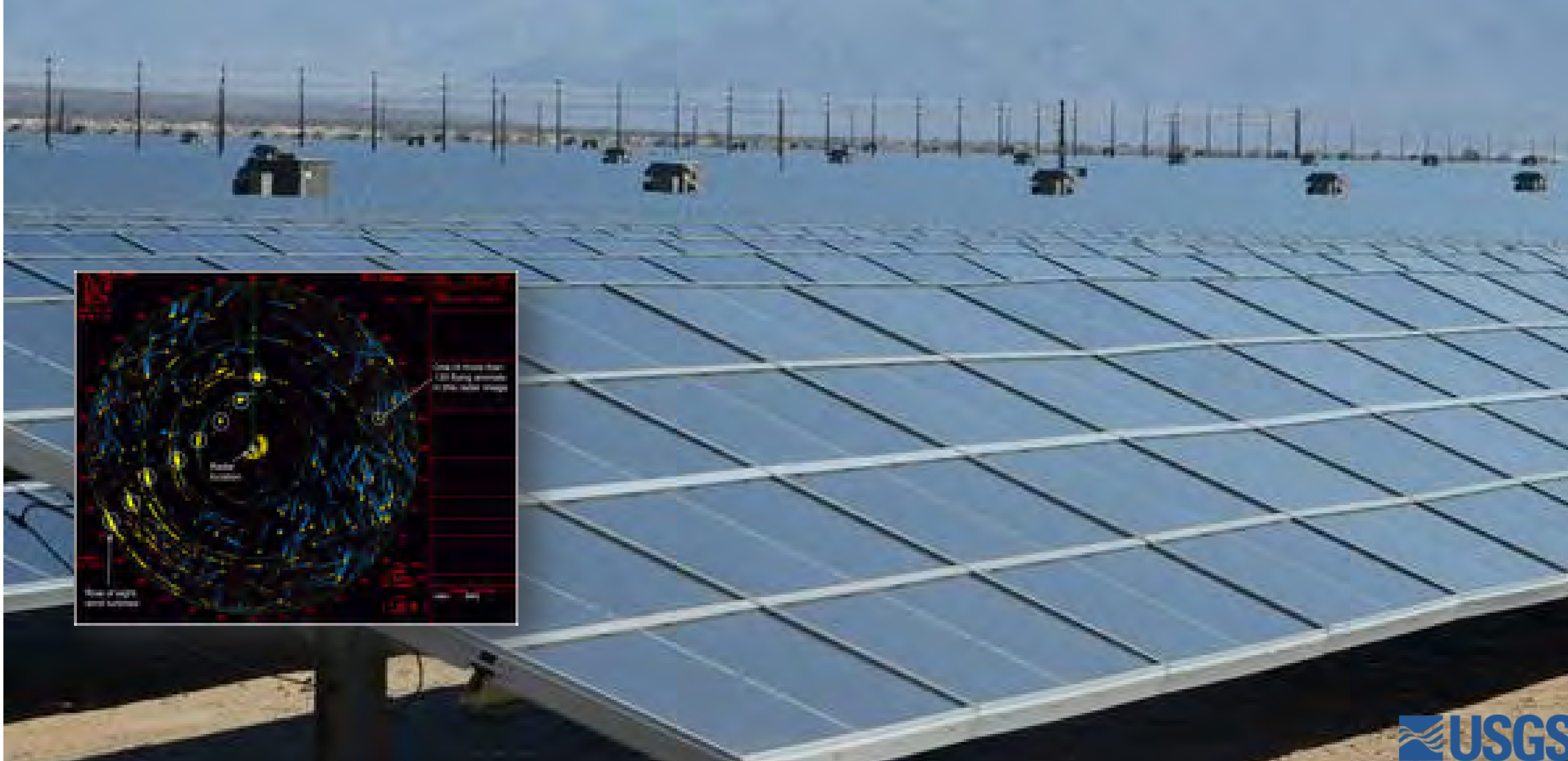
- **Understand risks:** when and where wildlife occur and how they use space
- **Measure impacts** to wildlife, both direct and indirect
- **Develop solutions:** minimize impacts through technological fixes, management, mitigation




USGS

# Measuring Impacts

- Characterize direct and indirect impacts to wildlife
- Define sources of fatality
- Develop consistent and accurate methods to detect and estimate fatalities



# Efficacy of Wildlife Monitoring Technologies at the Ivanpah Solar Electric Generating System

**Objective:**

- Evaluate efficacy of monitoring technologies to detect birds, bats, and insects flying in the vicinity of flux fields produced at the ISEGS
- Tested technologies concurrently (portable radar, surveillance video, thermal video). Also performed invertebrate sampling
- Monitoring period covered ~20 days in May and September 2014 during bird migration season
- Developing data handling and analysis software (presence/absence, speed, direction, abundance)

**PIs:** Robb Diehl (NRMSC), Paul Cryan & Ernie Valdez (FORT)

**Status**: In review. Full data release will accompany publication

USGS

# Monitoring Methodology for Solar Facilities

- No guidance currently exists for addressing wildlife conservation concerns at solar energy facilities
- Published studies have not directly addressed the methodology needed to accurately estimate fatality of birds and bats at solar facilities

**Objective:**

- Develop monitoring methodology for solar facilities to produce a consistent carcass search methodology

**PI:** Manuela Huso (FRESC)

**Project completion:** May 2016

US FWS Pacific Southwest Region

USGS

# Solar Fatality Estimator and *"Evidence of Absence"* Software

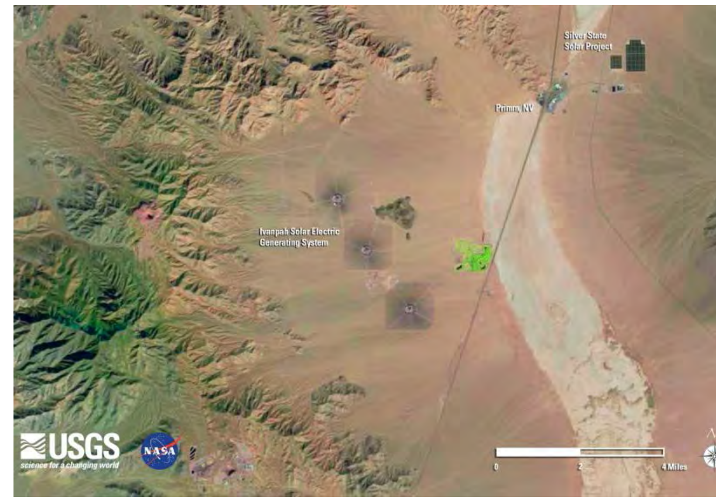
Need consistent and accurate methods to detect and estimate fatalities from carcass searches at solar facilities

## Objective:

- Modify existing software to produce unbiased estimates of fatalities at utility-scale solar facilities and "Evidence of Absence" software for rare species
- Define sources of fatality
- Estimate searcher efficiency and carcass persistence
- Determine when thresholds have likely been exceeded and mitigation might be considered

**PI:** Manuela Huso (FRESC)

**Anticipated completion:** April 2017




Ivanpah Solar Electric Generating System

Golden eagle at wind farm in CA.
Credit: Jeff Lovich

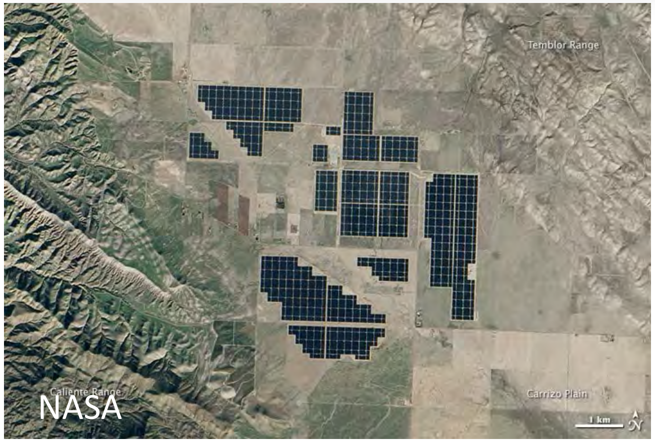
USGS

# Assess Energy Development Impacts to Sensitive Bird and Bat Species and Populations

Need to more accurately estimate fatality rates and effectiveness of mitigation techniques

## Project Objective:

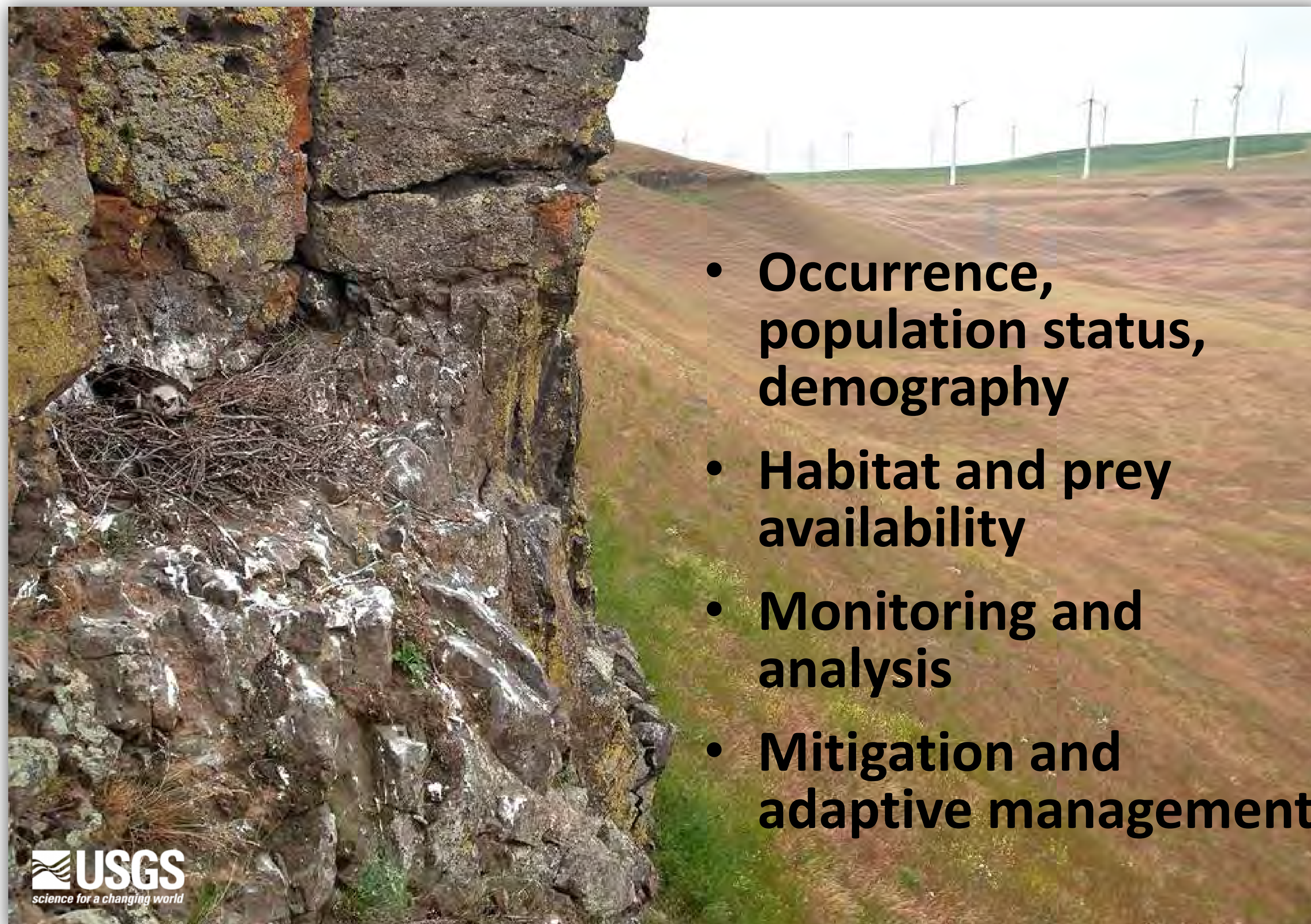
- Estimate geographic scope of species impacted
- Use demographic modeling to assess how fatalities affect population increases or declines
- Determine best practices for conducting risk assessments and predicting mitigation outcomes




**PI:** Todd Katzner (FRESC)

**Project period:** 2015-2018

# Understanding Risks




- Occurrence, population status, demography
- Habitat and prey availability
- Monitoring and analysis
- Mitigation and adaptive management

# Habitat Modeling to Inform Energy Development

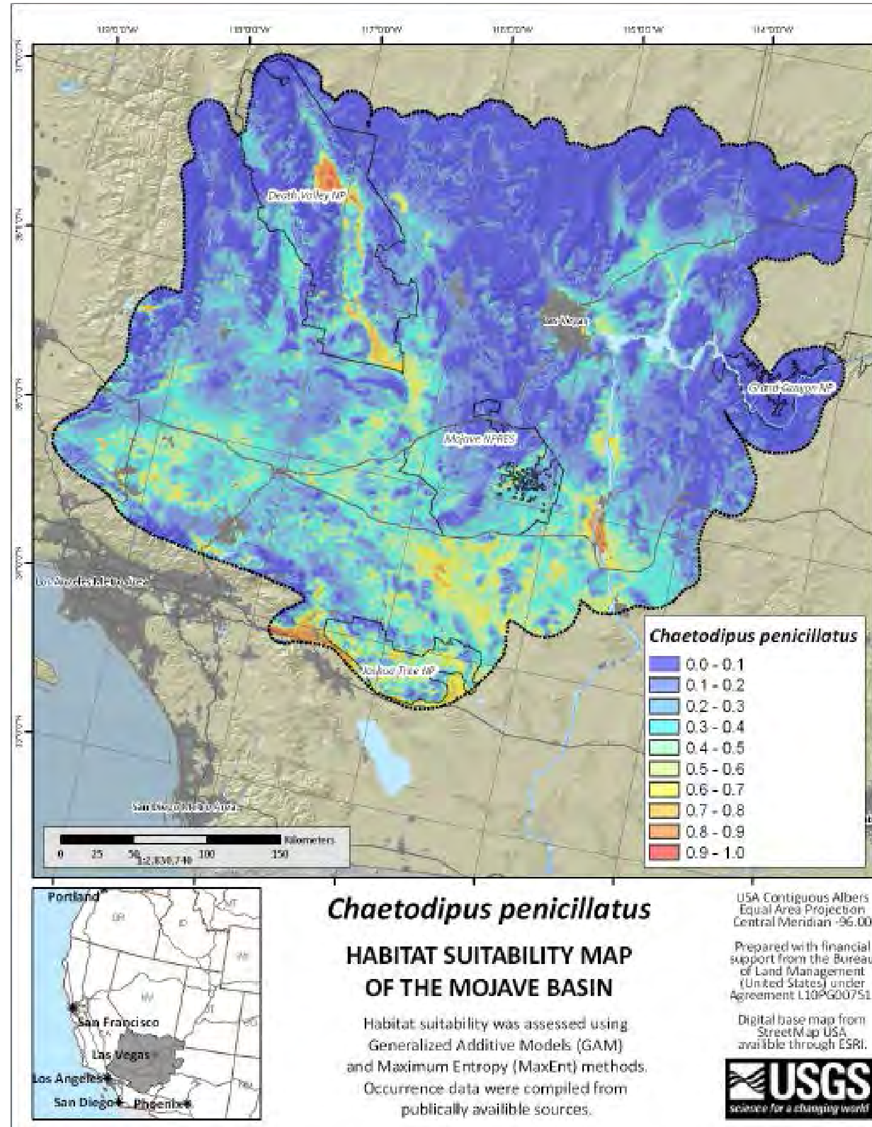
Renewable energy development in the Mojave Ecoregion is creating potential impacts to multiple species of wildlife

## USGS Published Research

- Habitat suitability models for over 50 desert plant and animal species can be used to rank potential habitat loss
- Golden eagle status assessments and monitoring protocols

**PIs**: Todd Esque, Amy Vandergast (WERC)

**Publication:** Inman, R. D. et al., 2014. Mapping Habitat for Multiple Species in the Desert Southwest. Open File Report 2014-1134.



# Linking Habitat and Prey Availability to Golden Eagle Ecology and Solar Energy in the Mojave

Inform energy and land-use planning ; assist with delineating conservation and development zones


Golden Eagle. Credit: USFWS

## Objectives:

- Assess food habits, reproductive success and prey availability of nesting golden eagles in the Mojave
- Synthesize and review rabbit distribution and abundance in the Western US
- Develop a regional prey database for rabbit populations across 17 western states

**PIs:** Kathleen Longshore & Todd Esque (WERC)

**Product completion:** Spring/Summer 2016

USGS

# Surveying and Monitoring Golden Eagles and Other Raptors in the DRECP Area

Effective surveys for eagles and status monitoring and mapping are needed to meet DRECP objectives

### Objective:

- Develop survey designs and field procedures to determine the distribution of golden eagles
- Assess their occurrence and nesting success in the DRECP area
- Compile and analyze eagle population data for CA & NV, and the larger context of their full migratory range into a geospatial database

**PI:** David Wiens (FRESC)

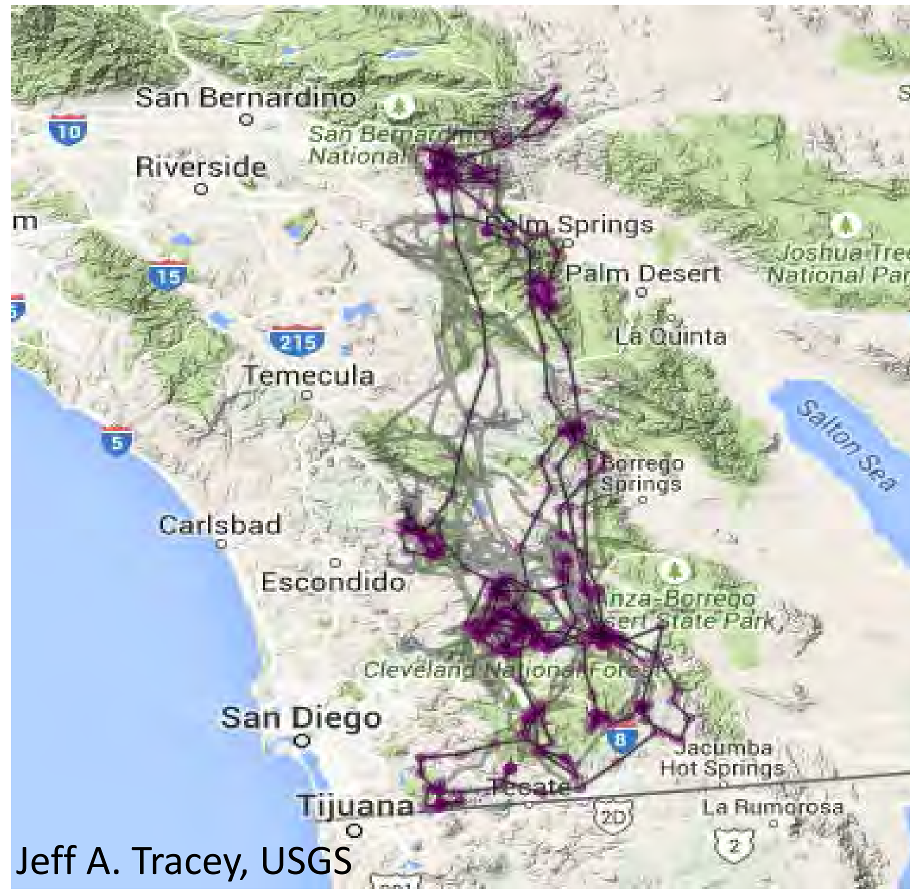
**Project Completion:** Summer 2016

# Helping Inform Siting Decisions

What are regional  golden eagle nesting and foraging behaviors that may lead to eagle – infrastructure interactions?

### Objectives:

- Population surveys, biotelemetry and genetics
- Focus on occupancy and movement
- Abundance and survival in relation to prey dynamics
- Regional understanding




Jeff A. Tracey, USGS

**PIs:** Jeff Tracey & Robert Fisher (WERC)

**Products:** Biotelemetry data for 24 eagles released May 2016

USGS

# Needs and Future Directions

- Expand research on wildlife interactions with large scale solar power facilities
- Understand direct and indirect effects on species and landscapes
- Expand knowledge of where species are on the landscape
- Continue efforts to develop deterrents to minimize interactions of wildlife with facilities and effective mitigation strategies

# USGS Energy and Wildlife Contacts

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USGS

# Recent USGS Publications of Relevance to Solar Energy Development


- Braham, M.E., Miller, T.A., Duerr, A., Lanzone, M., Fesnock, A., Lapre, L., Driscoll, D., Katzner, T.E., 2015, Home in the heat- Dramatic seasonal variation in home range of desert golden eagles informs management for renewable energy development. DOI- 10.1016/j.biocon.2015.03.020: Biological Conservation, v. 186, p. 225-232.
- Duerr, A., Miller, T.A., Duerr, K.C., Lanzone, M., Fesnock, A., Katzner, T.E., 2015, Landscape-scale distribution and density of raptor populations wintering in anthropogenic-dominated desert landscapes. DOI- 10.1007/s10531-015-0916-6: Biodiversity and Conservation, v. 24, no. 10, p. 2365-2381.
- Simes, M.T., K.M. Longshore, K.E. Nussear, G.L. Beatty, D.E. Brown, and T.C. Esque, 2015, Black-tailed and white tailed jackrabbits in the American West: History, ecology, significance, and survey methods. Submitted to Western North American Naturalist 75(4):491-521. DOI: 10.3398/064.075.0406
- Simes, M.T., K.M. Longshore, K.E. Nussear, G.L. Beatty, D.E. Brown, and T.C. Esque. *In Review*. An annotated bibliography for the black-tailed jackrabbit (*Lepus californicus*) and white-tailed jackrabbit (Lepus townsendii). Prepared and submitted as a USGS Open-File Report
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# ASWG Mission

*The ASWG is a collaborative group of environmental organizations, academics, solar companies, and solar industry representatives that will advance coordinated scientific research to better understand how birds interact with solar facilities. Given the threat that climate change poses to avian species, participants will work with the shared interests of protecting avian species and developing solar projects in an environmentally responsible and a commercially viable manner.*

# Participants and Roles

- Convener: Large-scale Solar Association
- Facilitation team: Pivot Point
- Decision-making members:
  - Audubon California
  - Defenders of Wildlife
  - Duke Energy
  - First Solar
  - Large-scale Solar Association
  - Natural Resources Defense Counsel
  - NextEra Energy Resources
  - Recurrent Energy
  - SunEdison
  - SunPower

# Progress to Date

2016

**January**

- ASWG meeting with Research Panel (1/13)
- Finalizing Terms of Reference
- Multiagency CWG meeting

**February**

- Research panel works independently
- ASWG call with research panel

**March**

- ASWG meeting
- Progress report on Research Panel from Science Advisors

**April**

- Research Panel develops draft report

Ongoing Engagement with Multiagency Avian-Solar Collaborative Working Group

# ASWG Next Steps

2016

| May | June | July-August |
| --- | --- | --- |
| • Multiagency CWG meeting (Week of 5/9)<br>• Research panel shares draft report with ASWG | • ASWG meeting with research panel (6/1-2)<br>• ASWG discussion of priorities | • ASWG and agency observers to meet to discuss final report<br>• Finalize priorities after agency input |

Ongoing Engagement with Multiagency Avian-Solar Collaborative Working Group

# Research Panelists

| | | |
|---|---|---|
| **Science Advisors** | | |
| Thomas Smith | UCLA | Director, Center for Tropical Research |
| Kristen Ruegg | UCLA / UCSC | Institute for the Environment and Sustainability, Center for Tropical Research |
| **Research Panelists** | | |
| Steve Beissinger | UC Berkeley | Professor of Conservation Biology |
| Wally Erickson | WEST Consulting | CEO / Senior Statistician |
| Vasilis Fthenakis | Brookhaven National Lab | Principal Investigator |
| Luke George | Colorado State University | Senior Research Associate |
| Rodney Siegel | Institute for Bird Populations | Executive Director |

# ASWG Research Questions

**I. Siting**

1) Do avian mortality rates at PV solar power plants differ from background rates at control sites?

2) What is the relationship of mortality rates to site characteristics (e.g., panels, fence lines, overhead transmission lines, scale/configuration of installations, proximity to other solar facilities or other natural or human landscape features such as levels of fragmentation and loss of habitat, migratory flyways and stop over sites, etc.)?

3) How might siting be optimized to reduce potential impacts on vulnerable bird populations in a cost-effective manner?

# ASWG Research Questions

**II. Population level effects**

1) Are solar sites causing avian mortality that is significant at the scale of the population for individual species?

   a) How should populations be defined in this context?

   b) What research and data would be required to determine if mortality associated with solar sites is additive or compensatory?

   c) How do population impacts differ by species, guild, migratory pathway, taxonomic unit and classification (threatened versus non-threatened), etc.?

# ASWG Research Questions

**III. Lake Effect**

1) Are water or other birds attracted to solar panels because they perceive them as water bodies (i.e., a “Lake Effect”)?
2) Is a possible Lake Effect related to geographic and environmental/infrastructure characteristics of sites?
3) Do birds show evidence of attraction to large solar arrays (e.g. show changes in flight direction or behavior as they approach arrays)?
4) What types of birds are affected?
5) Is possible mortality due to stranding, strikes or some other process?
6) If the Lake Effect is demonstrated, what cues are causing the birds to mistake the solar array as a water body (e.g., what wavelength of reflected light are they responding to)?
7) If a Lake Effect can be demonstrated, how might the threat be mitigated or eliminated?

# ASWG Research Questions

**IV. Avian attraction/mitigation/deterrents**

1) What are the avian risk-reduction options that might lower avian mortality?

**V. Feather spots**

1) What do feather spots represent? Can feather spots be better defined and quantified?

   a) What methods can be used to identify the species and number of individuals that comprise feather spots? Are feather spots a reliable indicator of avian strikes and/or fatalities.

   b) Do feather spots from larger carcasses persist in the environment longer than spots from smaller ones?

# ASWG Research Questions

**VI. Climate change and other broader impacts**

1) What demographic effects may result from climate change in the absence of large-scale solar development, and how do these compare with the impacts of solar facilities for specific bird populations?

2) Using historical and contemporary data on the abundance and distribution of avian species with future climate projections, what are the predictions for the future avian distribution and population trends in California?

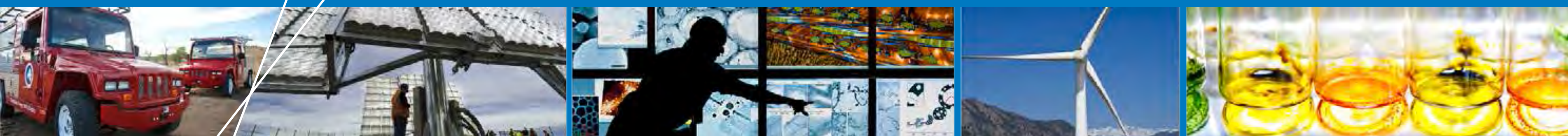
   a) How can this be used to mitigate the impacts of PV facilities?

# Achieving Mutual Goals

- Understanding common research interests
- Identifying key priorities
- Identifying funding mechanisms
- Continued collaboration to drive short and long term results

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

# Development of Tools, Training, and Outreach to Address Solar Glare and Flux-Related Avian Impacts



## Multiagency Avian-Solar Collaborative Working Group Public Workshop


**Timothy Wendelin**

National Renewable Energy Laboratory

**Clifford K. Ho**

Sandia National Laboratories

**Cianin Sims**

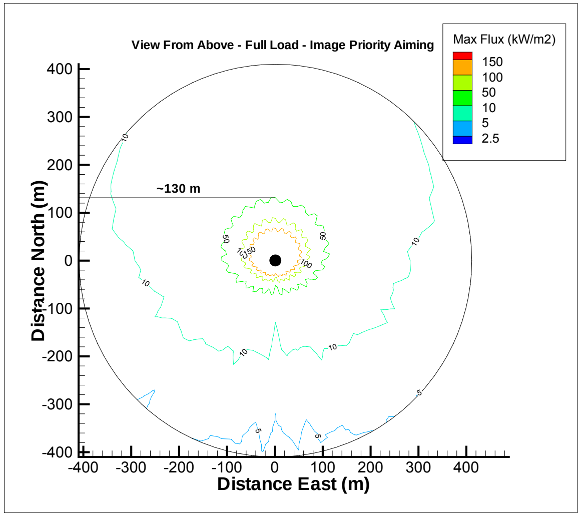
Sims Industries

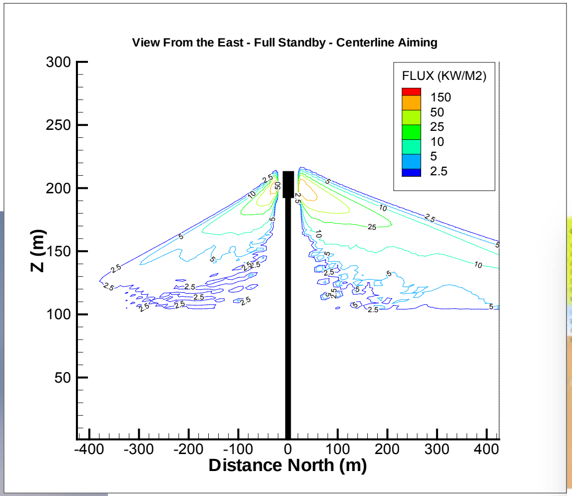

**May 10, 2016**


NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

# Goals

- **DOE is funding work to address avian flux hazards**
  - Develop models and tools to quantify flux (power/unit area) from heliostat aiming strategies
  - Mitigate impacts of avian (and glare) hazards
  - Optimize operational performance



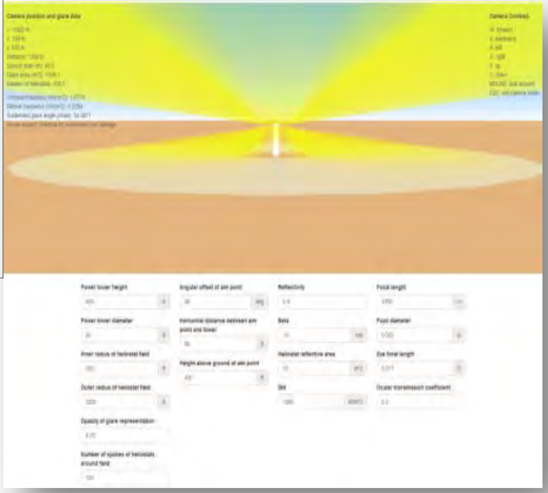
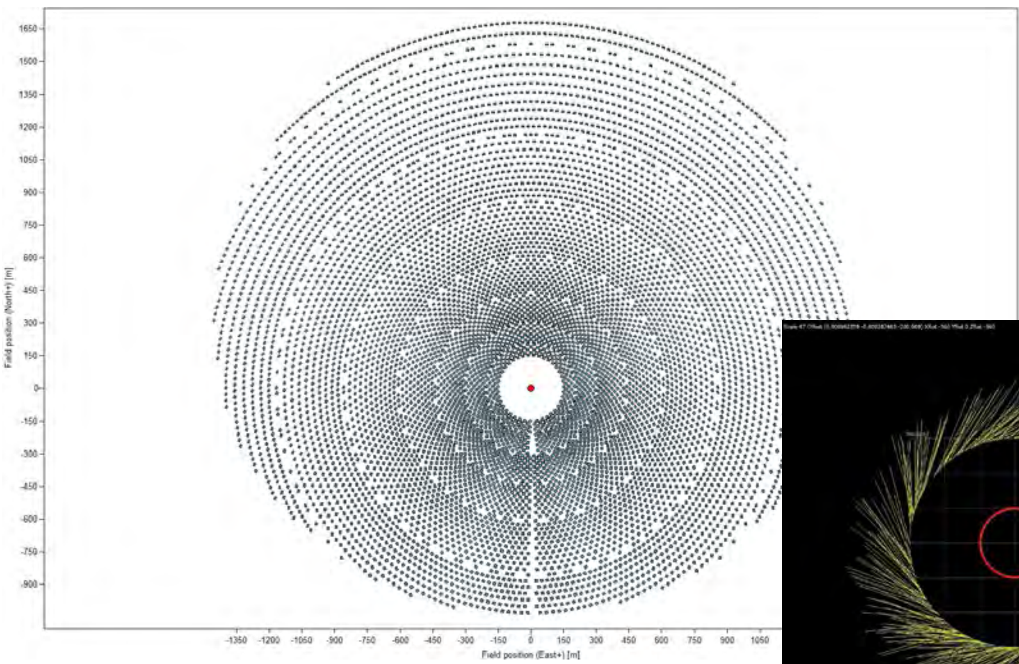
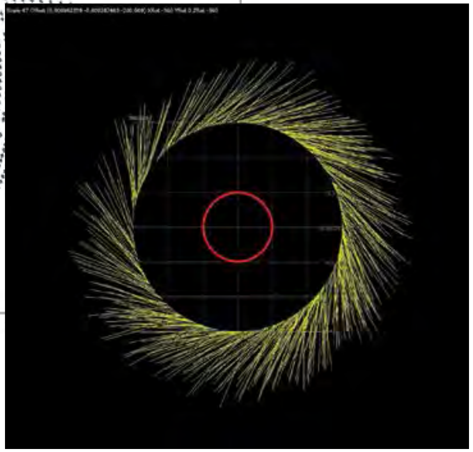



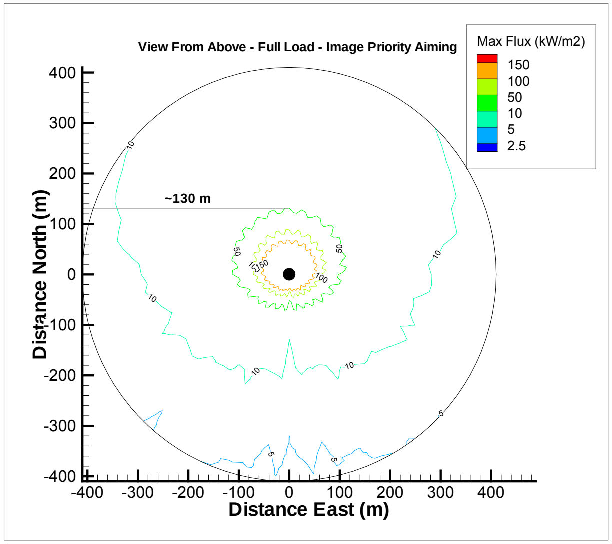
Photo and model of high-flux regions causing solar glare and avian hazards at Ivanpah Solar Electric Generating System

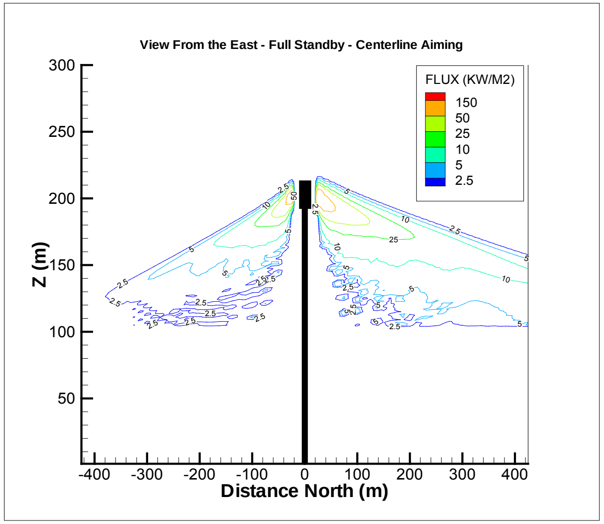
# Previous Work

- Argonne/NREL Study "A Summary Review of Issues Related to Avian Mortality at Utility-Scale Solar Facilities"
    - Preliminary results compare well with previous analyses
    - Various approaches to standby aiming can significantly reduce flux levels and their impact on avian mortality.
    - Future work recommended to determine the impact of alternative aiming strategies which simultaneously minimize impacts to plant operations and avian health.







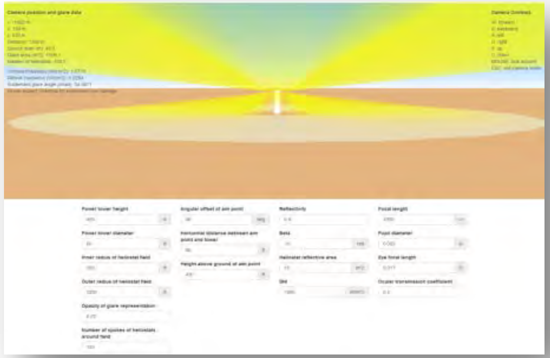



# Approach

1. Identify metrics for safe solar flux levels
2. Develop tools to model solar flux in air space around power tower
   - Case studies: Ivanpah and NSTTF at Sandia (for validation)
3. Compare alternative heliostat standby-aiming strategies
   - Minimize solar flux according to metrics in (1) above
   - Minimize impact on plant operations
4. Develop user friendly assessment tool for agencies/stakeholders

Ivanpah Solar Electric Generating System

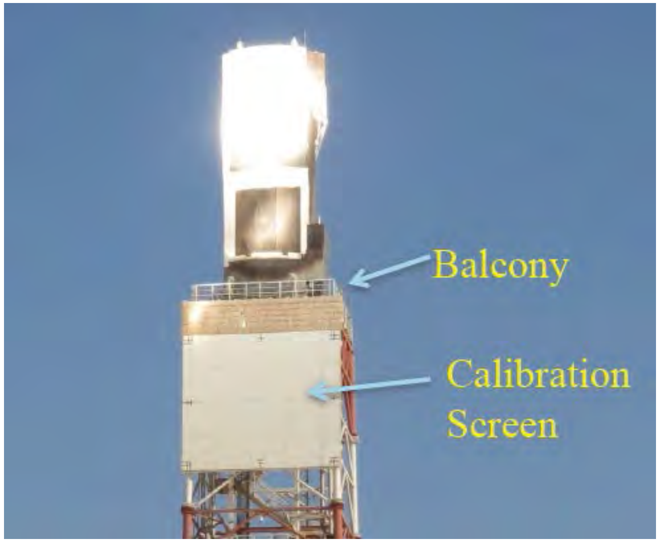
National Solar Thermal Test Facility (NSTTF)

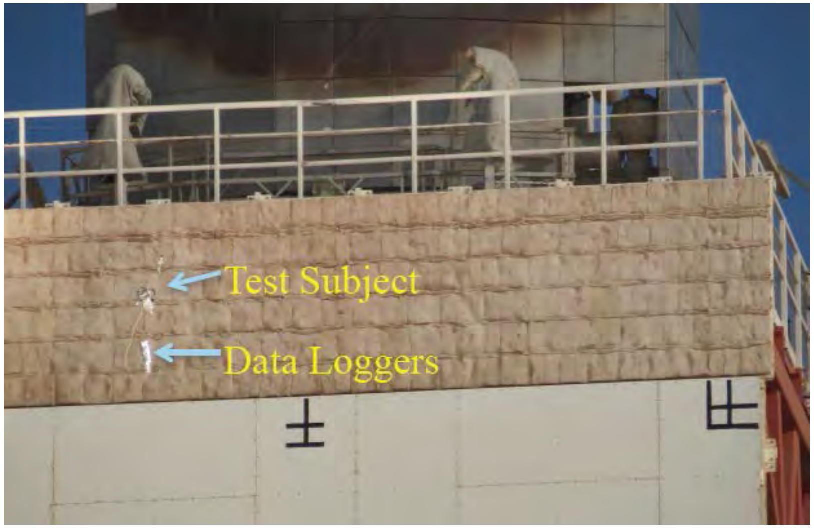


Tower Illuminance Model

# Solar Energy Development Center
## (Negev Desert, Southern Israel)

- Tests conducted with bird carcasses exposed to different flux levels (Santolo, 2012)
  - “no observable effects on feathers or tissue were found in test birds where solar flux was below 50 kW/m$^2$ with exposure times of up to 30 seconds.”
  - California Energy Commission analytical study found that “a threshold of safe exposure does not exist above a solar flux density of 4 kW/m$^2$ for a one-minute exposure”



# Crescent Dunes (SolarReserve)
## (Tonopah, Nevada)

- **110 $MW_e$ molten-salt power tower**
- **In January 2015, 3,000 heliostats were aimed at standby points above receiver**
  - o 115 bird deaths in 4 hours
  - o SolarReserve spread the aim points to reduce peak flux to < 4 $kW/m^2$
    - – Reported zero bird fatalities in months following change

Figure 1 – The halo created by the reflected light of 3,000 heliostats which caused the bird mortalities.

Images from http://cleantechnica.com

# Ivanpah Solar Electric Generating System

## (Ivanpah, California)

- **390 $MW_e$ direct steam power-tower plant (3 towers)**
- **Kagan et al. (2014) found 141 bird fatalities Oct 21 – 24, 2013**
    - 33% caused by solar flux
    - 67% caused by collisions or predation
- **H.T. Harvey and Associates found 703 bird fatalities in first year at ISEGS**
    - Study estimated 3500 bird fatalities accounting for search efficiency and scavengers removing carcasses
- **ISEGS has since implemented new heliostat aiming strategies and bird deterrents**


| | Number of Detections | | | | |
|---|---|---|---|---|---|
| Cause | Winter | Spring | Summer | Fall | Total |
| Singed | 27 | 100 | 42 | 147 | 316 |
| Collision | 14 | 15 | 10 | 45 | 84 |
| Other* | 5 | 5 | 2 | 3 | 15 |
| Unknown | 51 | 82 | 61 | 94 | 288 |
| **Total** | **97** | **202** | **115** | **289** | **703** |

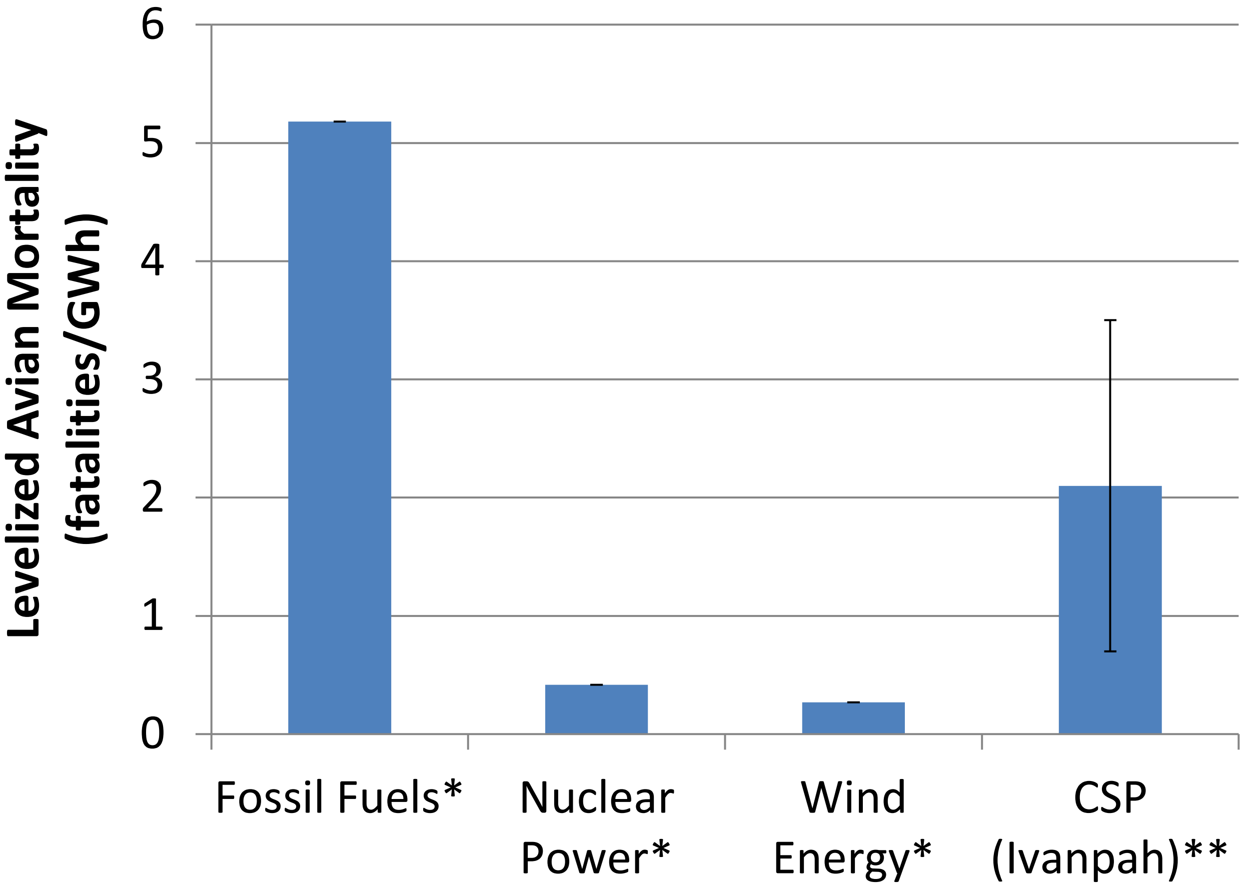
* Includes detections in ACC buildings without evidence of singeing or collision effects.

H.T. Harvey and Associates, 2013 - 2014

# Gemasolar Thermosolar Plant
## (Andalusia, Spain)

- **20 $MW_e$ molten-salt power tower plant**
- **14-month study revealed no avian fatalities in vicinity of tower (Dept. of Zoology, U. Granada)**

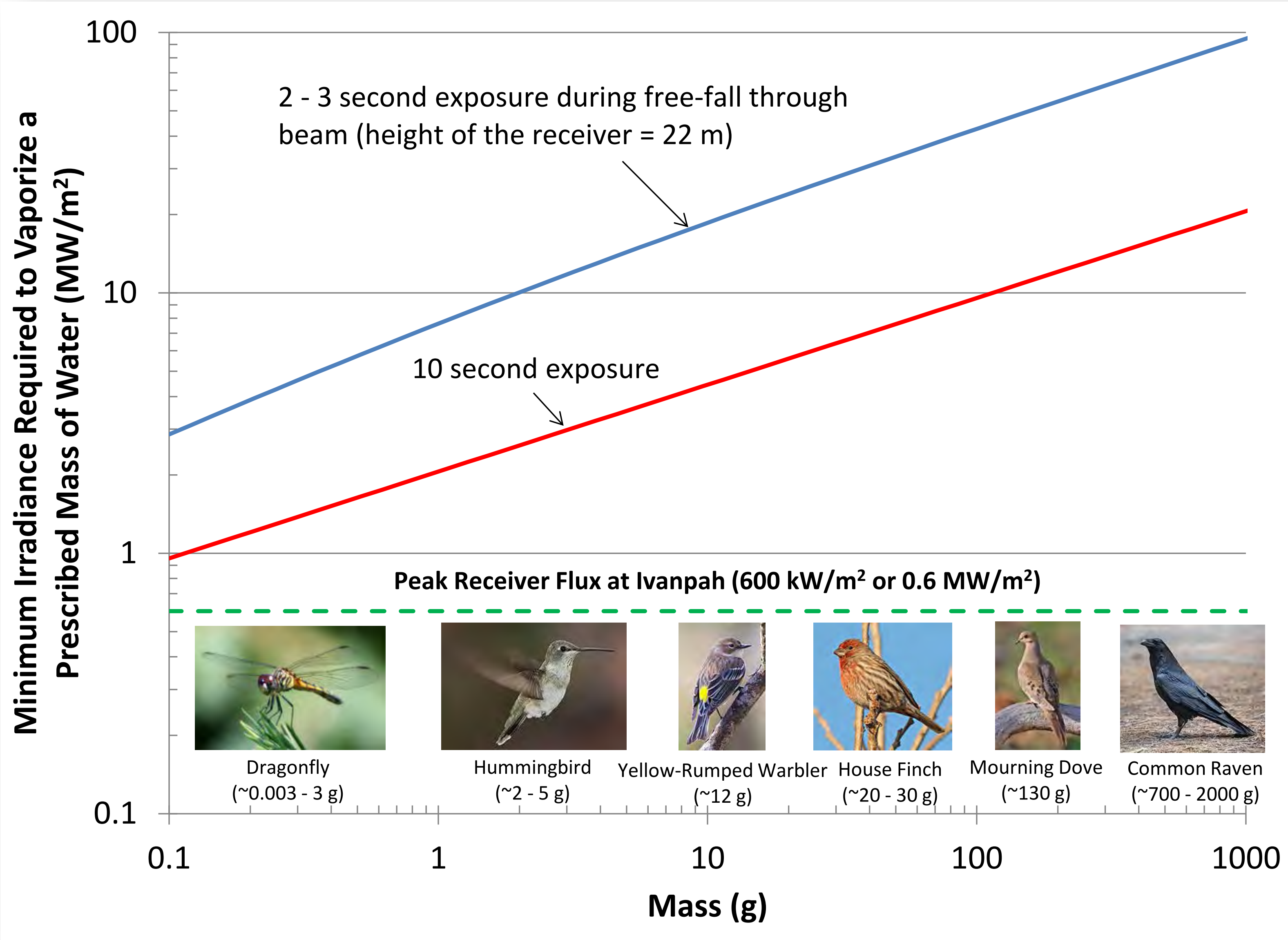
# Levelized Avian Mortality for Energy (LAME)




*Sovacool (2009)

**During first year of operation at Ivanpah (2013 – 2014) before mitigation measures and deterrents were implemented

# Feasibility of Bird Vaporization



# Deterrents

- **Acoustic**
  - Painful or predatory sounds
- **Visual**
  - Intense lights and decoys
- **Tactile**
  - Bird spikes, anti-perching devices
- **Chemosensory**
  - Grape-flavored powder drinks (methyl anthranilate)


11

# Conclusions from prior studies

- The large number of "streamers," or smoke plumes, observed and attributed to vaporization of birds is likely caused by insects flying into the concentrated flux
- Complete vaporization of birds flying into concentrated solar flux is highly improbable
- Safe irradiance levels for birds have been reported to range from 4 $kW/m^2$ to 50 $kW/m^2$
- Mitigation measures and bird deterrents can and are being used

# Flux Hazard Analysis

- Create computer model of baseline power tower design (Ivanpah Unit #2) in SolarPILOT / SolTrace.
  - Heliostat geometry, positions and tower height from NRG.
- Create computer model of National Solar Thermal Test Facility in SolarPILOT / SolTrace.
  - Validate model using flux measurement tools

# Flux Hazard Analysis

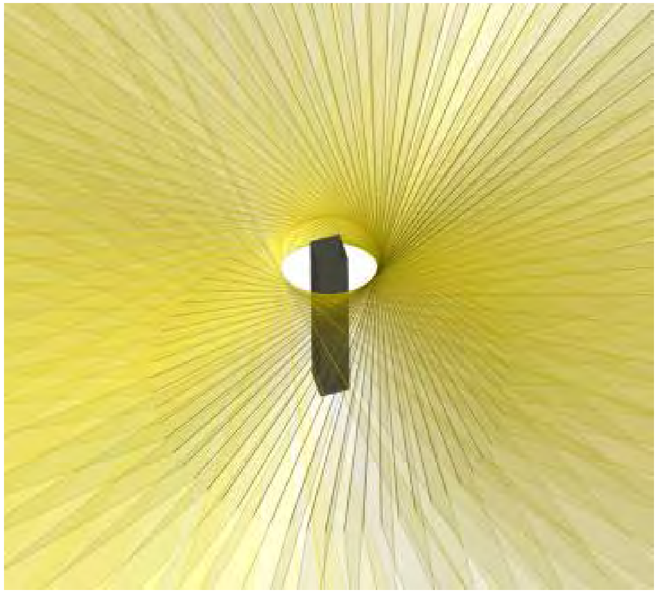
- Obtain/establish relevant information/parametric data from industry/stakeholder workshop
  - Baseline/novel aiming strategies.
  - Heliostat control capabilities (slew rates, aiming algorithms/capabilities)
  - Metrics for safe solar flux levels ($I_{haz}$, $V > I_{haz}$)
  - Performance metrics

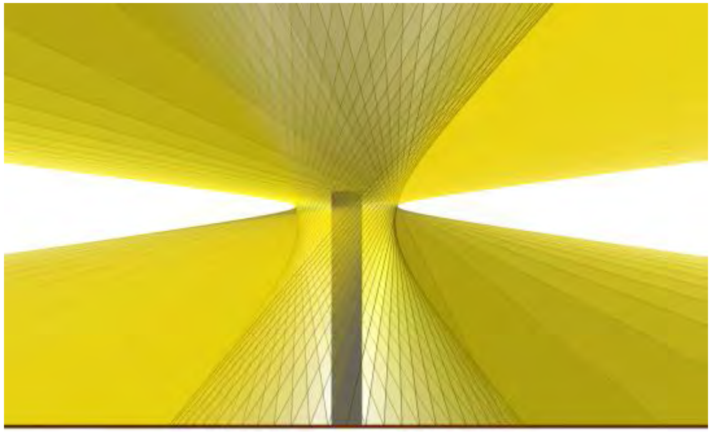
# Flux Hazard Analysis

- **Apply methodology to Ivanpah and NSTTF fields for analyzing baseline and alternative cases for standby conditions.**
  - **Generate volumetric flux maps for standby aim-point strategies for representative times and days of the year.**
  - **For representative flight paths through the volume, perform worse case thermal analysis to determine whether surface (feather) temperature exceeds 160$^{o}$ C along given flight path.**
  - **Consider number of flight paths exceeding 160$^{o}$C or the total time of exceedance as metrics to determine the effectiveness of different stand-by aiming strategies.**

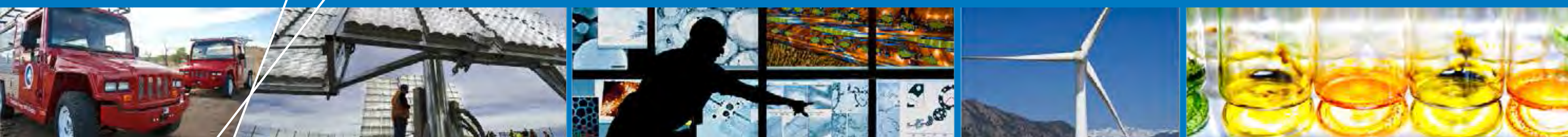
# Flux Hazard Analysis

- Evaluate successful aiming strategies for impact on annual performance
  - Quantify time from standby to operational for representative days of the year and for both baseline and alternative standby aiming strategies.
  - Quantify annual performance impact of alternative vs baseline cases with the goal of achieving zero loss of annual energy delivered.
- Provide both input and output data from methodology for validation of the enhanced Tower Illuminance Model (TIM)



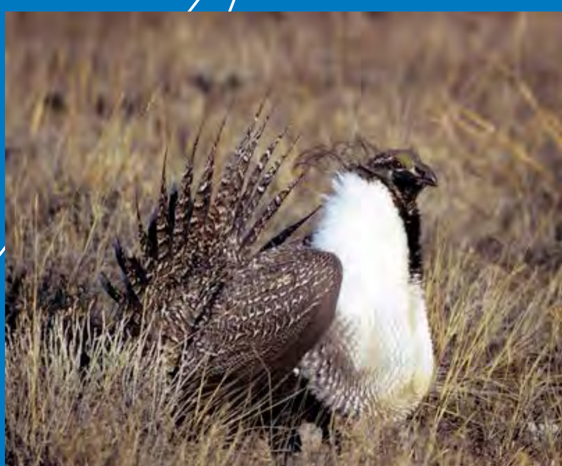


# Wind Energy/Wildlife Interactions: Overview of the Challenges and Current Efforts to Address Them



Elise DeGeorge, NREL

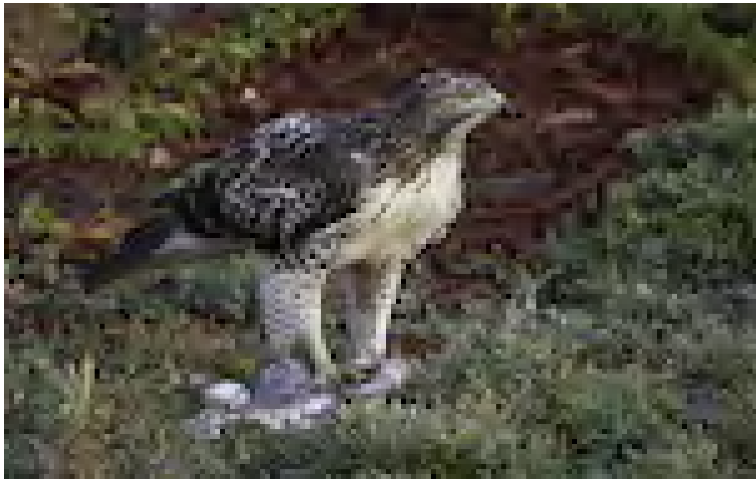
May 11, 2016



NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

# Outline

- Historical overview and statutory authority
- Challenges to wildlife
- Key species habitat distribution
- Research
- Collaboratives
- Conclusions



Red-tailed hawk eating a rabbit.
*Photo by Dennis Schroeder, NREL 22325*

# Outline

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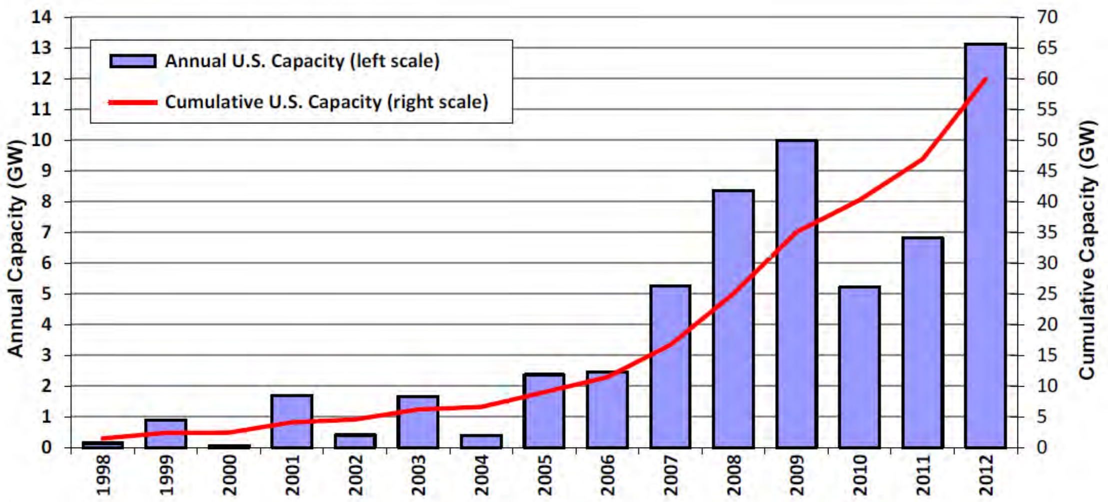
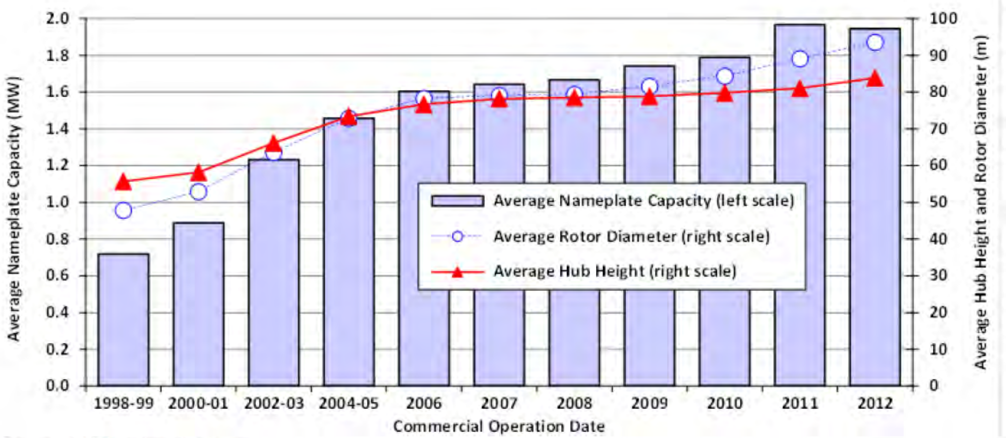
Photo by J. Lucas, Purdue University

# Wind Installed Capacity over Time




*Source: AWEA project database*

**Figure 1. Annual and Cumulative Growth in U.S. Wind Power Capacity**

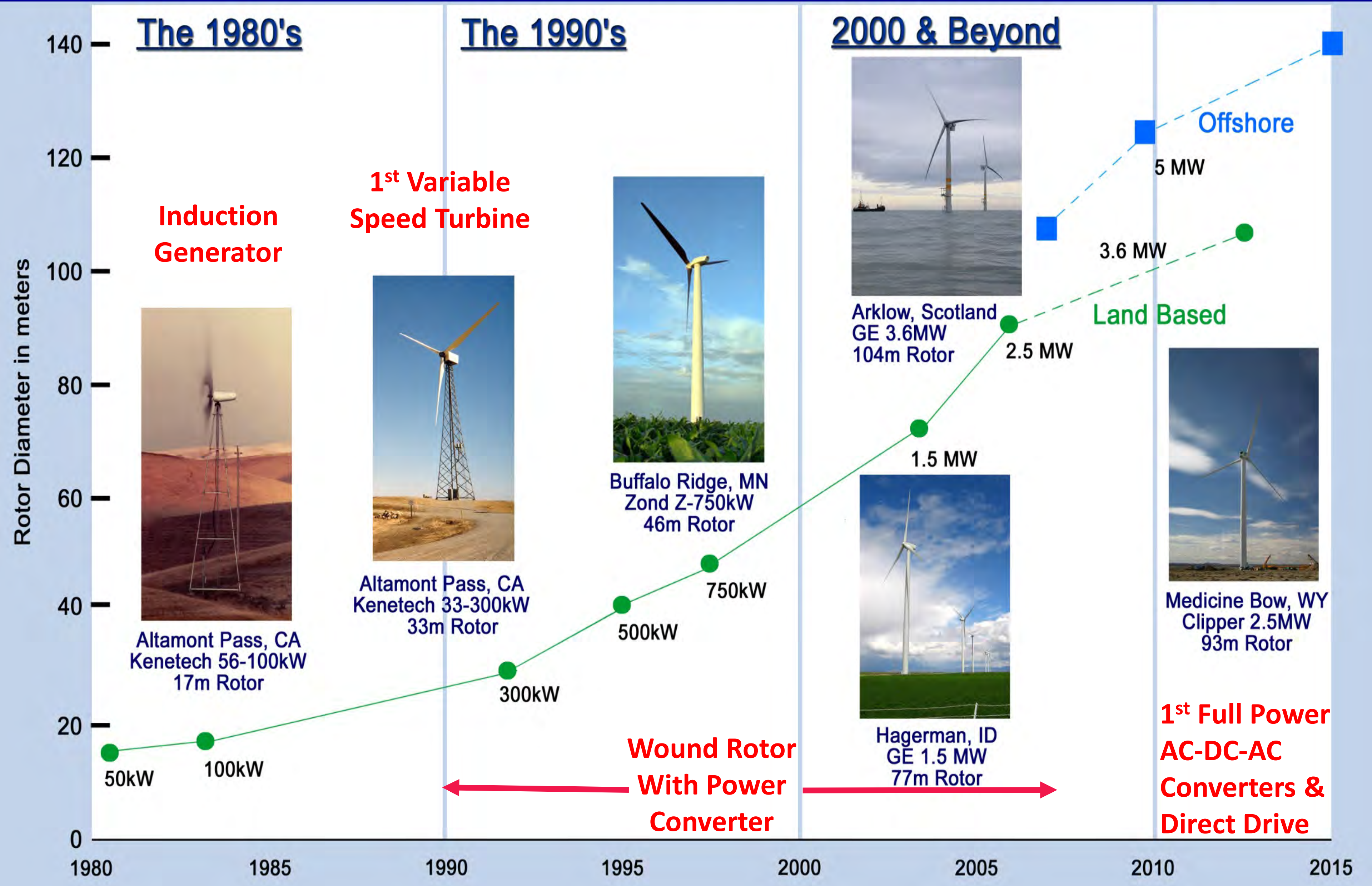



*Source: AWEA project database*

**Figure 15. Average Turbine Nameplate Capacity, Rotor Diameter, and Hub Height Installed during Period (only turbines larger than 100 kW)**

Source: 2012 Wind Technologies Market Report

# Evolution of U.S. Commercial Wind Technology



# Wind Turbines May Impact Wildlife & Habitats

The discussion of wind turbine impact on wildlife began at the Altamont Wind Resource Area, California, in the late 1980s and early 1990s

Junction Hill Top Wind Farm, Iowa. Five GE 1.6-megawatt (MW) turbines. *Photo by Tom Wind, NREL 26494*

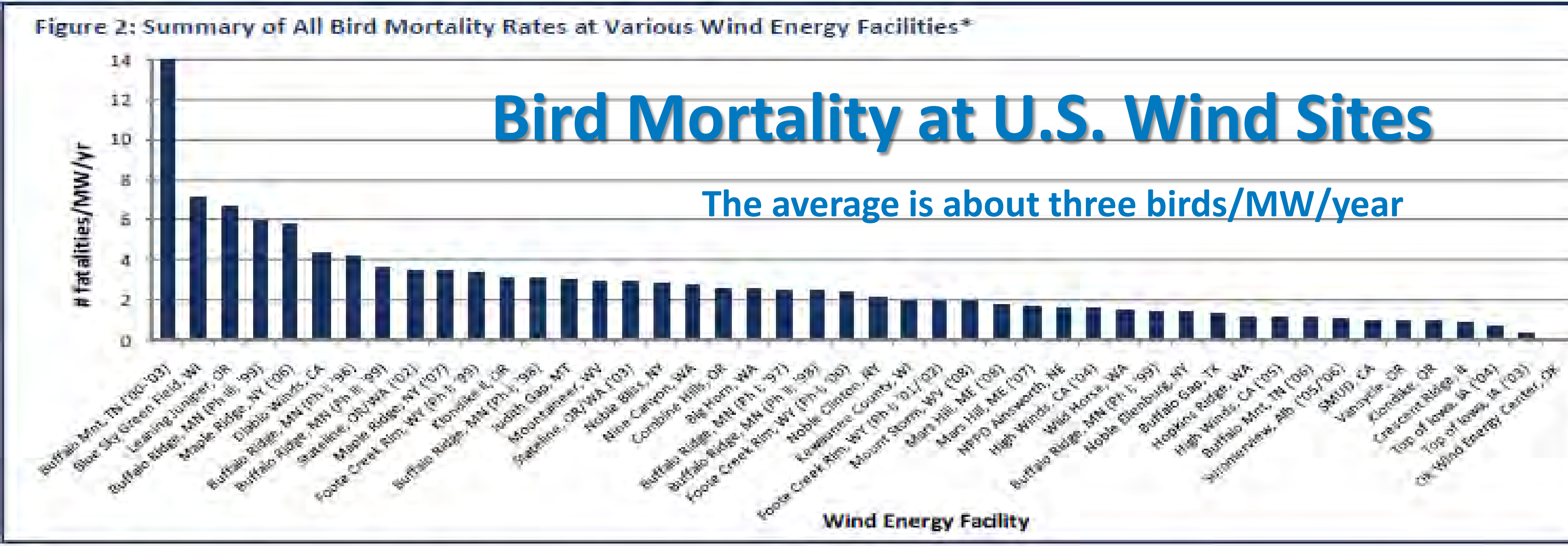
Altamont Pass Wind Resource Area, California. Kenetech 56-100 kilowatt (kW) turbines. *Photo by Shawn Smallwood, NREL 17329*

# Real or Perceived Wildlife Impacts can be a Challenge for Development

- Misinformation on potential of impacts is rampant
- Impacts are species- and habitat-specific
- Impacts are site-specific; micrositing is critical to reducing these impacts.

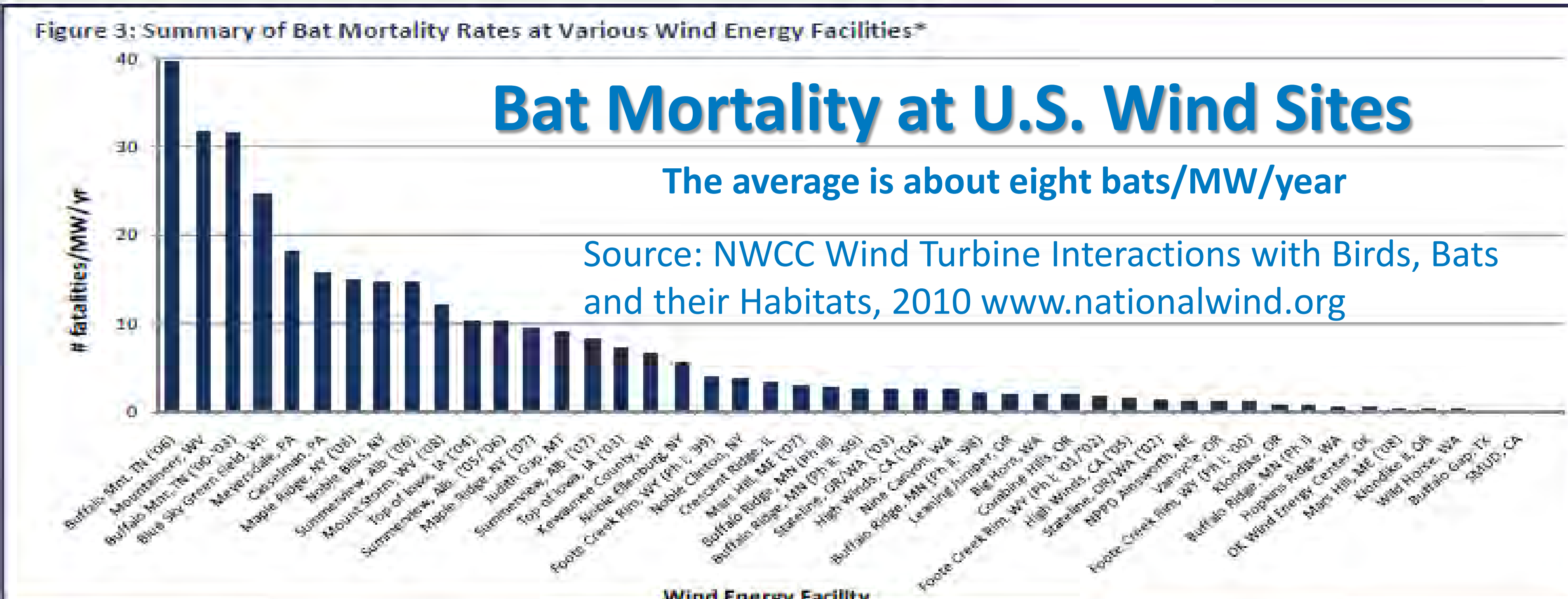
Combination of 221 Mitsubishi Heavy Industries 1-MW turbines and 53 GE 1.5-MW turbines at the Cedar Creek Wind Farm in Grover, Colorado. *Photo by Dennis Schroeder, NREL 30593*

Eight Nordex N60, 1,300-kW wind turbines in Garrett, Pennsylvania. *Photo by Green Mountain Energy* Company, *NREL 09699*




# Bird Mortality at U.S. Wind Sites

**The average is about three birds/MW/year**




# Bat Mortality at U.S. Wind Sites

**The average is about eight bats/MW/year**

Source: NWCC Wind Turbine Interactions with Birds, Bats and their Habitats, 2010 www.nationalwind.org

# U.S. Fish and Wildlife Service Statutory Authority for Wind Permitting Guidelines

- **Endangered Species Act:**
  - Directs the Service to identify and protect threatened and endangered species and their critical habitat
  - Must provide a means to protect the species' ecosystems.
- **Migratory Bird Treaty Act:**
  - Based on a strict liability statute
  - Does not require proof of intent, knowledge, or negligence to be deemed a violation
  - Does include actions resulting in the 'taking' or possession of a protected species, in the absence of a USFWS permit or regulatory authorization, is deemed a violation.
- **Bald and Golden Eagle Protection Act:**
  - Provides additional legal protection for bald and golden eagles. First enacted in 1940/ golden eagle added in 1962

Whooping Crane. *Photo by Karin Sinclair, NREL 27961*

Bald Eagle. *NREL 01101*

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# Challenges to Wildlife Related to Wind Energy

**Wildlife challenges include:**

- Habitat and species that are likely to be impacted vary by
  - Climate
  - Topography
  - Location
- No single solution
- Impacts expected to increase as more turbines are installed across the country—but these can be managed.

**Ways of addressing the challenges:**

- Identify-near-term research needs
- Use a multipronged approach
- Involve multiple stakeholders
- Garner support for collaborative field research, methods/metrics refinement, tools, mitigation strategies, and deterrent development/testing
- Disseminate information.

# Challenges: Key Issues Being Addressed

**Impacts of wind turbines on wildlife include:**

- Bats (mortality)
- Raptors (mortality)
- Nocturnal migration (mortality)
- Prairie birds (habitat – displacement; genetic diversity)
- Cumulative (population impacts).

**Tools to avoid problematic sites:**

- Federal (e.g. Wind Energy Guidelines)
- State guidelines
- Pre versus post construction validation
- Mapping of migratory pathways
- Presiting assessments
- Risk assessments
- Literature archive
- Peer review (promote transparency)

Sage Grouse. *NREL 20649*

# Avian Strike Probability Versus Turbine Size

**Altamont Scale**

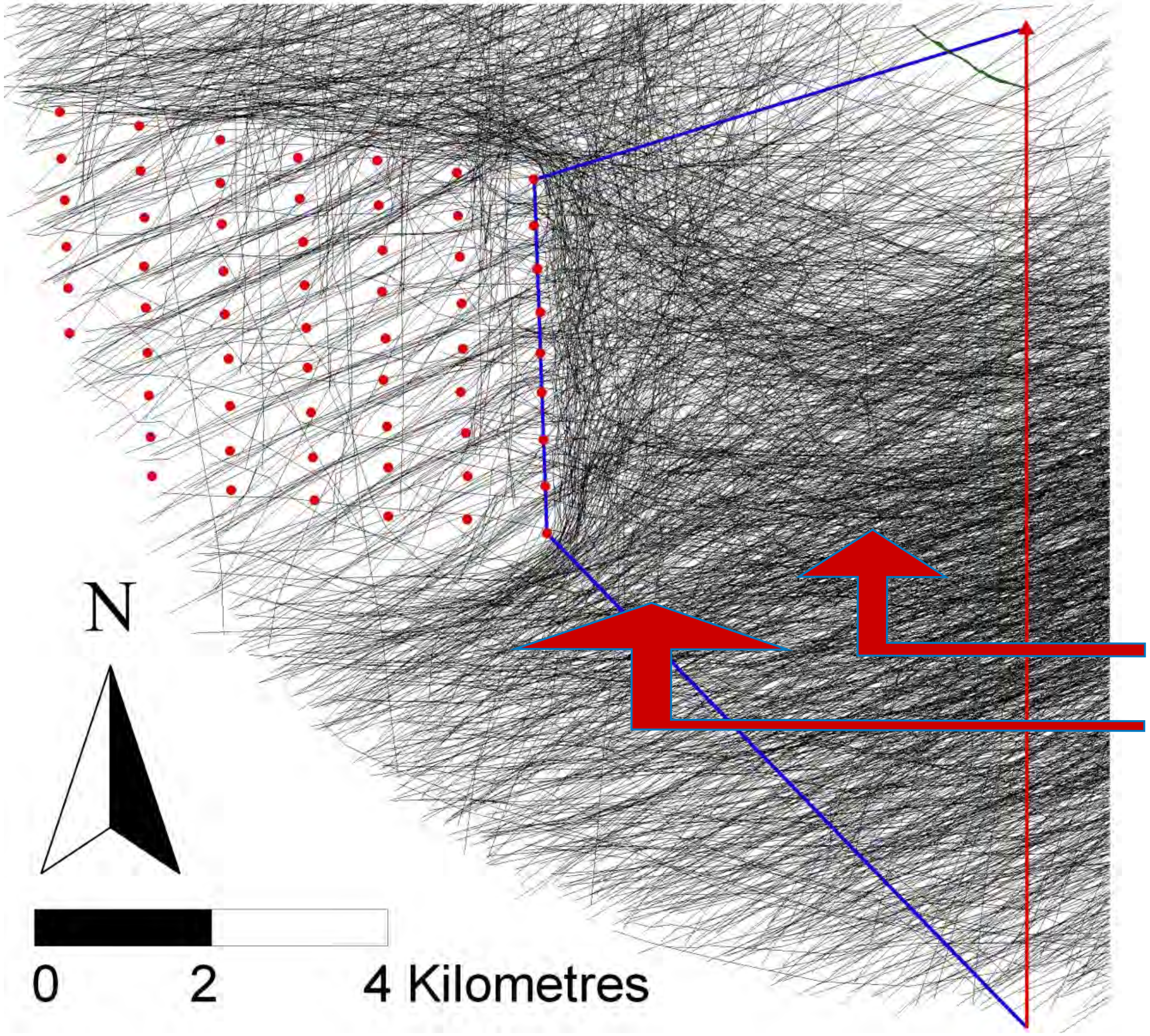
15-meter (m) diameter RSA and 100 kW

**Next-Generation Scale**

93-m diameter RSA and 2.5 MW

# Avoidance Behavior can be Significant

**Radar tracks of migrating birds through the Nysted Offshore Windfarm for operation in 2003**

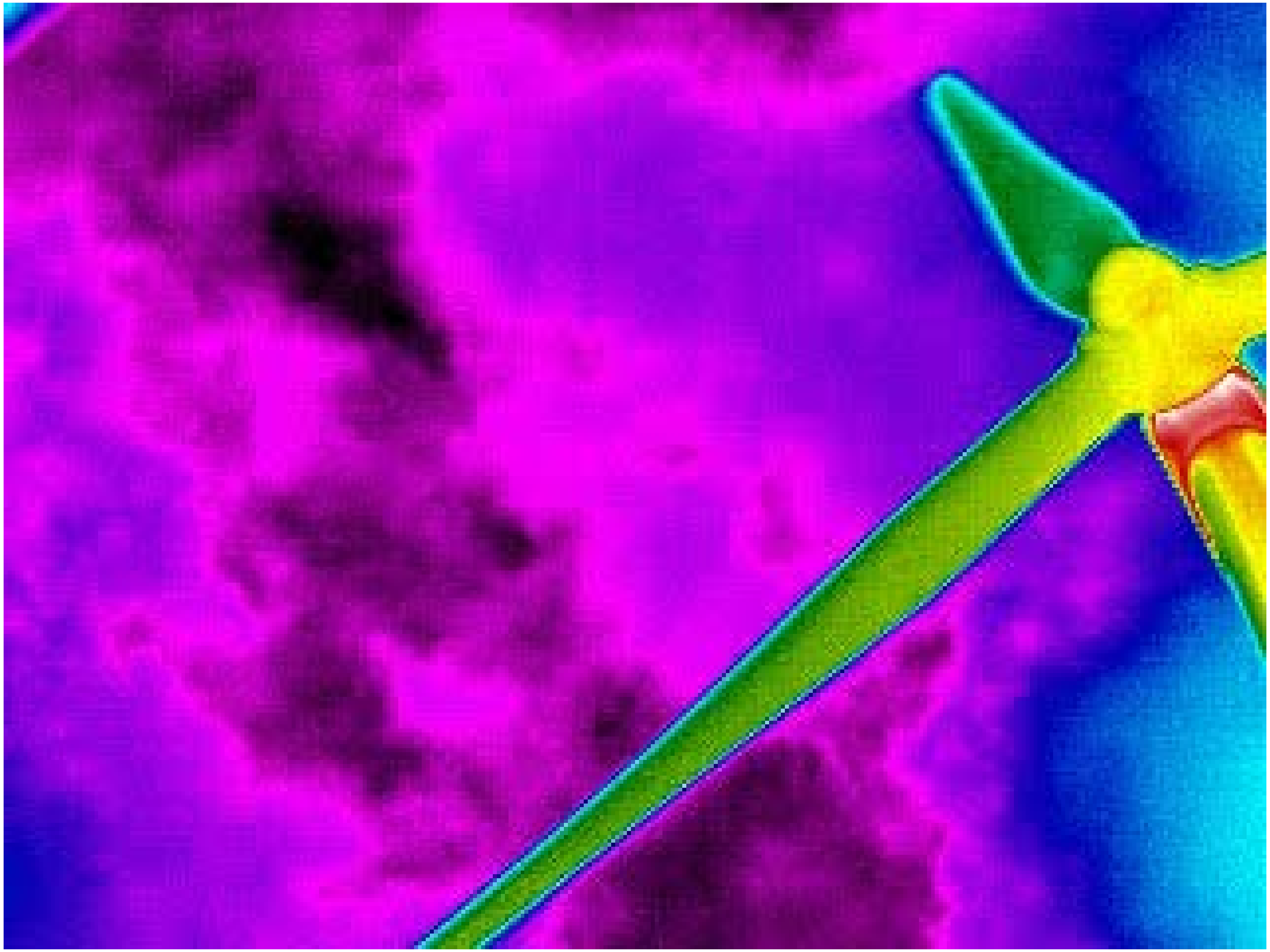



Response distance:

day = c. 3,000 meters (m)

night = c. 1,000 m

# Bats Interactions: Curiosity?



Infrared Image of a Bat Flying Through a Wind Turbine Rotor

Video by Jason Horn, Boston University

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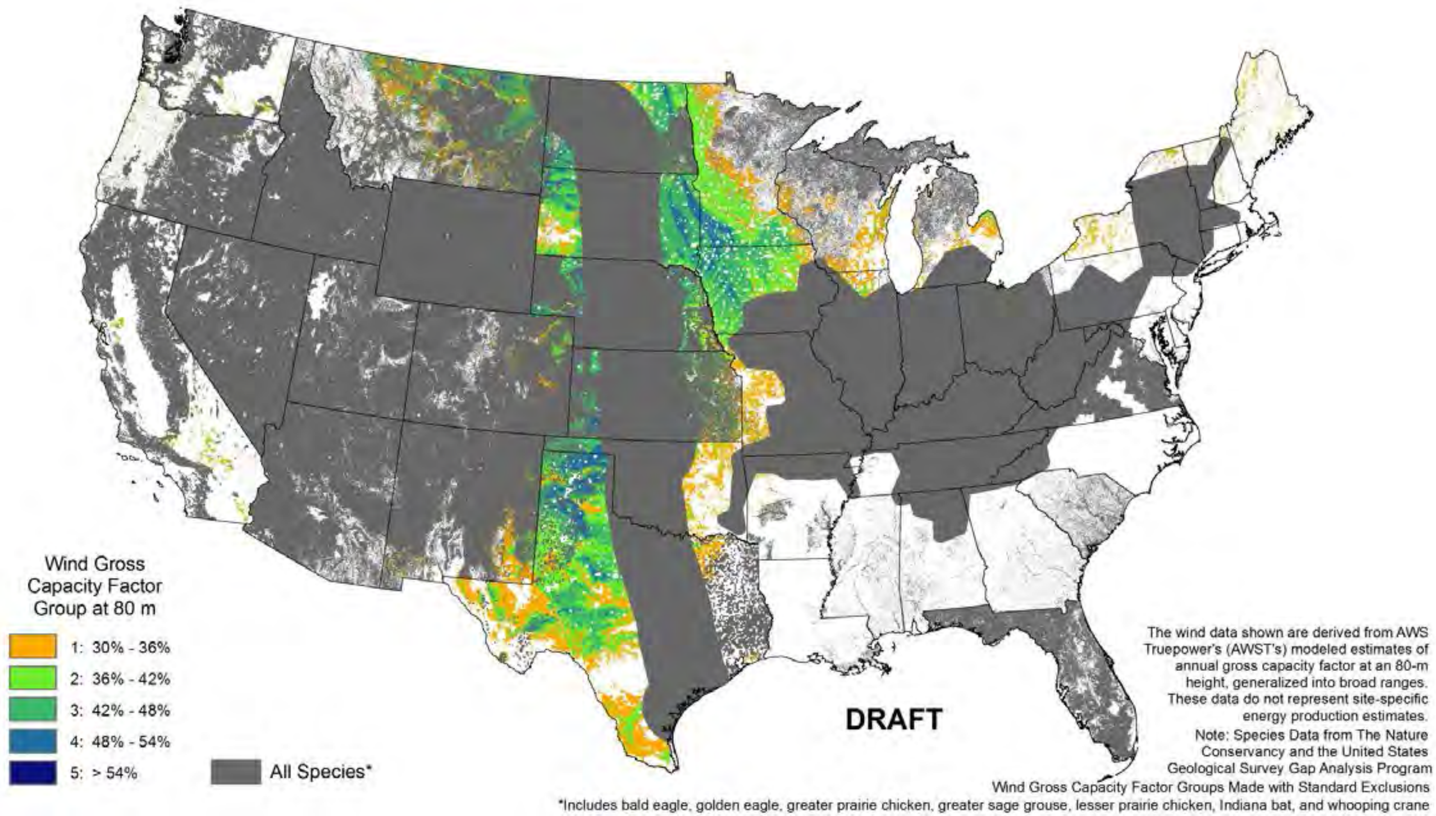
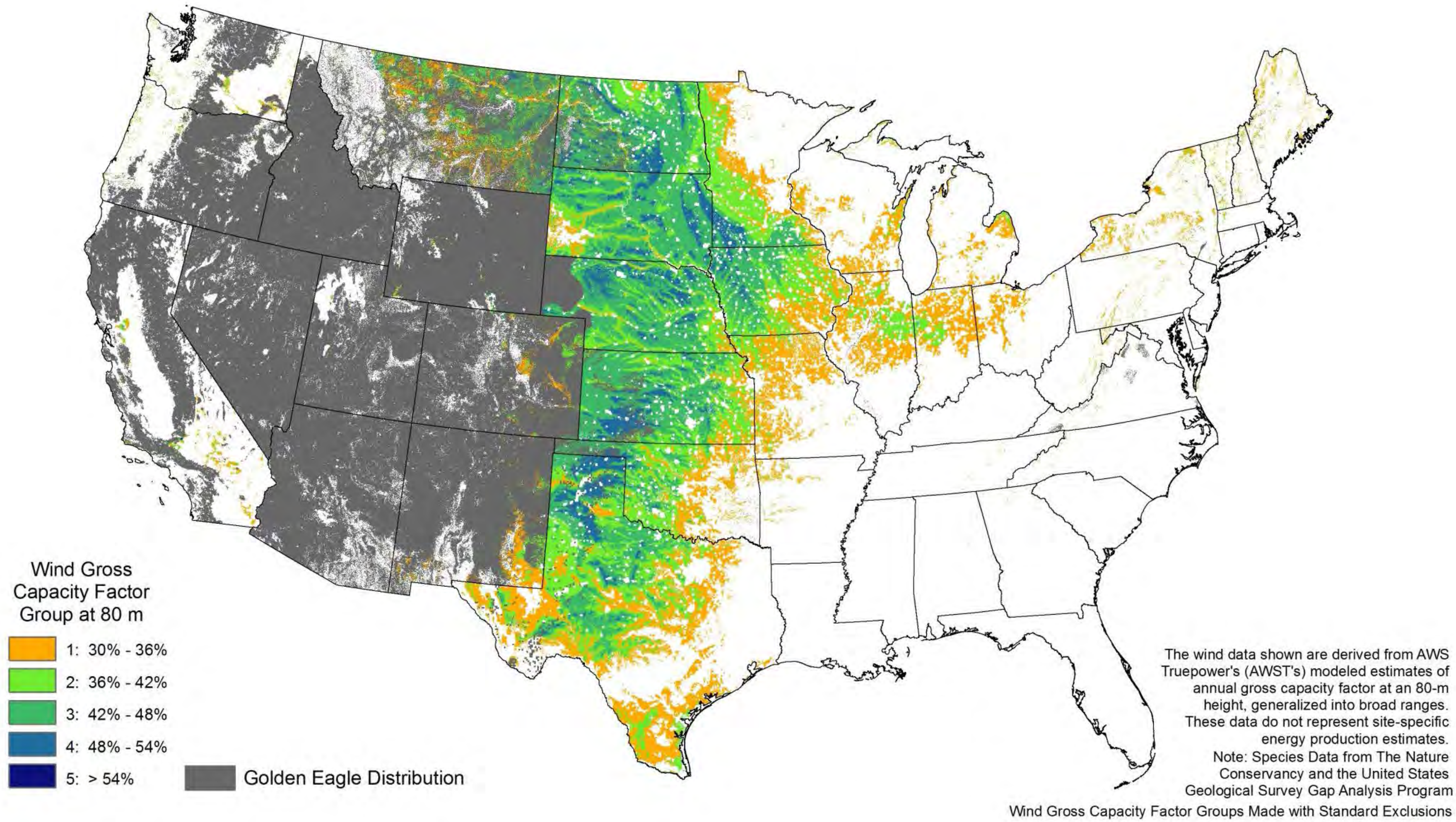
# Key Species Habitat Distribution: Seven Species




Areas in grey indicate where wildlife species live, breed, and migrate. These areas are *not* no-build zones, but are of special concern for developers that could increase costs and time, or lead to project delays or cancellation.

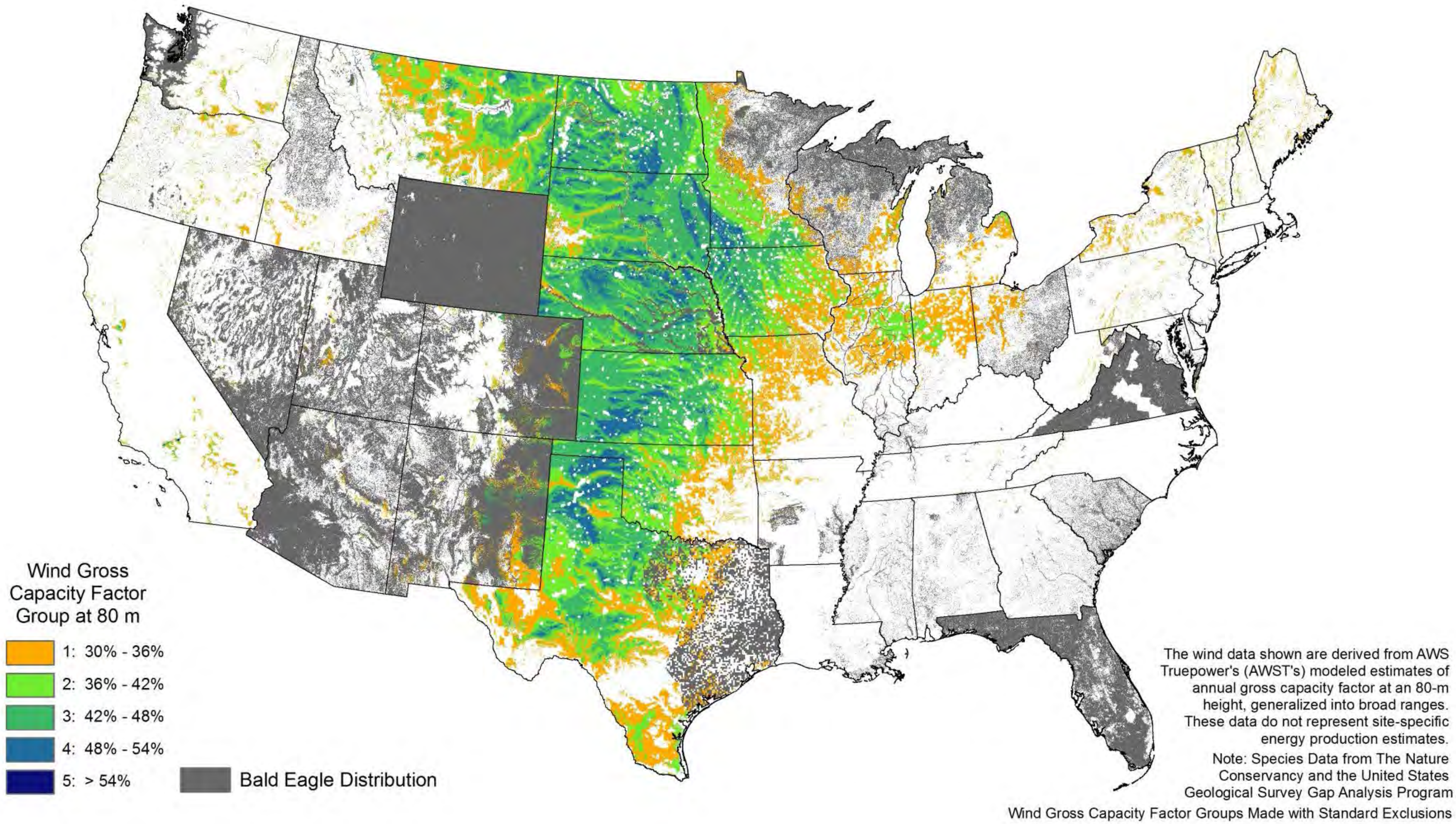
**Wildlife distribution can impact local areas very differently. On a national scale, 44%–53% of land could be affected.**

# Key Species Habitat Distribution: Golden Eagles



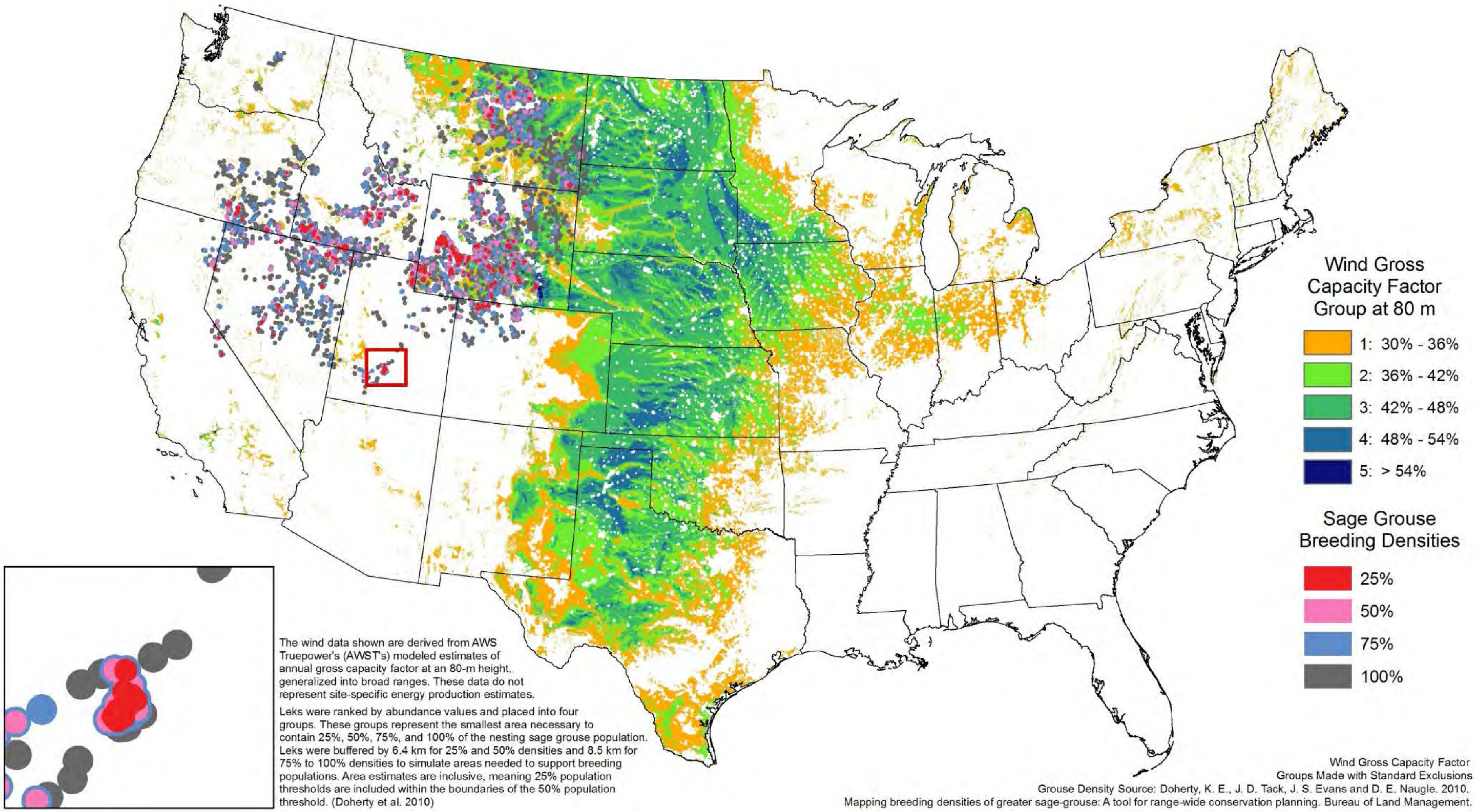

## Golden eagle habitat: areas requiring additional consideration

# Key Species Habitat Distribution: Bald Eagles



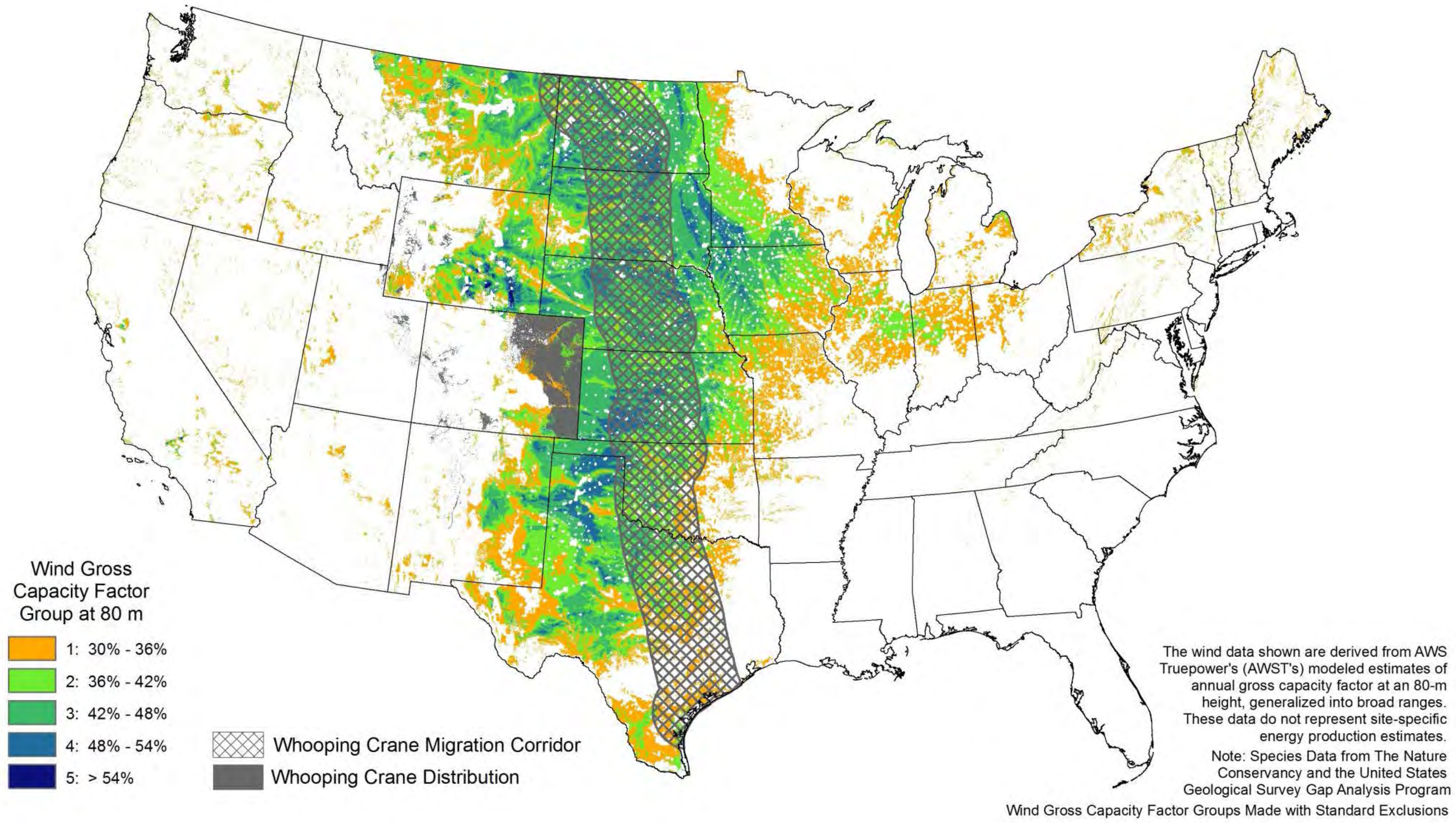

**Bald eagle habitat: areas requiring additional consideration**

# Key Species Habitat Distribution: Sage Grouse



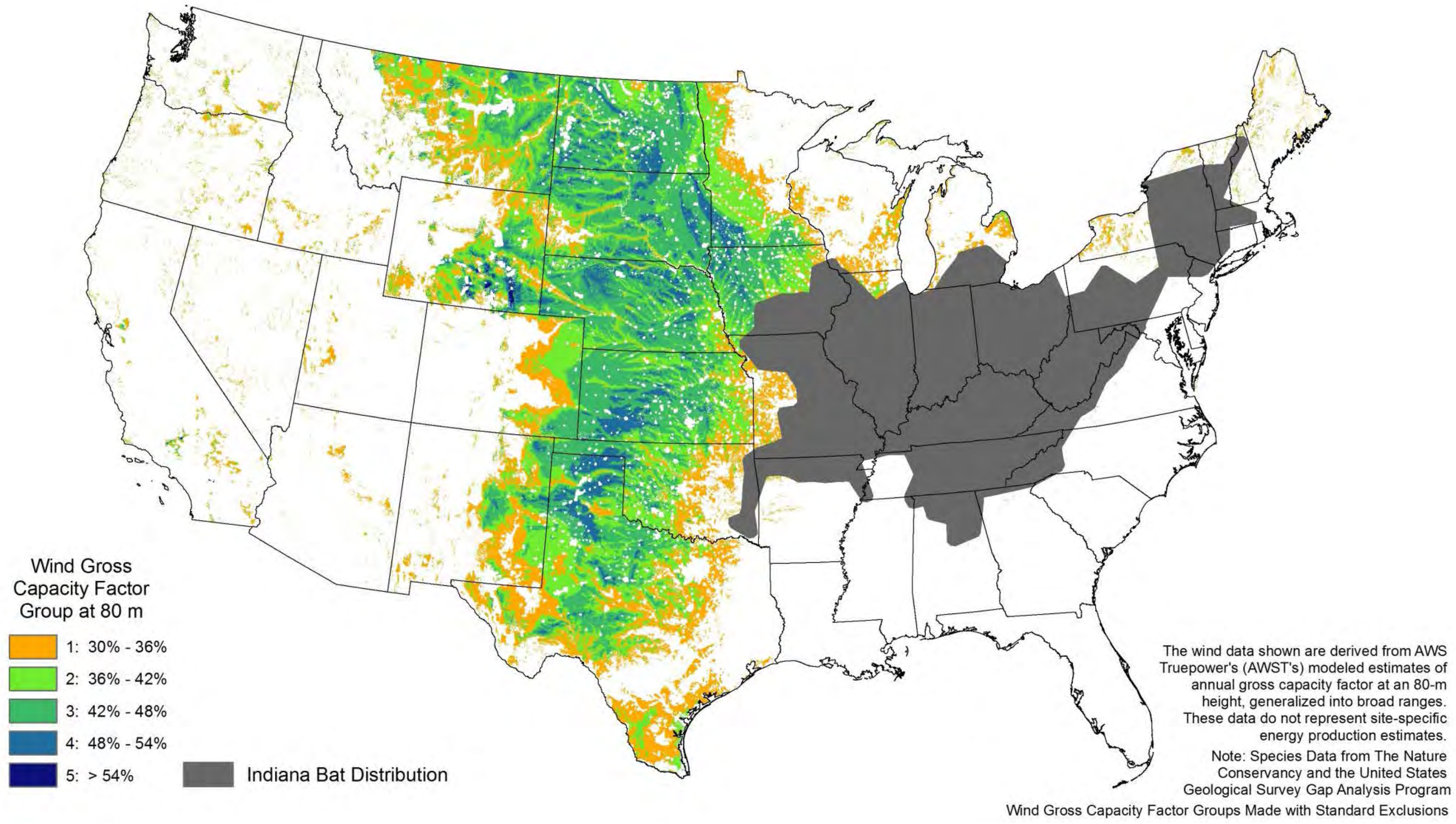

**Sage grouse habitat and breeding sites: areas requiring additional consideration**

# Key Species Habitat Distribution: Whooping Crane



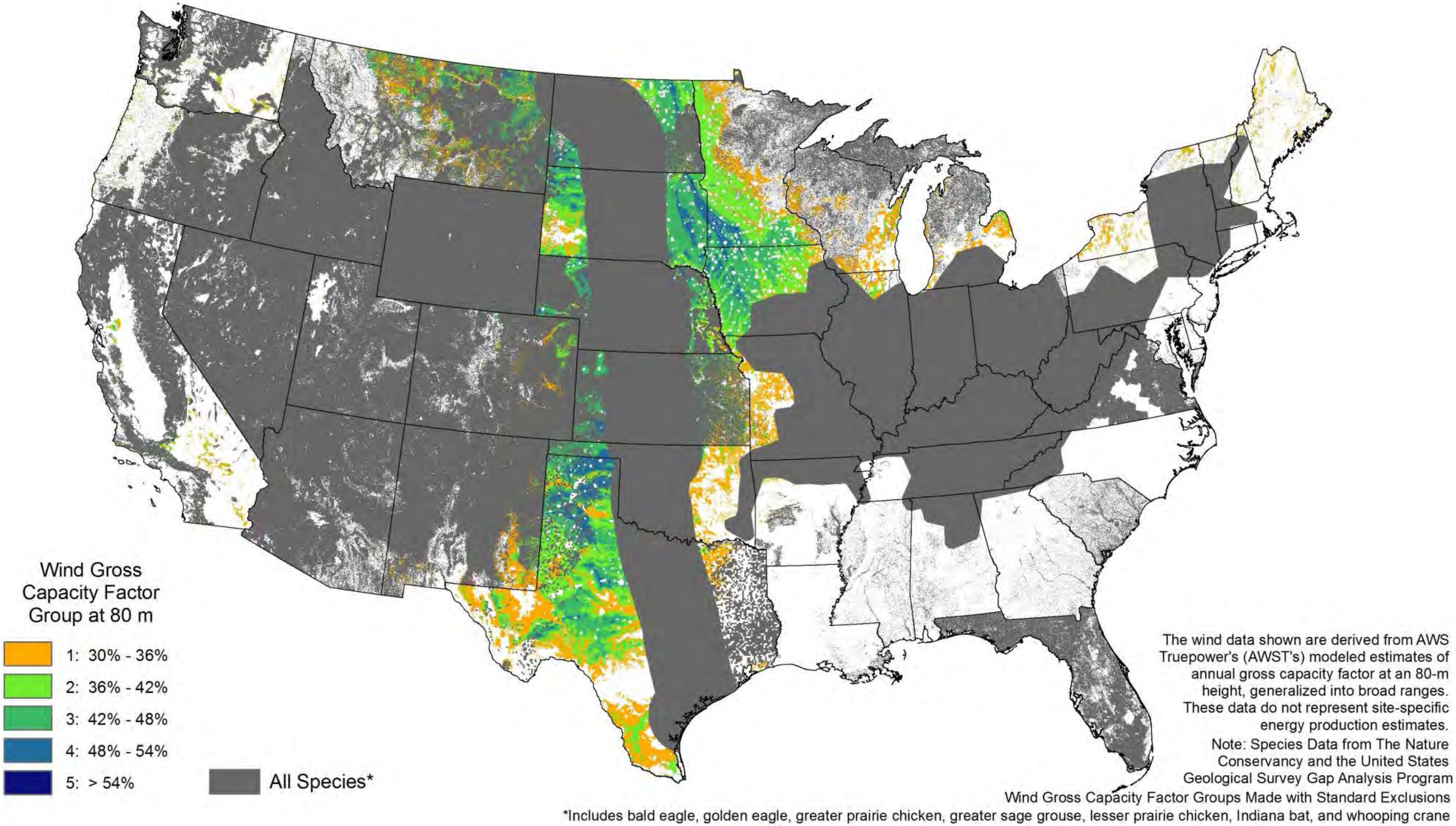

**Whooping crane habitat and migratory corridor: areas requiring additional consideration**

# Key Species Habitat Distribution: Indiana Bat




**Indiana bat habitat distribution: areas requiring additional consideration**

# Key Species Habitat Distribution: Combined




**Combined wildlife impacts: areas requiring additional consideration**

# Outline

- Historical overview and statutory authority
- Challenges to wildlife
- Key species habitat distribution
- Research
- Collaboratives
- Conclusions

# Mitigation Research

**Mitigation research focuses on:**

- Deterrent development
- Correlating wind speed to utilization
- Correlating weather patterns to fatality patterns
- Offsite compensation
- Micrositing
- Turbine size
- Blade visibility
- Seasonal shutdowns
- Habitat manipulation
- Artificial roosts.

Greater Prairie Chicken. *Photo by Mark Herse, Kansas State University, NREL 27970*

# Technology/Model Research

**Technology/modeling research is focused on:**

- Radar validation
- Thermal imaging cameras
- Near-infrared cameras
- Stable isotopes
- Predictive models.

Infrared camera. *Photo by Dennis Schroeder, NREL 20338*

# Testing Detection Systems at the NWTC


**Houdini in flight during FY15. GPS data logger can be seen on his right foot and UHF tracker can be seen on his left.**

**Testing of detection systems using Auburn University's golden and bald eagles**

# Importance of Convening Interdisciplinary Panel of Experts for Prioritizing Research

The National Renewable Energy Laboratory
together with
The Department of Energy's Wind and Water Power Technologies Office
are pleased to invite you to the
**Eagle Detection and Deterrent Technology Research Gaps and Solutions Workshop**

Land-based wind energy deployment is challenged by the lack of accepted solutions for reducing eagle fatalities at wind energy projects. Therefore, there is an expressed need for tools to reduce these fatalities and to facilitate permitting under the Bald and Golden Eagle Protection Act. For this workshop, we will be engaging experts from a wide range of fields to comprehensively assess the current state of technologies, key gaps, promising emerging technology solutions, novel ideas, and research and development needs.

*Please join us…*
**The National Renewable Energy Laboratory**
Research Support Facility
15013 Denver West Parkway
Golden, Colorado

| | |
|---|---|
| Tuesday December 8th, 2015 | Full day |
| Wednesday December 9th, 2015 | Half day |

CONTACTS

| | |
|---|---|
| Bethany Straw<br>bethany.straw@nrel.gov | 303.275.4557 |
| Karin Sinclair<br>karin.sinclair@nrel.gov | 303.384.6946 |
| Elise DeGeorge<br>elise.degeorge@nrel.gov | 303.384.7136 |

RSVP *required*.
Please provide a response **no later than September 21, 2015** to bethany.straw@nrel.gov.

NREL | NATIONAL WIND TECHNOLOGY CENTER

- Bringing people of different focus areas/expertise to the table to understand and prioritize solutions
- Outcome as it relates to wind energy and eagle impacts: need to understand fundamental behavior and physiology of species of concern

# Recommendations from Physiology and Behavior Specialists

- Understand: population and habitat associations, threats, annual cycle, demography, flight behavior, diet, etc..
- Risk is when turbines intersect with a species basic needs (e.g. with eagles it is food, updraft and nesting sites)

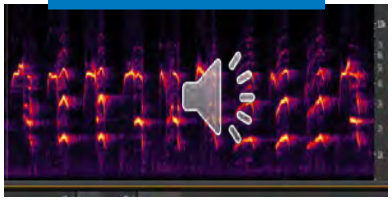
Photo provided by T. Katzner

**For auditory deterrent research, one expert recommends the following:**

- Measure the auditory system of these birds
- Use this information to build a library of sounds that might be stressful (annoying)
- Use heart monitors to give us an index of stress (estimated by an increase in heart rate)
- Give a variety of different sounds to estimate stress induced by the sounds

  Test birds over different time intervals (hours to weeks) to estimate the rate of adaptation to these sounds

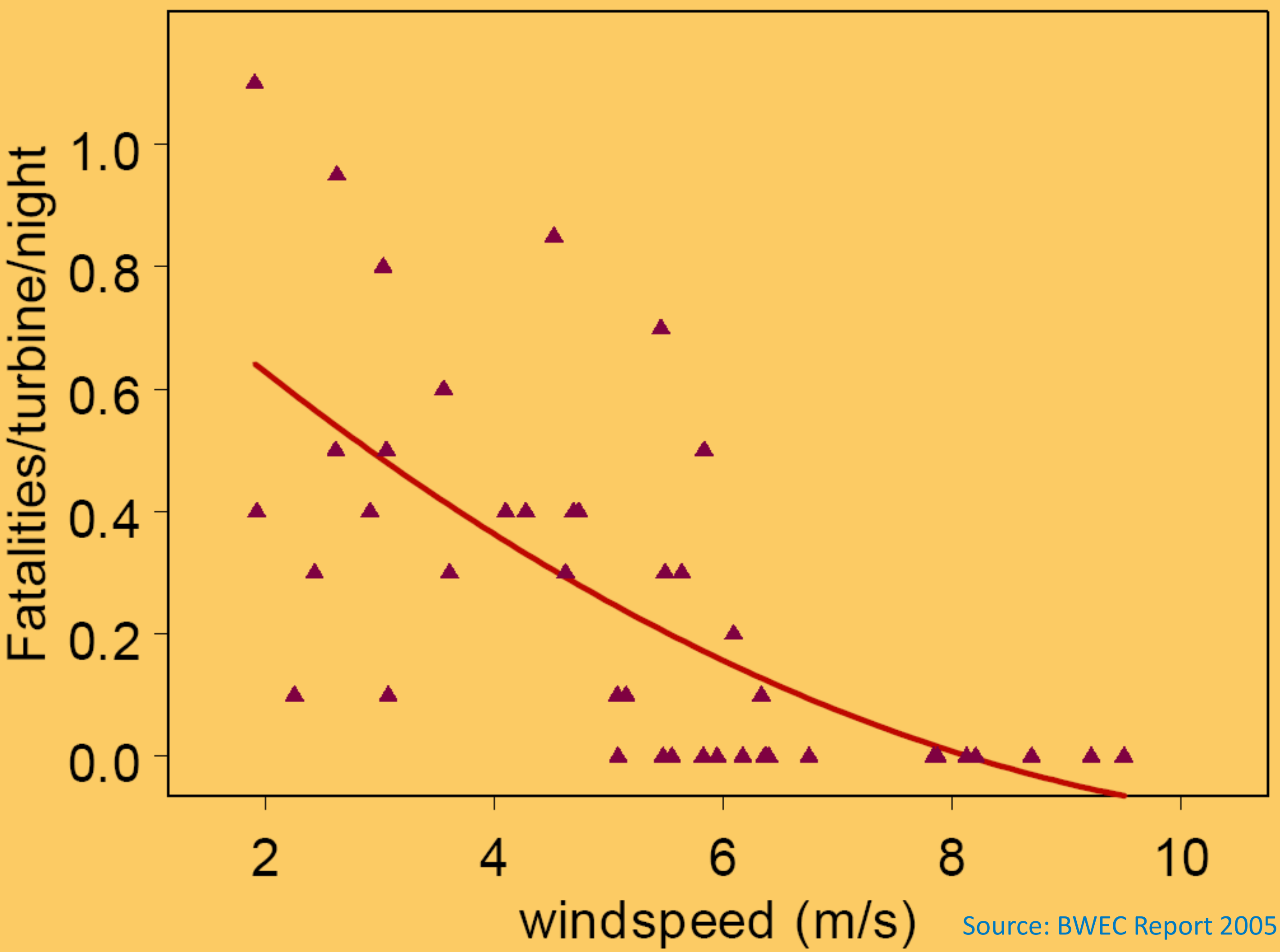
**Golden eagle copulation call**



**Properties of the Vocal System Provide Clues about Properties of the Auditory System**

Source: As presented by Jeff Lucas, Purdue University at Eagle Detection and Deterrent Technology Research Gaps and Solutions Workshop, December 2015

# BWEC Study Results




Source: BWEC Report 2005

# Research Conducted from Settlement Agreements

## *Duke Energy at Top of the World Windfarm in Casper, Wyoming*

- Onsite wildlife specialists during daylight hours
- Working with FWS on an eagle trapping and tracking project
- GPS help to understand eagle migration movements
- Advancing IdentiFlight camera system
- Opportunities for R&D when faced with unsupported requirements

**An aerial view of Duke's Top of the World wind farm, located in Casper, Wyo.**
Photo courtesy of Duke Energy Renewables

Source: http://nawindpower.com/online/issues/NAW1604/FEAT_01_Duke-s-Avian-Mitigation-Techniques-Take-Flight-What-s-Working-And-Why.html

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# Outline

- Historical overview and statutory authority
- Challenges to wildlife
- Key species habitat distribution
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- Collaboratives
- Conclusions

# Collaboratives are Often Beneficial for Advancing the Knowledge Base

Benefits of collaboratives include:

- Access to third party, unbiased research
- Accepted experts within collaborative
- Agreement on study design
- The ability to develop relationships (trust)
- A safe forum for discussion
- The ability to engage early and often
- Transparency/credibility
- Leveraging of funds
- Project access
- Access to interim results
- Accepted results
- A model for future interactions.

705-MW project in Tehachapi Pass Wind Resource Area, California.

*Photo by David Hicks, NREL 18455*

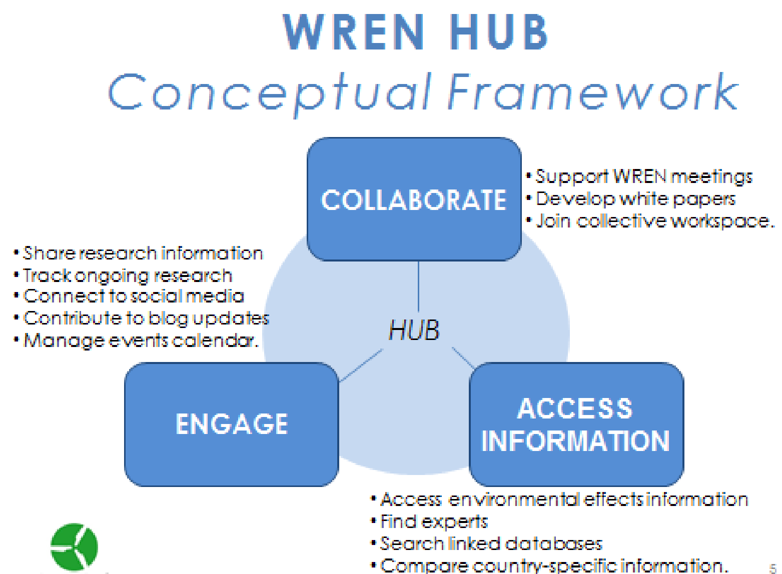
# Current collaboratives

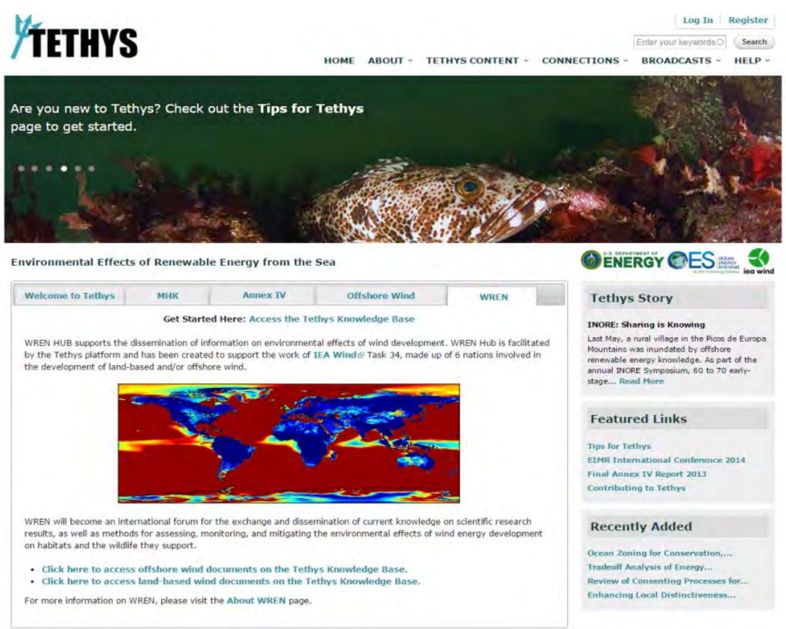
## Current collaboratives include:

- The National Wind Coordinating Collaborative (NWCC). Includes federal, state, utilities, nongovernmental organizations (NGOs), and wind industry
  - Grassland Shrub Steppe Species Collaborative. Includes federal, state, NGOs, and wind industry
  - Sage Grouse Collaborative. Includes federal, state, NGOs, and wind industry
- Bats and Wind Energy Cooperative (BWEC). Includes federal, state, NGOs, and wind industry
- American Wind Wildlife Institute (AWWI). Includes industry and NGOs
- International Energy Agency Wind Task 34. Includes nine member countries.

# More on International Energy Agency Wind Task 34

- Working Together to Resolve Environmental Effects of Wind Energy, known as **WREN**
- October 2012–2016; extension under discussion
- Current member countries: Ireland, Netherlands, Norway, Spain, Switzerland, United Kingdom, United States, France, and Sweden.




**Primary products**:

- WREN Hub/Tethys (http://tethys.pnnl.gov/)
- White papers: Adaptive management, individual impacts to population effects, green versus green, cumulative impacts, transboundary issues
- Webinars: on land/offshore, birds/bats/marine mammals, tools http://tethys.pnnl.gov/environmental-webinars?content=wind

# Outline

- Historical overview and statutory authority
- Challenges to wildlife
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- Conclusions

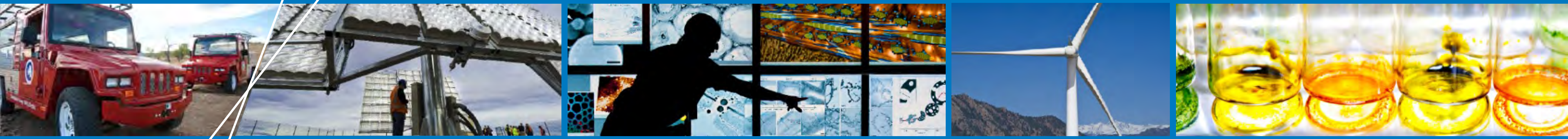
# Conclusions

- Wind-wildlife impact concerns are complicated
- Micrositing is key to avoiding, minimizing, and mitigating impacts;  some locations may just not be appropriate for wind development
- Research and development of tools is ongoing and benefits from interdisciplinary approaches
- Collaboratives provide opportunities to leverage resources to find solutions for common challenges.

Grand Ridge Wind Energy Center.  GE 1.5-MW turbines in Lasalle County, Illinois. *Photo by Invenergy, LLC, NREL 16040.*

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

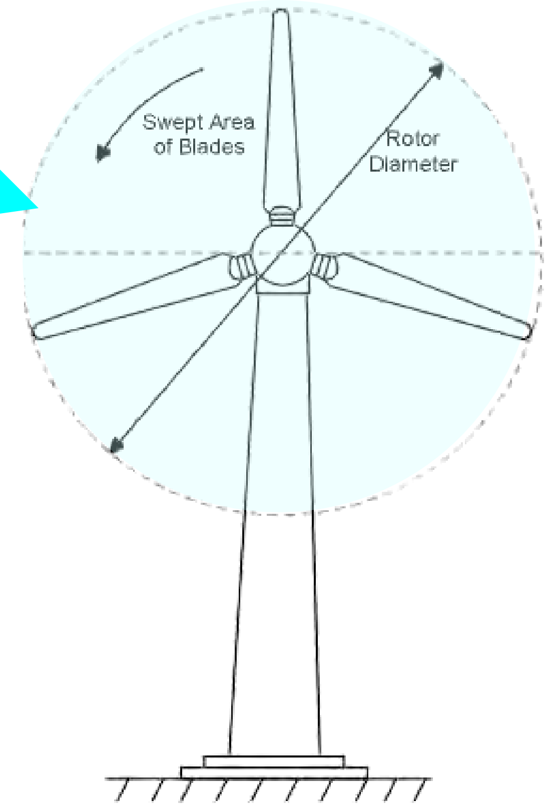
# QUESTIONS?



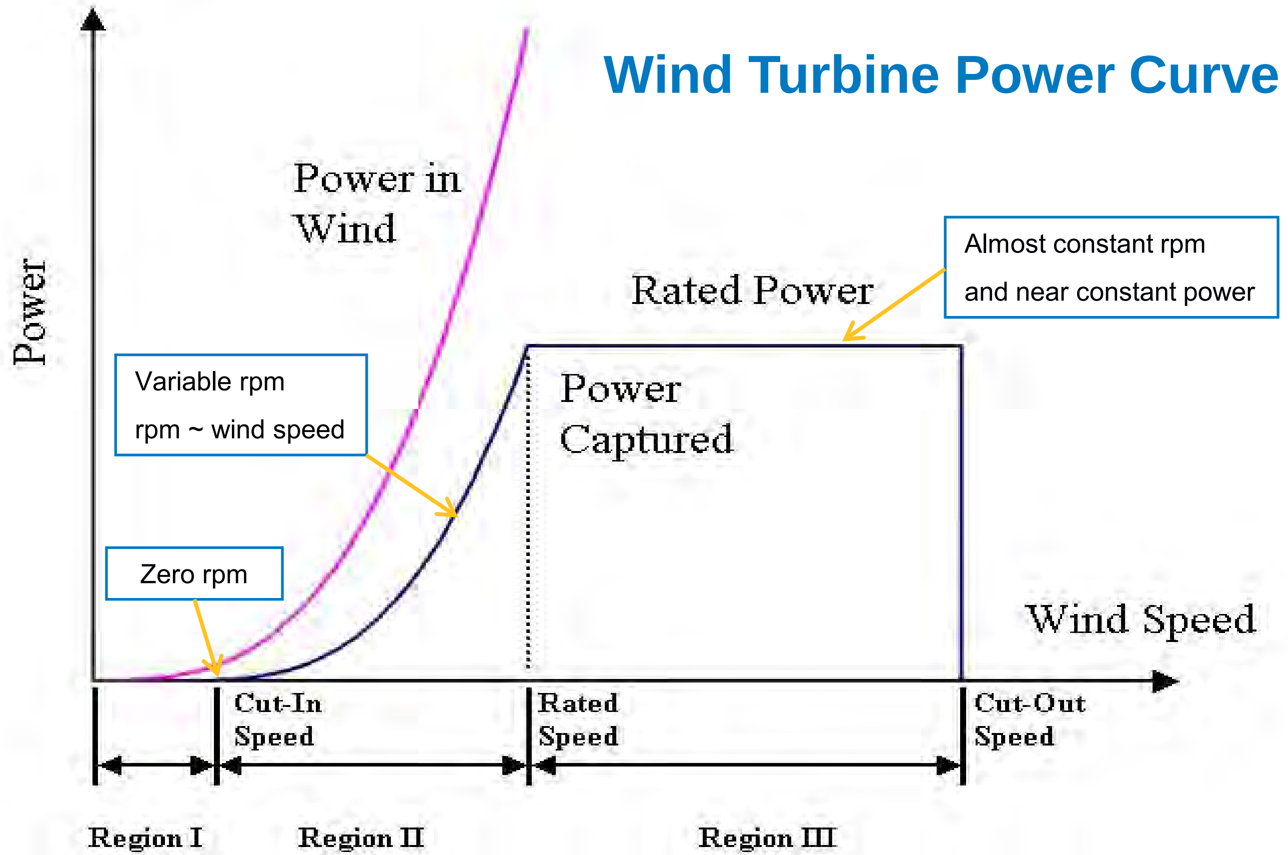
# Turbine Power Basics

**Power in the Wind = $\frac{1}{2}\rho A V^3$**

A - Area of the circle swept by the rotor
$\rho$ = Air density
V = Wind Velocity




## Wind Turbine Power Curve



# NWCC

Formed in 1994, founding members included NREL and DOE, the American Wind Energy Association, National Audubon Society, Electric Power Research Institute, and Union of Concerned Scientists. Membership currently exceeds 1,500 people.

Major features of the NWCC include:

- Multistakeholder
- Facilitated; ground rules for engagement
- Coordinated field research
- Information dissemination (e.g., website; coordination of report preparation and publication; presentations at meetings)
- Biennial Research Meeting (X in December 2014)

Recent research activities were initiated under the Grassland Shrub Steppe Species Collaborative, and include:

- Grassland Community Collaborative (Prairie-Chicken research)
- Sage Grouse Collaborative (Sage Grouse research)

http://www.nationalwind.org/

# BWEC

Formed in 2004, founding members included the American Wind Energy Association, Bat Conservation International, USFWS, and NREL, with DOE and the U.S. Geological Survey later. Major features of the BWEC include:

- Objective, science-based
- International expertise tapped
- Organizational structure includes an oversight committee, technical committee, and science committee
- Coordination of field research (e.g., operational curtailment, acoustic deterrent, other)
- Information dissemination (e.g., website; coordination of report preparation and publication; presentations at meetings)
- Frequent science meeting.

http://www.batsandwind.org/

Source: Arnett, et al. 2008. Effectiveness of Changing Wind Turbine Cut-in Speed to Reduce Bat Fatalities at Wind Facilities

# AWWI

Formed in 2008, board members consist of 50% industry and 50% NGOs.

Primary activities include:

- Research
- Data repository

Wind-Wildlife Research Information System

- Landscape tools

Landscape Assessment Tool

- Mitigation strategies for eagle take

Through the use of expert elicitation, AWWI has facilitated the development of two models to predict numerical effects of compensatory mitigation on golden eagle survival and reproduction through: lead abatement and vehicle collision reduction strategies.

- Education

http://www.awwi.org/

Golden Eagle with a transmitter on its back.
*Photo by Randy Flament, NREL 23585*

# Candidate Avian Risk Metrics

**Hypothesis: "Mortality risk increases with flight time in the rotor zone (yellow zone), if the turbine is operating"**

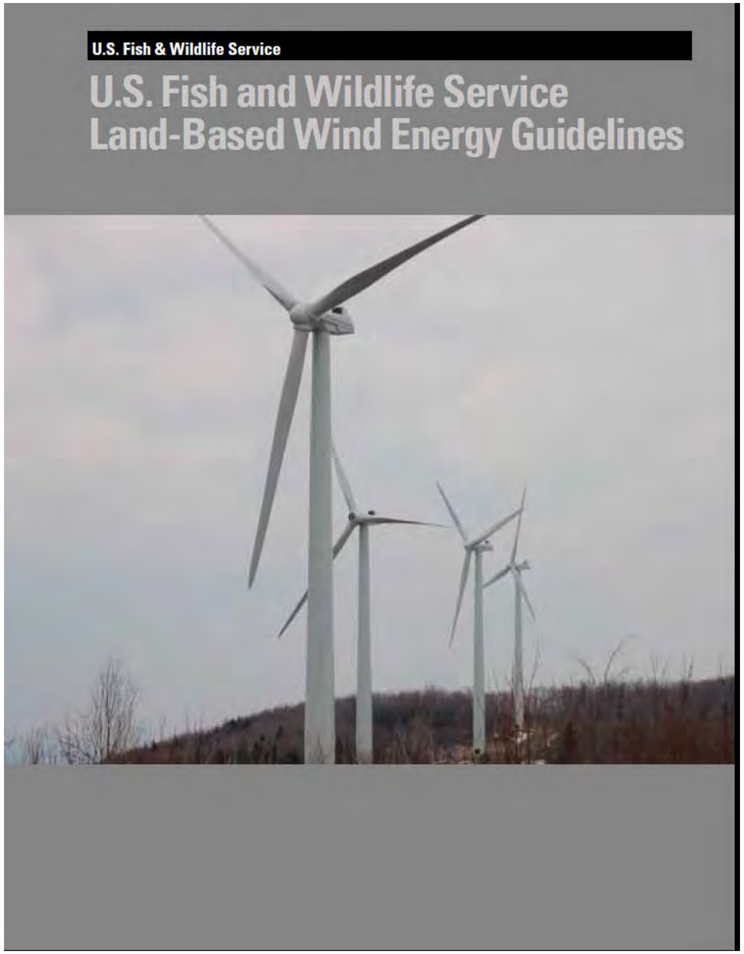
**A Candidate Preconstruction Relative Risk Metric:**

Species Relative Risk = (Flight Hours in Rotor Zone with Wind in Operating Range)/(Plant Swept Area x Hours with Wind in Operating Range)

**A Candidate Postconstruction Fatality Metric:**

Species Risk = Fatalities/(Swept Area x Turbine Operation Hours)

# The USFWS Land-based Wind Energy Guidelines




Released March 2012

**Provide a Tiered Approach, including:**

- Tier 1 – Preliminary site evaluation (landscape-scale screening of possible project sites)
- Tier 2 – Site characterization (broad characterization of one or more potential project sites)
- Tier 3 – Field studies to document site wildlife and habitat and predict project impacts
- Tier 4 – Postconstruction studies to estimate impacts
- Tier 5 – Other postconstruction studies and research.

# USFWS Guidelines: Developer and Service Roles

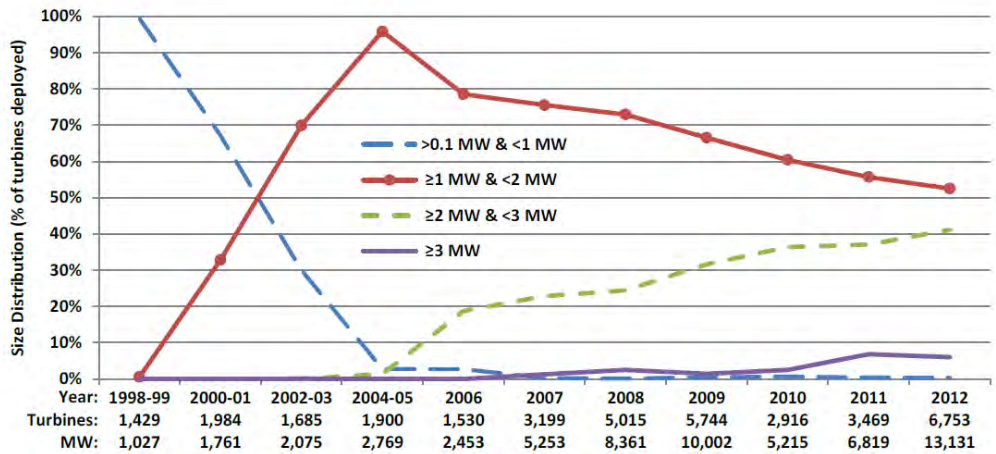
| *TIER* | *Project Developer/Operator Role* | *Service Role* |
|---|---|---|
| Tier 1: Preliminary site evaluation | • Landscape level assessment of habitat for species of concern<br>• Request data sources for existing information and literature | • Provide lists of data sources and references, if requested |
| Tier 2: Site characterization | • Assess potential presence of species of concern, including species of habitat fragmentation concern, likely to be on site<br>• Assess potential presence of plant communities present on site that may provide habitat for species of concern<br>• Assess potential presence of critical congregation areas for species of concern<br>• One or more reconnaissance level site visit by biologist<br>• Communicate results of site visits and other assessments with the Service<br>• Provide general information about the size and location of the project to the Service | • Provide species lists, for species of concern, including species of habitat fragmentation concern, for general area, if available<br>• Provide information regarding plant communities of concern, if available<br>• Respond to information provided about findings of biologist from site visit<br>• Identify initial concerns about site(s) based on available information<br>• Inform lead federal agencies of communications with wind project developers |
| Tier 3: Field studies and impact prediction | • Discuss extent and design of field studies to conduct with the Service<br>• Conduct biological studies<br>• Communicate results of all studies to Service field office in a timely manner<br>• Evaluate risk to species of concern from project construction and operation<br>• Identify ways to mitigate potential direct and indirect impacts of building and operating the project | • Respond to requests to discuss field studies<br>• Advise project proponent about studies to conduct and methods for conducting them<br>• Communicate with project proponent(s) about results of field studies and risk assessments<br>• Communicate with project proponents(s) ways to mitigate potential impacts of building and operating the project<br>• Inform lead federal agencies of communications with wind project developers |
| Tier 4: Post construction studies to estimate impacts | • Discuss extent and design of post-construction studies to conduct with the Service<br>• Conduct post-construction studies to assess fatalities and habitat-related impacts<br>• Communicate results of all studies to Service field office in a timely manner<br>• If necessary, discuss potential mitigation strategies with Service<br>• Maintain appropriate records of data collected from studies | • Advise project operator on study design, including duration of studies to collect adequate information<br>• Communicate with project operator about results of studies<br>• Advise project operator of potential mitigation strategies, when appropriate |

# USFWS Eagle Conservation Plan Guidance (April 2013)

- To facilitate issuance of programmatic eagle take permits for wind energy facilities the USFWS finalized the Eagle Conservation Plan Guidance- Module 1- Land-based Wind Energy Version 2
- This Guidance provides a framework for developing and evaluating Advanced Conservation Practices, which is the framework for detect and deter technologies

Photo by T. Katzner

# Power and Size of Turbines Over Time

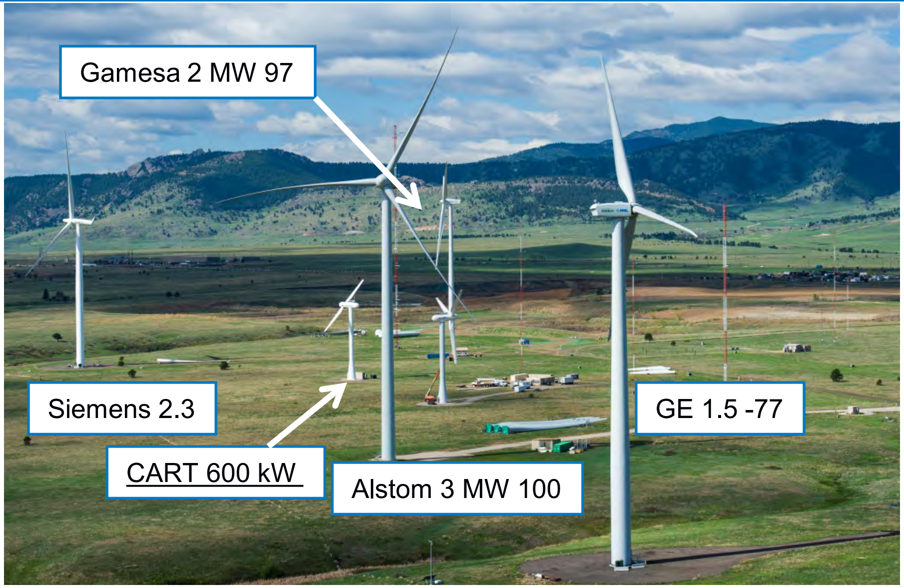



*Source: AWEA project database*

**Figure 16. Size Distribution of Number of Turbines (>100 kW) Deployed in Each Period**

Source: 2012 Wind Technologies Market Report

# Representative Wind Turbine Specifications




National Wind Technology Center – NREL Pic 25898


Danish National Wind Test Center – Photo by R. Thresher

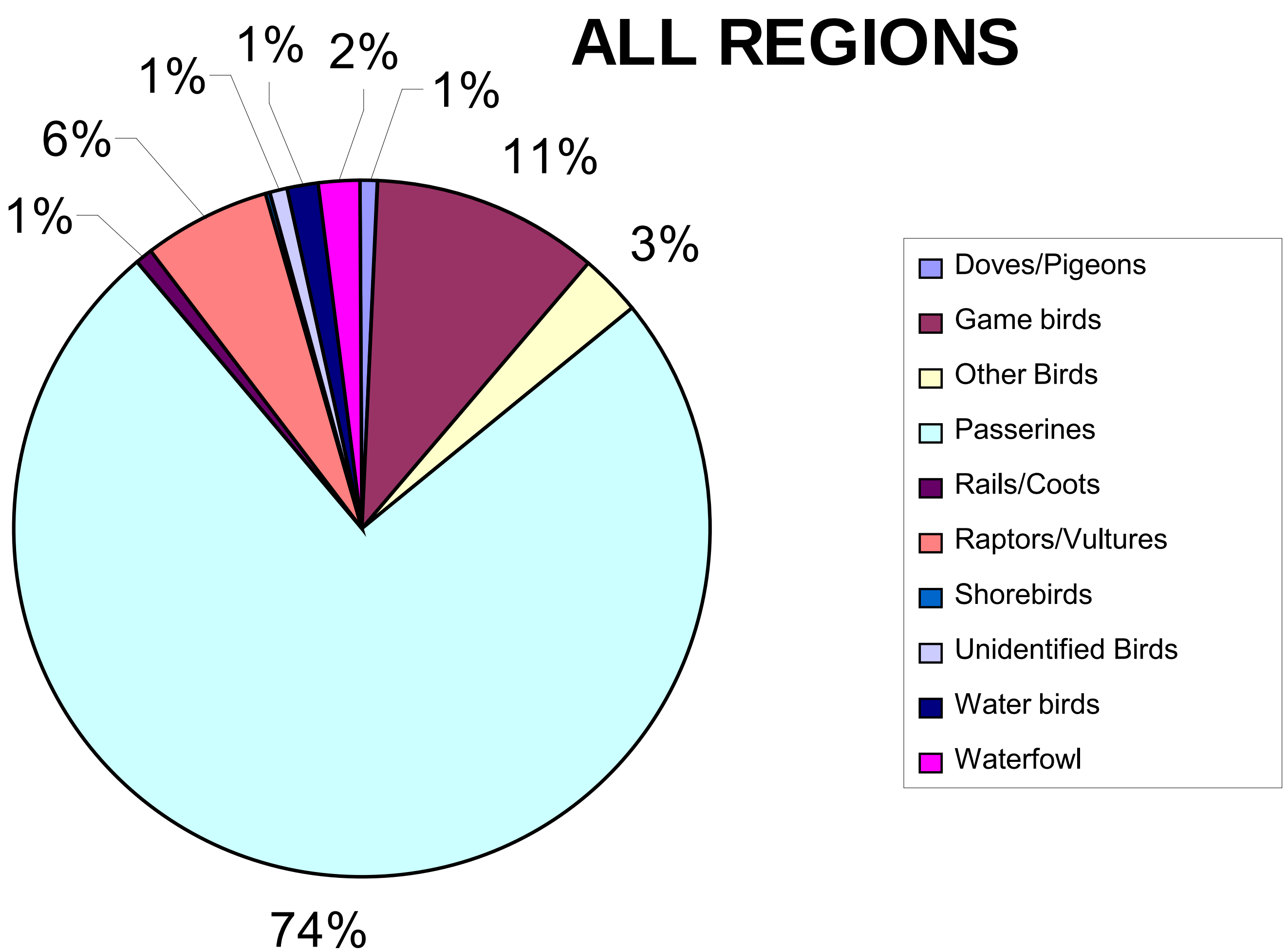
| Turbine | Power - MW | Rotor Size - m | Rotor Area – $m^2$ | Rotor Speed - rpm | Tower Height - m | Cut-in Wind Speed m/s |
|---|---|---|---|---|---|---|
| GE 1.5 se | 1.5 | 70.5 | 3904 | 12-22.4 | 54.7 – 64.7 | 4 |
| GE 1.5 sl | 1.5 | 77 | 4657 | 11-20.4 | 61.4 - 100 | 3.5 |
| GE 1.5 sle | 1.5 | 77 | 4657 | 11-20.4 | 61.4 - 100 | 3.5 |
| GE 1.5 xle | 1.5 | 82.5 | 5346 | 10.1-18.7 | 58.7 - 100 | 3.5 |
| GE 1.6 or 1.7 | 1.6 – 1.7 | 100 | 7854 | ? | 80 -96 | ? |
| GE 2.5 -100 | 2.5 | 103 | 8333 | ? | 75-100 | 3 |
| GE 3.2 -103 | 3.2 | 103 | 8333 | ? | 70-98 | ? |
| Siemens SWT 2.3 | 2.3 | 100 | 7854 | 6-16 | 80 or Site specific | 3-4 |
| Siemens Offshore SWT – 6.0 – 154 | 6 | 154 | 18,600 | 5-11 | Site Specific | 3-5 |

# U.S. Department of Energy Wind Program's Mission

- Reduce challenges to project development to accelerate deployment of appropriate wind energy
- Support achievement of 20% wind energy by 2030
- Accelerate wind energy capacity growth/ development of domestic energy options (Energy Policy Act of 2005).


Northwind 100, 100-kW wind turbine; Hempstead, New York.
*Photo by Town of Hempstead, NREL 28963*

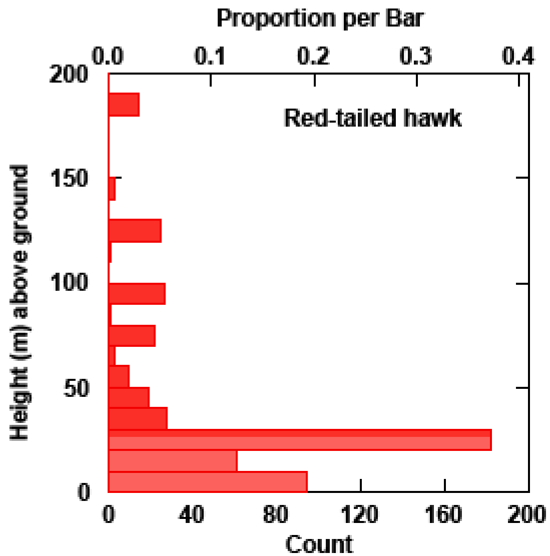
# Research: Species Composition of Bird Fatalities




Proportion of fatalities at sites reporting fatalities by species, for all regions where studies have been conducted (the Pacific Northwest, Midwest, Rocky Mountains, and East).
Source: Strickland and Morrison, February 26, 2008.
http://www.fws.gov/habitatconservation/windpower/Past_Meeting_Presentations/Morrison_Strickland.pdf

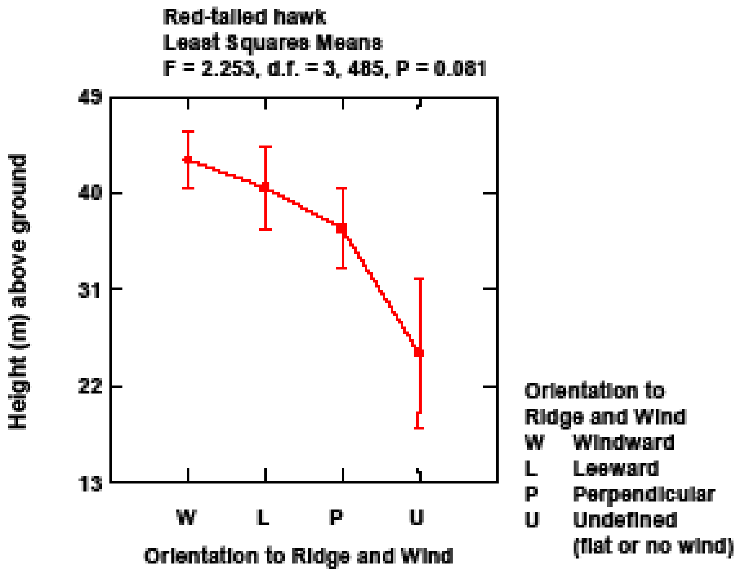
# Red-Tailed Hawk Flight Observations in Altamont Pass

## Height Histogram




Distribution of flight heights above ground level amount red-tailed hawks observed during behavioral observation sessions during 2003 and 2004 in the Altamont Pass Wind Resource Area.

## Height versus Orientation




Mean flight heights of red-tailed hawk over aspect of ridge relative to oncoming winds.

Source: K. Smallwood and L. Neher, CEC-500-2005-005, December 2004

# Highlights of One Interaction Study in Altamont Pass

## Raptor Fatalities and Sightings

| | Fatalities | Sightings | Rel. Risk F/S |
|---|---|---|---|
| Burrowing Owl | 38 | 56 | 0.68 |
| American Kestrel | 22 | 429 | 0.05 |
| Red-Tailed Hawk | 100 | 1,780 | 0.06 |
| Golden Eagle | 10 | 401 | 0.02 |
| Northern Harrier | 2 | 114 | 0.02 |
| Prairie Falcon | 1 | 63 | 0.02 |
| Turkey Vulture | 0 | 756 | 0 |
| Common Raven | 0 | 792 | 0 |

**From: *Bird Risk Behaviors and Fatalities at the Altamont Pass WRA*, Carl G. Thelander, et al**

# Sage Grouse Research

These are preliminary results and are not for distribution or citation.

**Annual Report**

**A Study of the Impacts of a Wind Energy Development on Female Greater Sage-Grouse in Southeastern Wyoming**

January 27, 2014

**Presented to:**
National Wind Coordinating Collaborative Sage-Grouse Research Collaborative Oversight Committee

***Internal Document – Not for Distribution***

**Ecology of Male Greater Sage-Grouse in Relation to Wind Energy in Wyoming**

Research Team: Power Company of Wyoming and University of Missouri

Sage Grouse. *NREL 20649*

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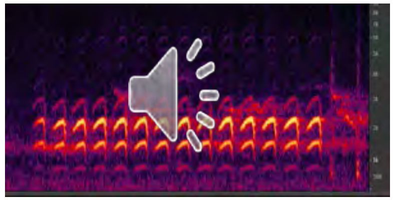
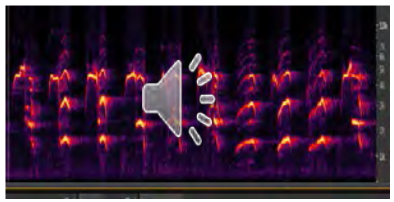
# Properties of the Vocal System Provide Clues about Properties of the Auditory System

White-breasted nuthatch



Golden eagle copulation call



Golden eagle skonk call

Bald eagle chatter call


## Examples of amplitude modulation and frequency spectrums

Source: As presented by Jeff Lucas, Purdue University at Eagle Detection and Deterrent Technology Research Gaps and Solutions Workshop, December 2015

# Breakout Session 1 (Day 1)

Stakeholder Concerns, Additional Relevant Data Sources, and Additional Research underway

# Breakout Group 1

# Other things CWG should undertake?

- Greater stakeholder involvement
  - CWG & ASWG
  - FACA?
  - Use industry as a resource
  - Review of the Science Plan
- Outline next steps beyond the Science Plan
  - Implementation

# New Information

- New solar project in Pahrump, NV
  - Panel spacing may diffuse the lake effect
- Widen the scope beyond AZ, CA, and NV
- USGS-FWS OFR on standardized monitoring

# Group 2 (Day 2)

# What other tasks should the CWG Undertake (1 of 2)

- Focusing on the science is the correct approach.  Monitoring should be informed by research.  Don't monitor for sake of monitoring.  Interrelationship between monitoring and research.
- Consider costs when determining monitoring requirements (Danielle, Jeremiah)
- Monitoring should be designed to answer specific questions.
- Monitoring Guidelines due out in June.  Will be publically available.  Different from the CWG Science Plan.
- Monitoring procedures are a research question.
- Determine level of overall mortality
- Look at causation.
- Get data to focus the research
- Science plan should have priorities as a product
- What is the low hanging fruit?
- Leverage information and existing data

# What other tasks should the CWG Undertake (1 of 2)

- Site specific monitoring vs understanding where projects should go
- What are we siting for? Any specific species? (Songbirds, migratory birds, etc.) E.g. wind now focuses on bats and raptors.
- Good model is San Juaquin Valley Least Conflict Plan (goes beyond science)
- What features in the landscape influence avian presence and behavior
- Keep in mind Technology specific effects
- Keep visibility on ongoing research efforts, common database? AWWI web site has extensive list of studies. When should studies be released?
- General research studies vs project data. CEC posts project data after review.
- Lots of folks want data/information, but many studies are still underway
- CWG and ASWG access to raw data? What questions can be answered?

# Any ongoing or planned research or data collection efforts that are relevant to developing the science plan

- ASWG Research Panel looking at rough methodologies to answer ASWG questions
- ASWG Research Panel asked to sequence the research

# Breakout Group 3

Stakeholder Concerns, Additional Relevant Data Sources, and Additional Research underway

# Group 3

- Dan Boff, DOE
- Kirk LaGory
- Amy Fesnock,
- Bill Werner
- Katie Umekubo
- Chuck Griffin
- Juliette Falkner
- Karyn Coppinger
- Brian Boroski, H.T. Harvey
- Matt Hutchinson

# Other things CWG should undertake?

- Need to specify focus on causation of mortality
- Look at sublethal effects (e.g., decreased reproduction, carrying capacity, etc.)
- Scope should go beyond regulatory requirements

# Data and models

- Use of existing monitoring data: What does it tell us? What would we do differently?
- Making data available to the public. Data quality issues.
- Need to develop a toolkit

# Relevant studies

- Genetic studies to examine population of origin
- Golden eagle research related to populations
- Look at rare and common species to provide bookends
- Condor Issue (vol 118): several papers population concerns related to renewable energy issues
- Draft article submitted to JWM, modeling estimates related to searcher efficiencies for rare species
- Draft paper looking at direct and indirect effects for solar, wind, and transmission

# Conceptual Understanding of Avian-Solar Interactions

*Lee Walston*

*Argonne National Laboratory*

*May 10-11, 2016*

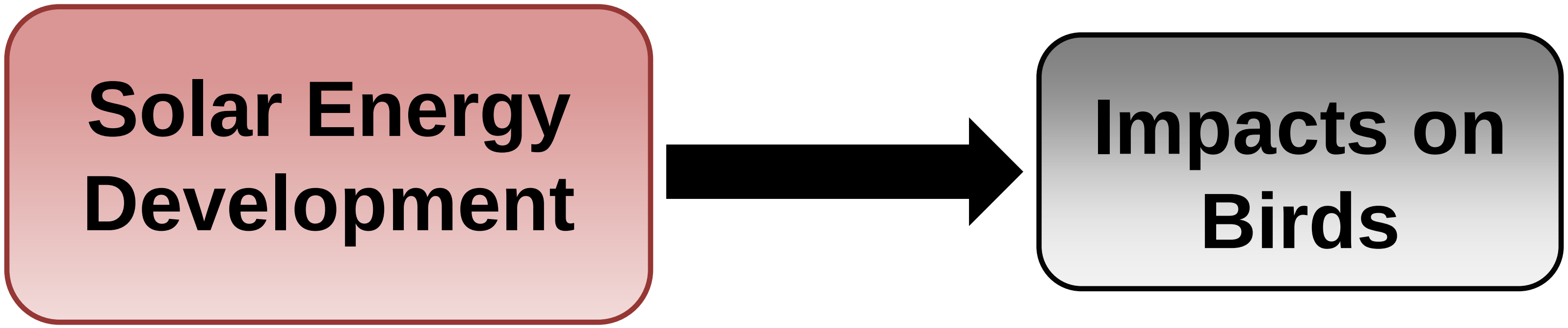
*Sacramento, California*

# Why Develop a Conceptual Model?

- Illustrate important processes
  - Direct & indirect effects
  - Interactions and cumulative effects
- Synthesize current understanding of avian-solar interactions
  - Foster a common understanding
- Identify information gaps and research priorities
- Starting point for the avian-solar science plan

# Avian-Solar Conceptual Model

- Simple vs. Complex




- Two main focal points

# Avian-Solar Conceptual Model

- Simple vs. Complex

**Solar Energy Development** → **Impacts on Birds**

- Impacting factors, pathways, and interactions

Technology?

Direct / Indirect Impacts?

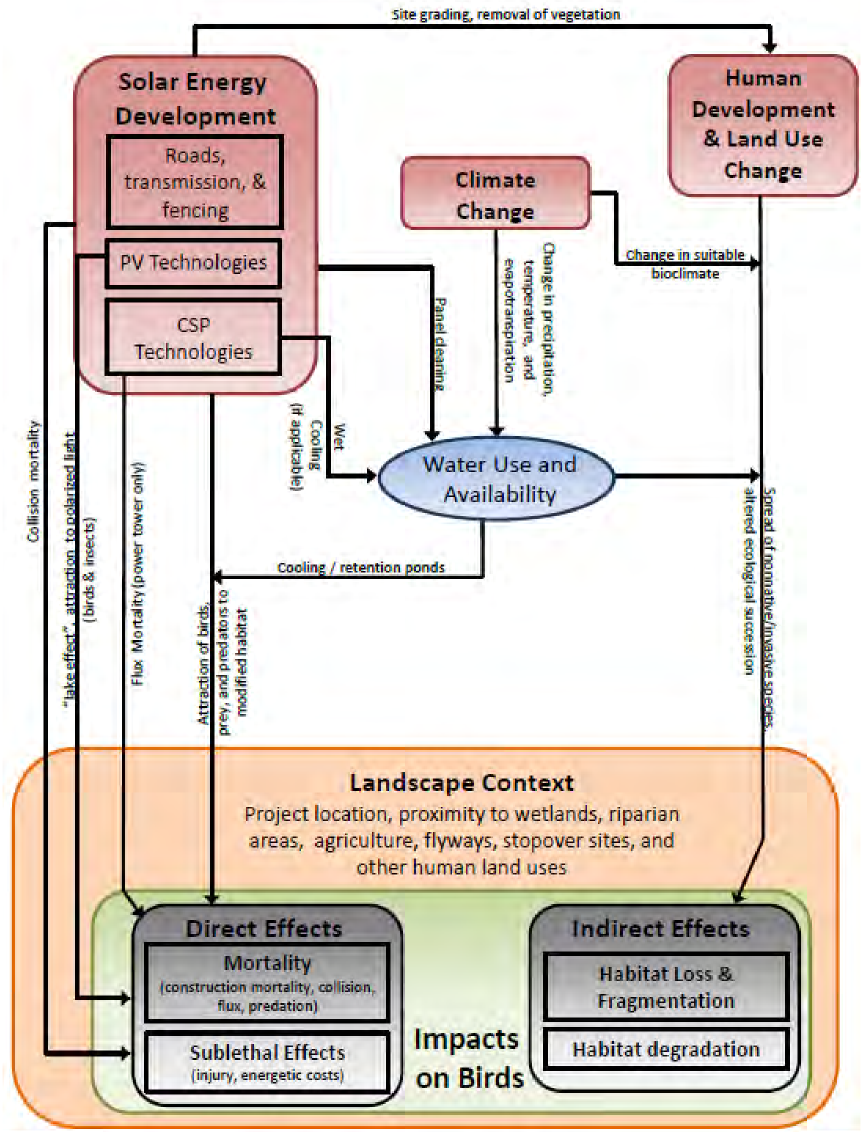
Climate Change?

Attraction?

Landscape Context?

# Avian-Solar Conceptual Model

DRAFT



# Avian-Solar Conceptual Model

**Climate Change**

**Human Development & Land Use Change**

**Solar Energy Development**

- Roads, transmission, & fencing
- PV Technologies
- CSP Technologies

## Indirect Effects

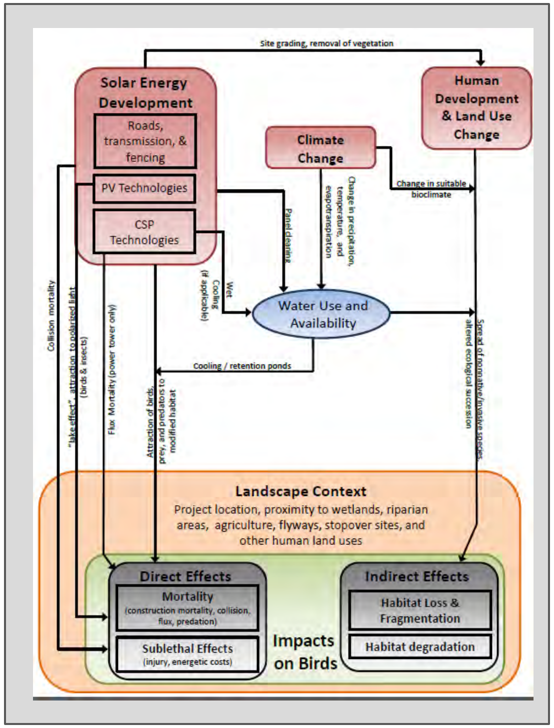
- Habitat loss & fragmentation
- Habitat degradation

Change in suitable climate

Habitat loss

Spread of nonnative / invasive species

Altered ecological succession



# Avian-Solar Conceptual Model

Climate Change

Human Development & Land Use Change

**Solar Energy Development**

- Roads, transmission, & fencing
- PV Technologies
- CSP Technologies

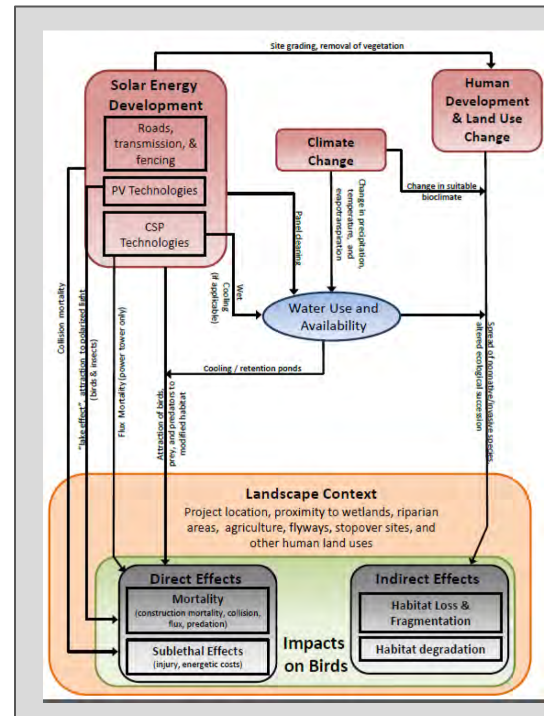
## Direct Effects

- Mortality
- Sublethal Effects

Construction mortality, collision, flux, predation

Attraction of birds, prey, and predators

Technological considerations & project design (e.g., water)



# Avian-Solar Conceptual Model

- Location matters

**Landscape Context**

Project location, proximity to wetlands, riparian areas, agriculture, flyways, stopover sites, and other human land uses

**Direct Effects**

**Mortality**
(construction mortality, collision, flux, predation)

**Sublethal Effects**
(injury, energetic costs)

**Impacts on Birds**

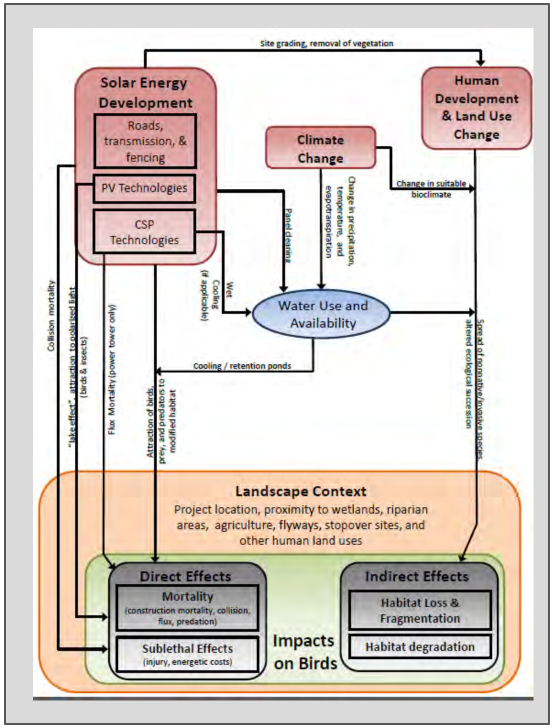
**Indirect Effects**

**Habitat Loss & Fragmentation**

**Habitat degradation**

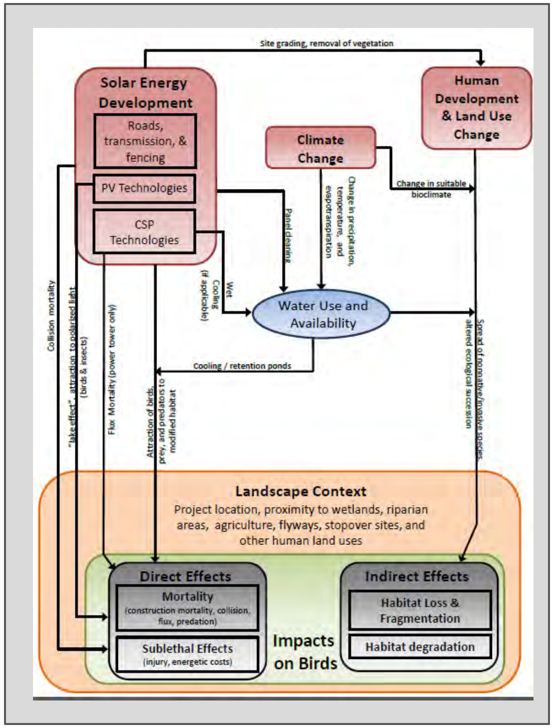
# Avian-Solar Conceptual Model

- Focus on processes and interactions the CWG may be most concerned about
- Supporting text to be provided in the science plan
- The diagram illustrates *potential* impacts that could occur
  - Projects sited on previously disturbed lands may have less impact
  - Projects with minimal water requirements (and no ponds) may have less impact



# Avian-Solar Conceptual Model

- To inform selection and prioritization of the CWG management questions
  - Are any processes more important for agency decision making?
  - What are the information gaps?
  - Which information gaps should be addressed first?
- Future versions of the model may illustrate important information gaps and CWG priorities
  - Color / thickness of the arrows
  - Additional annotation



# Questions?

# Agency Management Questions and Related Research Needs

Tony Jimenez

May 11, 2016

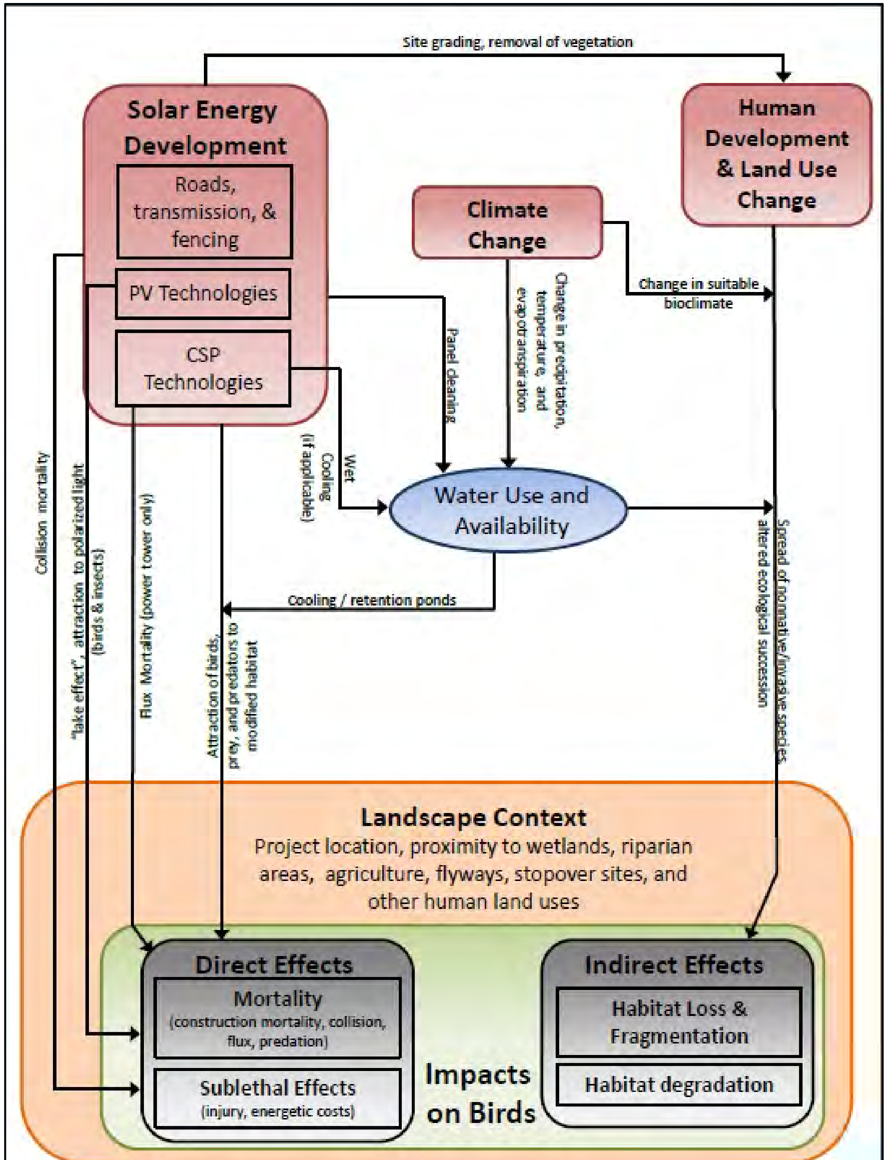
NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy, LLC.

# Outline

- Avian-Solar Interaction Model
- “Management Question” Defined
- Sample Questions
- Management Question Categories
- Generalized Management Questions
- Research Prioritization
- Discussion

Red-tailed hawk eating a rabbit.
*Photo by Dennis Schroeder, NREL 22325*

# Avian Solar Conceptual Framework



# Management Questions Background

- Define what information the agencies need
- Define research needs
- Tied to the conceptual model
- Due to differing missions, different agencies may have different questions
- Received 108 questions
- Questions grouped into seven (7) categories
- Questions consolidated into 14 “generalized questions”

# Sampling of Management Questions

- What are the most scientifically rigorous and cost-effective population monitoring tools available for: 1) quickly identifying potential impacts to populations, and 2) determining effectiveness of mitigation strategies at local and regional scales?
- Is higher mortality realized during any particular time of year?
- Are birds being attracted to the site to forage on insects killed by the concentrated solar flux?

# Management Questions Categories

1. Landscape Considerations
2. Methods to Evaluate Avian Risk and Impacts
3. Sources of Mortality and Injury
4. Avian Behavior (Attraction/Avoidance)
5. Impacts to Habitat and Other Wildlife That Might Affect Birds
6. Taxonomic and Guild-Specific Impacts
7. Minimization, Mitigation, and Adaptive Management

# Generalized Management Questions

| | |
|---|---|
| 1. Landscape Considerations | What are the larger-scale avian movement patterns in the region (including seasonal movements and factors that influence avian movements such as the presence of stopover sites in the landscape)?<br><br>What are the landscape-level cumulative impacts on regional bird populations or on bird populations migrating through landscapes targeted for solar development?<br><br>What is the anticipated solar energy build-out for the foreseeable future? (e.g., project size, location, technology type) |
| 2. Methods to Evaluate Avian Risk and Impacts | What are the best methods for monitoring and evaluating avian mortality, specific to each type of solar energy technology?<br><br>What are the best methods for identifying the bird species that would be most vulnerable during all phases of solar development (pre-construction, construction, and post-construction)? |
| 3. Sources of Mortality and Injury | What are the sources of avian mortality and injury at solar facilities (i.e., project features), and what factors (e.g., location, habitat characteristics, time of year, species) affect frequency of those mortalities and injuries? |

# Generalized Management Questions

| | |
|---|---|
| 4. Avian Behavior (Attraction / Avoidance) | How do solar facilities affect landscape level movements of birds (i.e., migration and dispersal movements), and what factors (e.g., location, habitat characteristics, time of year, species) affect these movements?<br><br>How do solar facilities affect local-scale movements/behaviors of birds (i.e., foraging and breeding behaviors), and what factors affect these behaviors? |
| 5. Impacts to Habitat and Other Wildlife That Might Affect Birds | What are the impacts of solar development to other wildlife (such as predators or prey) and habitat that might affect birds? |

# Generalized Management Questions

| | |
|---|---|
| 6. Taxonomic and Guild-Specific Impacts | How do solar developments affect different bird taxa or guilds?<br><br>What are the population effects from solar developments to individual bird species, particularly those of conservation concern?<br><br>Which population or species-specific impacts are of greatest conservation concern? |
| 7. Minimization, Mitigation, and Adaptive Management | What are the most effective minimization and mitigation methods to reduce or eliminate avian mortality? (e.g., project siting, technology engineering and project design to reduce attractiveness of facilities to birds, construction timing, operational parameters, deterrents, or offset)<br><br>What off-site mitigation is most effective for off-setting mortalities for affected populations/species? |

# Research Prioritization

Based upon initial input from CWG members

- **Management:** Questions that are important for informing management decisions (management questions vs. research questions)
- **Timeliness:** Questions that can be answered in 3-5 years
- **Overlap:** Questions shared by multiple agencies

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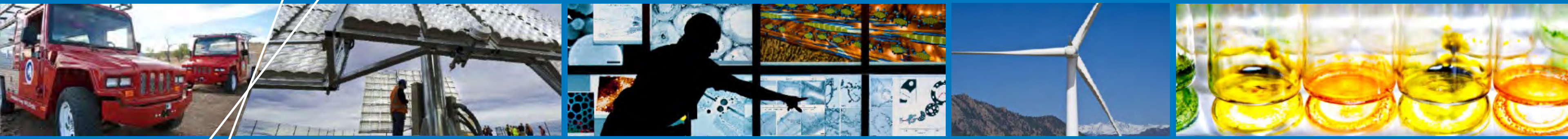
# QUESTIONS / DISCUSSION



# Day 2 Breakout Group Discussions

# Group #1

**Conceptual Framework**

- Add stranding as another form of mortality
- Add dust suppression as water use

## Management Questions (General)

- Research questions cannot be fully addressed through monitoring; require research/study design
- Not all questions can be answered with existing data
- Focus on natural history of taxa most likely to interact with solar facilities (e.g., insectivores).

## #1 Landscape Considerations

- Scope concerns with the amount of foreseeable development question.
- Meta-analysis of existing data could address landscape considerations
  - ebird
  - Breeding bird survey

## #2 Monitoring Methods

- Consider changes to pre-construction baseline surveys for taxa most likely to be affected ("better" baseline monitoring data)
  - Different seasons
  - Species-specific protocols
  - What taxa are most likely to interact with solar facilities?

## #3 Source of Mortality and Injury

- It is possible ("maybe") for existing data and monitoring protocols to help inform sources of mortality and causation.

**#4 Behavior**

- Existing data/studies that could be used to understand avian behavior:
  - Pre-construction radar study for at least one solar project
  - Raptor telemetry data

**#5 Impacts to habitat and other wildlife**

- Could use predictive information on ravens, raptors, and desert tortoise.

**#6 Population-level effects**

- Monitoring data could help address how solar impacts different taxa differently.

**#7 Mitigation**

- Look at deterrents used in other industries (wind, aviation)
- Connect new approaches to systematic monitoring designs

**Climate Change**

- Could also be used to determine species of concern.

**Criteria**

- Budget & duration
- Would the answer to the question affect decisions?

# Group 2 (Day 2)

**Any Important elements missing or misrepresented in the conceptual framework?**

- These were mostly captured in the discussion after Lee’s presentation
- All birds lumped as one. Consider differential impacts to different guilds/species
- Take into account potential benefits and risks? Or relabel “Potential Negative Impacts” which acknowledges that there may be potential benefits.

**Can any of the management questions be addressed with existing information/data? What questions would require additional field work?**

- Do we have a good understanding of current monitoring protocols? Protocols evolve based on past experience.
- Look at monitoring approaches for uniformity.
- What are the sources of mortality? (Partial).
- How do impacts of development affect different guilds/taxonomies (Partial)
- Most of the questions will need research.
- Some/many effects appear to be location specific. Depend upon landscape and terrain features.
- Use existing data to develop hypothesis and inform the next iteration of research

**Additional critical research needs that weren’t identified**

- Preconstruction monitoring (as research) to establish baseline mortality for areas that will see lots of development.
- How do we gather baseline mortality data? How funded?
- What before/after data already exists?
- Effect of emerging/future/sunsetting technologies?  E.g. types of panels, antireflective coatings. tracking/fixed tilt.

**What criteria should be considered by the agencies in establishing priorities for future research? Can you rank in terms of importance for guiding future research (e.g. allocation of funds)?**

- Prioritize questions that can be answered sooner?
- Cost/difficulty
- Avoid duplication
- Foundationality
- Fills an important gap
- Should different agencies focus on different questions?
- What are the priorities of the individual agencies?
- Scope and applicability
- Unique to solar
- Solicit public comment on criteria & research needs

**Other**

- No definitive focus yet (as to priorities)
- Need to do background comparisons
- How do we ensure these agreed-upon priorities are carried out by the member agencies (implementation)

# Breakout Session 3

Conceptual Framework, Management Questions, Research Needs and Priorities

# Group 3

- Dan Boff, DOE
- Kirk LaGory
- Amy Fesnock,
- Bill Werner
- Katie Umekubo
- Chuck Griffin
- Juliette Falkner
- Karyn Coppinger
- Brian Borowski, H.T. Harvey
- Matt Hutchinson

# Conceptual Framework

- Suggestions included
  - Place solar impact box within human development to show proper context
  - Solar should show as positive effect on climate change
  - Add season and weather as influencing factors
  - Present as hypothesis driven
  - Include avian behavior as factor
  - Define indirect
  - Factors are not comprehensive list. Add “e.g.,”
  - Water availability and use should be placed within solar box
  - Need to include potential benefits (e.g., use more neutral language regarding change rather than just degradation)

# Management Questions

- Many questions have landscape context but not included in landscape bin
- Data are available on solar development projections, but may not have specific information on where these would go
- Monitoring data available on limited questions regarding mortality

# Research Needs and Priorities

- What are the fundamental data needs to answer questions?
- Focus on basic processes:
  - Why are birds at site?
  - What are they exposed to?
  - What results in fatality?
- What is net effect on birds

**Breakout 4 –**

- *Landscape Framework comments*
  - *Broader context would be good beyond just solar.*
  - *Also, put INTO context to ensure it isn't misinterpreted when seen as a standalone document.*
  - *Should be entitled "pathway for potential impacts";*
  - *Suggest that at the core, it begins with the concepts lifecycle/life history perspective*

## Breakout 4

- *Management questions comments*
  - *'landscape considerations' is not a management question but rather required background for solving other management questions.*
    - *Importance of background mortality*
  - *Level of pre-construction needed*
    - *BACI versus geospatial*
    - *Understand first what agency's want to see*
  - *Different ways to determine which guilds/species to study, e.g.*
    - *disproportional impacts, water birds, subset example of all guilds, other?*

# Breakout 4

- ASWG compared to CWG questions
  - Feather spots…include clearly in CWG
  - *climate change futures with landscape considerations management question*
  - *Standardization - what attributes are needed to determine best methods?*
- *Criteria Ranking*
  - *#1 Fundamental need – recommend adding this*
  - *#2 Management*
  - *#3 Overlap*
  - *#4 Timeliness*

# Multiagency Avian-Solar Collaborative Working Group: Stakeholder Workshop

## *Next Steps*

*May 10-11, 2016*

*Sacramento, California*

# Stakeholder Input Wanted

- All handouts and presentations will be available on the CWG webpage: http://blmsolar.anl.gov/program/avian-solar/
- Stakeholders can comment during this meeting and/or in writing following the workshop by **June 1, 2016**
- Agencies are seeking input from stakeholders on all matters relevant to the CWG objectives:
  - Concerns about avian-solar issues
  - Relevant existing data and studies
  - Understanding of avian-solar interactions
  - Focus of future research
  - Priorities for research needs
  - Future activities of the CWG
  - Level and mode of future stakeholder engagement

# Draft Avian-Solar Science Plan

- Revise draft elements incorporating stakeholder comments
  - Summary of available data
  - Conceptual framework
  - Management questions
- Develop additional elements
  - Prioritization of management questions
  - Implementation plan
  - Comparative cost data
- Draft plan released for stakeholder review mid summer

# Future Stakeholder Engagement

- A stakeholder webinar will be hosted to present and take comments on the draft avian-solar science plan (late summer 2016)
- For more information:
  - Subscribe for email updates: send request to rollins@anl.gov
  - CWG webpage: http://blmsolar.anl.gov/program/avian-solar/

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**Via email only**

18 September 2021

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RE: Oberon Renewable Energy Project Draft EIR Comments (SCH#2021-03-0462)

Dear Mr. Raub, et al.,

The Desert Tortoise Council (Council) is a non-profit organization comprised of hundreds of professionals and laypersons who share a common concern for wild desert tortoises and a commitment to advancing the public's understanding of desert tortoise species. Established in 1975 to promote conservation of tortoises in the deserts of the southwestern United States and Mexico, the Council routinely provides information and other forms of assistance to individuals, organizations, and regulatory agencies on matters potentially affecting desert tortoises within their geographic ranges.

We appreciate this opportunity to provide comments on the above-referenced project. Given the location of the proposed project in habitats likely occupied by Mojave desert tortoise (*Gopherus agassizii*) (synonymous with Agassiz's desert tortoise), our comments pertain to enhancing protection of this species during activities authorized by the Colorado River Basin Regional Water Quality Control Board (Water Board), which we assume will be added to the Decision Record as needed. Please accept, carefully review, and include in the relevant project file the Council's following comments and attachments for the proposed project. We also appreciate that Aspen Environmental Group extended a personal invitation to comment on this project, which was received by email on August 13, 2021.

Despite our numerous requests of the Bureau of Land Management (BLM) to inform the Council of projects that may affect desert tortoises[1], BLM did not contact us; rather we received notice of the BLM's solicitation for comments on an environmental assessment (EA) from a third party on August 13, 2021. It is unfortunate that comments were due to BLM by September 14, 2021, and then to the Water Board on the Draft Environmental Impact Report (EIR) by September 27, 2021. Although we have missed the August 13 deadline, we are still providing these comments to BLM before the September 27 deadline.

On April 15, 2021, the Council submitted scoping comments on the Notice of Preparation (NOP; Desert Tortoise Council 2021[2]), which are incorporated by reference. In the March 18, 2021 NOP we did not find the words, "critical habitat," although another member of the environmental community indicated that 600 acres of desert tortoise critical habitat is proposed for development and therefore adversely degraded or destroyed (and there are numerous places in Appendix A to the DEIR where this acreage is substantiated). The Council was very outspoken that this unprecedented intent to place a renewable energy project in critical habitat was unacceptable, and that the project should be redesigned to avoid critical habitat. We see that our concerns have not only been ignored, but that the proponent now intends to develop more acres in critical habitat than envisioned in March 2021. The project proponent now proposes to develop 817 acres of critical habitat, which is a discretionary action that could have been avoided, and we believe should still be avoided.

It is unconscionable that with thousands of acres of impaired habitats and Development Focus Areas (DFAs) designated by the Desert Renewable Energy Conservation Plan (DRECP; BLM 2016) for energy development, that the proponent, BLM, and the Water Board have disregarded the planning, science, and coordination that numerous federal and state agencies participated in to produce the DRECP. These entities are disregarding information in scientific journal articles, agency reports, and rulemaking documents that support our assertion that all critical habitat, which is deemed essential habitat for the recovery of tortoises (USFWS 1994a), is necessary given the persisting declines in tortoise populations in the region (Allison and McLuckie 2018). This assertion is further supported by the U.S. Fish and Wildlife Service's (USFWS) publication of the final critical habitat designation in which they said, "The [U.S. Fish and Wildlife] Service expects that proposed actions that are inconsistent with land management recommendations for DWMAs in the Draft Recovery Plan [for the desert tortoise] would likely be considered to adversely modify critical habitat" (USFWS 1994a). Critical habitat designations overlay DWMAs, now included in Tortoise Conservation Areas.

Range-wide, densities of adult Mojave desert tortoises declined more than 32% between 2004 and 2014 (USFWS 2015). In the Colorado Desert, the annual decline was 4.5% or 36.25% between 2004 and 2014 (Allison and McLuckie 2018). In the Chuckwalla DWMA/TCA/critical habitat unit, adult tortoise densities declined 37.43%. Densities of juvenile desert tortoises have been decreasing in all five recovery units since 2007 (Allison and McLuckie 2018). In addition, adult tortoise numbers or abundance declined in this recovery unit by 36% between 2004 and 2014 (Allison and McLuckie 2018).

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[1] https://www.dropbox.com/s/mlwe60a9lcxhy56/BLM%20CDCA%20District%20Manager%20DTC%20as%20an%20Affected%20Interest.11-7-2019.pdf?dl=0
[2] https://www.dropbox.com/s/981zy5wnymmywu8/Oberon%20Solar.4-15-2021.pdf?dl=0

Like the NOP, the DEIR appears to minimize, even camouflage, that 817 acres of tortoise critical habitat would be destroyed because of the proposed development. The words “critical habitat” appear only one time in the Executive Summary; not in the context of a project impact, but as a statement as to how a dismissed alternative avoids critical habitat. The first-time critical habitat is mentioned is 161 pages into the document, where the following vague description is given: “The southern portion of the project site is within designated critical habitat for desert tortoise (Figure 3.4-1, Project Location).” For the first time, 185 pages into the document, the DEIR divulges that 817 acres of critical habitat would be lost to project development on page 3.4-25.

Even there, the loss of critical habitat, which at the very least comprises a CEQA-significant impact, is de-emphasized by the DEIR as not being in an Area of Critical Environmental Concern (ACEC) or Tortoise Conservation Area (TCA), is compromised by existing development, is within a designated DFA, and is isolated from other critical habitat south of Interstate 10. We see in Figure 2-2 in Appendix B that given the amount of tortoise habitat that has already been lost to solar development north of I-10, that it absolutely increases the importance of critical habitat located to the north, as between this and the Arica/Victory Pass, all critical habitat north of I-10 would be eliminated in this critical habitat unit. *But for* these two projects, and particularly Oberon, desert tortoise critical habitats, which were deemed essential in 1994 before the ongoing declines since before listing in 1990 and particularly the catastrophic declines documented since 2004, would be eliminated from areas immediately north of I-10.

Additionally, this statement about critical habitat not being in a TCA is incorrect. TCA is a term used by the USFWS in the 2011 Recovery Plan. It includes ACECs and DWMAs from the 1994 Recovery Plan (USFWS 1994b). The USFWS identified and designated critical habitat to follow the DWMA boundaries. Thus, the Chuckwalla DWMA/TCA and critical habitat unit includes land north of I-10.

On page 2 of our comment letter (Desert Tortoise Council 2021), we specifically asked that “the Draft EIR/EIS must adequately assess the status and trends of desert tortoise populations in the affected region, particularly in adjacent and nearby critical habitats located south of Interstate 10. At a minimum, data analyses in Allison and McLuckie (2018) and USFWS (2014, 2015, and 2017) must be reported in the draft document as baseline information. The Council believes that these status and trend data clearly show why **600** acres of critical habitat should not be sacrificed to this development” (**bold emphasis added**). So, not only is this requested analysis missing from the DEIR, but the amount of critical habitat has also increased since the March 2021 NOP, and rather than a realistic accounting of lost critical habitat, the loss is de-emphasized in the DEIR as inconsequential. In so doing, the DEIR fails to adequately and accurately assess impacts. Again, we request that the DEIR and NEPA document include an analysis of the direct, indirect, and cumulative impacts to the Chuckwalla tortoise population in the Chuckwalla TCA and critical habitat unit, the Colorado Desert recovery unit, and the Mojave desert tortoise (see *Union Neighbors United, Inc. v. Jewell* below).

For example, page ES-1 reveals that the site is in a DFA but not that it is also within critical habitat. Project Objectives in Section ES.2, point 4 claims, “Minimize environmental impacts and land disturbance associated with solar development,” which is disingenuous when it is revealed, not until page 3.4-25, that this objective of minimizing impacts does not extend to critical habitat, which should be and can be avoided *but for* the proponents unwillingness to avoid these essential habitats. In our comment letter (Desert Tortoise Council 2021), we dedicated three paragraphs expressing our concern with the unprecedented loss of critical habitat, yet there is no mention in Section ES.4.3 where "Areas of Controversy/Public Scoping Issues" are vetted that this loss would occur.

Section ES.5.1 Project Location identifies three constructed solar facilities, one currently being developed, and three more being planned (the Arica/Victory Pass facility would also develop critical habitat) in the immediate area, which brings into question the need for this eighth project. We conclude that the focus of solar energy development has changed to favor development anywhere the project proponent wants it. This conclusion is supported by the statement at the bottom of page ES-9, which states, "…because most of the land within the DFA is already in use." Finally, the No Action Alternative fails to reveal that *but for* this project, 817 acres of critical habitat would not be lost to solar development in a full DFA. Nor do we agree with the statement that the proponent's intent in Section ES.6.1 is to comply with the DRECP, which envisioned development on impaired habitats in DFAs, not designated critical habitat.

In our scoping comments (Desert Tortoise Council 2021), we asked that rooftop solar be analyzed as an alternative, which is given in Section ES.6.2 on pages ES-11 and ES-12, where the discussion is subjective and presents the proponent in an unrealistically favorable light. For example, the proponent indicates that the number of solar panels distributed across rooftops would "…be similar in size to the proposed project;" yes, but it would be in residential and commercial neighborhoods where 5,000 acres of tortoise habitat, including 817 acres of critical habitat, are not at risk. Development of rooftop solar may not benefit "…firms that are in the business of developing utility-scale facilities" but it does preserve intact the ecological resources of native public lands, including essential critical habitats. We find that this is one of many examples of pro-proponent rhetoric that fails to reveal the negative, long-term environmental impacts that would result with project development. We request that the CEQA and NEPA documents compare the loss of carbon sequestration from solar development in desert habitat to rooftop development with no loss of carbon sequestration.

Unless otherwise noted, the following page numbers refer to the draft environmental impact report (DEIR), entitled "IP Oberon LLC's Oberon Renewable Energy Project," dated August 2021.

In Section 1.4 Public Review and Noticing, pages 1-3 to 1-5, we expected to see an explanation for how a project like this that occurs exclusively on public lands managed by the Bureau of Land Management (BLM) can be certified in an EIR without explaining why the analysis is not in a combined EIR/EIS (environmental impact statement). It is our belief that a combined EIR/EIS would have garnered more public review and input, that an EIS component still needs to be added, and that the Final EIR/EIS should explain why an EIR-only analysis was pursued for this project. The statements on page 1-9 that the BLM "is not participating as a joint preparer of this document" and that an environmental assessment (EA) will be prepared instead, does not adequately address the serious nature of this project to plan for and facilitate the *adverse modification* of 817 acres of critical habitat, which crosses a significance threshold that warrants completion of an EIS.

Section 2.2.1.3 Off-site Habitation Mitigation on page 2-8 states that an "…off-site compensation package consists of a total of approximately 5,500 acres." Given that 5,000 acres of public lands would be lost (theoretical decommissioning notwithstanding), we ask if the California Department of Fish and Wildlife (CDFW) was consulted when this 1 to 1.1 compensation ratio was determined? We note that the compensation ratio given in the DRECP for loss of critical habitat is 5:1, which is tabulated on page 3.4-46, but that typical compensation ratios acceptable to CDFW for non-critical habitat are 3:1 at a minimum. The Council's 15-member Board includes five biological consultants and two recently retired agency biologists, and none of us has ever heard of a 1:1 compensation ratio for lost tortoise habitats in the last 10 years. We expect the Final EIR/EIS to report a realistic compensation ratio that documents agency-concurrence (with evidence that CDFW was consulted) on the final ratio decision. Also note that the 5,500 acres stated on page 2-8 for habitat compensation is different from the 6,808 acres shown on page 3.4-46.

Given the tone of the EIR to de-emphasize the impacts to critical habitat, it is a significant concern to us that the proponent may opt to fence approximately 12 miles of Interstate 10 (Option 1 on page 3.4-47) rather than purchase the 6,808 acres of compensation habitats (Option 2 on page 3.4-48). The Final EIS/EIR needs to estimate the costs associated with these options. Further, we know that the Recovery Implementation Teams (RITs) have identified fencing transportation corridors as a high priority, and that it may already be planned by Caltrans to complete this fencing, thereby making the fencing portion of Option 1 obsolete. Option 3 seems even less effective than the first two and perhaps less expensive, pending the cost estimates to be published in the Final EIS/EIR. If some form of fencing is to be used, the proponent would need to contact Caltrans to discuss right-of-way issues. Also, funds would need to be set aside for fence maintenance.

With regards to Section 2.2.2.1 Construction Schedule and Workforce, which states, "Construction is anticipated to occur over an approximately 15- to 20-month period dictated by the Applicant's Power Purchase Agreement (PPA) and financing requirements," we believe that this statement should be augmented in the Final EIS/EIR by a phrase like, "and issuance of a Section 2081 incidental take permit." One of our Board members submitted a 2081 permit application for a 160-acre solar project in March 2020, and that permit, 18 months later, has yet to be issued. Given this and similar experiences with delayed permit issuance, we question the proponent's unrealistic expectation that "high-voltage components of the project … be constructed and interconnected no later than April 30, 2023." This presumption seems to anticipate fast-tracking approval of this highly controversial project before its impacts can be fully assessed, and denies the possibility that the footprint should be modified to avoid development of critical habitats. Note that collapsing tortoise burrows as described in the middle of page 2-12 cannot occur until both the U.S. Fish and Wildlife Service (USFWS) biological opinion and CDFW 2081 permit are issued.

The project proponent may need to obtain a section 10(a)(1)B) incidental take permit (ITP) from the USFWS if the BLM has no regulatory authority over the proposed action on parcels that are not public land. This requirement should be discussed in the CEQA and NEPA documents for this proposed project. Again, the issue of when a federal ITP would be issued should be discussed in the timeline.

Mitigation requirements for a section 2081 permit from CDFW and ITP are similar. Page 3.4-22 states that impacts would be minimized by implementing mitigation measures. CDFW code section requires that impacts be both minimized and fully mitigated. So, we note that minimization measures are not mitigation. Section 2081(a)(2) of the California Fish and Game Code requires that the impacts of the authorized take shall be minimized and fully mitigated. All required measures shall be capable of successful implementation.

Section 783.2, Incidental Take Permit Applications requires the following information for an application to be considered – "An analysis of the impacts of the proposed taking on the species. An analysis of whether issuance of the incidental take permit would jeopardize the continued existence of a species. This analysis shall include consideration of the species' capability to survive and reproduce, and any adverse impacts of the taking on those abilities in light of (A) known population trends; (B) known threats to the species; and (C) reasonably foreseeable impacts on the species from other related projects and activities. (8) Proposed measures to minimize and fully mitigate the impacts of the proposed taking. (9) A proposed plan to monitor compliance with the minimization and mitigation measures and the effectiveness of the measures. (10) A description of the funding source and the level of funding available for implementation of the minimization and mitigation measures." We request that the project proponent obtain a section 2081 permit from CDFW before initiating any activity that may result in take of the tortoise. This commitment should be in the NEPA and CEQA documents for the proposed project.

Before the USFWS may issue an ITP, the permit applicant must demonstrate that their implementation of the Habitat Conservation Plan (HCP) would "minimize and mitigate to the maximum extent practicable" for the covered species. To do this, the HCP must first fully analyze the impacts of the take that it is requesting. In *Union Neighbors United, Inc. v. Jewell*, (2016 U.S. App. LEXIS 14377; D.C. Cir, August 5, 2016), the Court gave deference to the HCP Handbook, rejecting USFWS request to apply Chevron. The Court determined "that the term 'impacts' refers to the population or subpopulation of the species as a whole, rather than the discrete number of individual members of the species," rejecting Plaintiff argument to minimize impacts to individuals. On Maximum Extent Practicable, the Court again gave deference to the Handbook.

In *Friends of the Wild Swan v. Jewell*, 2014 U.S. Dist. LEXIS 116788 (D. Mont., Aug. 21, 2014) the court faulted USFWS's conclusion that take would be fully mitigated, finding that there was "limited scientific support" for that conclusion and providing deference to the HCP Handbook. Citing the HCP Handbook guidance that, where adequacy of mitigation is a "close call," the record must support a finding that the mitigation is the maximum practicable, the court found that USFWS made no independent analysis of whether more mitigation was impracticable. The court faulted USFWS for relying entirely on the applicant's representations as to practicability.

Consequently, we request that the project proponent develop and submit an HCP and application for an ITP for the proposed project that complies with the HCP handbook including fully mitigating the take (USFWS and NMFS 2016).

With regards to the fifth bullet on page 2-13, "Protective measures, including Best Management Practices [BMPs], being implemented to conserve the desert tortoise during construction activities," herein we provide the proponent with a set of BMPs[3] completed by the Council in 2017 that may be helpful. These BMPs reduce some direct and indirect impacts to tortoises; they do not eliminate these impacts or impacts not addressed. For example, the BMPs do not address the temporal degradation/loss of tortoise habitat that results from construction, operation and maintenance, and decommissioning activities.

With regards to Section 2.2.5.1 Environmental Resources on page 2-24, which states, "Biological and cultural resources pedestrian surveys will be conducted after coordination with BLM, USFWS, and Native American tribes," we ask that this statement be augmented in the Final EIR/EIS to coordinate these and other actions with the CDFW.

With regards to the following statement on page 3.4-6, "They [larger creosote bush rings] are considered rare and 'sensitive' by federal and state agencies, including BLM, but they do not have any formal protections in place." It is our understanding that there are specific measures identified in the DRECP for protection of creosote bush rings larger than 15 feet (4.5 meters) in diameter, which the proponent is obligated to implement. We request that the Final EIR/EIS disclose applicable protective measures.

With regards to MM BIO-1, page 3.4-39, first bullet, "Lead Biologist: The Applicant shall assign a Lead Biologist, **approved by BLM**, as the primary point of contact for the BLM and resource agencies regarding biological resources mitigation and compliance" (**bold emphasis added**). Please note that the CDFW will also need to review and approve the Lead Biologist and must be given that opportunity before the BLM's approved person can implement certain actions, including collapsing tortoise burrows or handling tortoises. This comment also pertains to the statements at the top of page 3.4-52 identifying a "USFWS Approved Biologist."

We appreciate this opportunity to provide input and trust that our comments will help protect tortoises during any authorized project activities. Herein, we ask that the Desert Tortoise Council be identified as an Affected Interest for this and all other Water Board and BLM-authorized projects that may affect species of desert tortoises, and that any subsequent environmental documentation for this project is provided to us at the contact information listed above. Additionally, we ask that you respond in an email that you have received this comment letter so we can be sure our concerns have been registered with the appropriate personnel and office for this project.

Regards,

Edward L. LaRue, Jr., M.S.
Desert Tortoise Council, Ecosystems Advisory Committee, Chairperson

cc: California State Clearinghouse, state.clearinghouse@opr.ca.gov

[3] https://www.dropbox.com/s/fbx0uw43hs44i1w/%23DTC%20Construction%20Best%20Management%20Practices%20082117.pdf?dl=0

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# Construction Best Management Practices

# Desert Tortoise Protection

# August 21, 2017

**Prepared by:**


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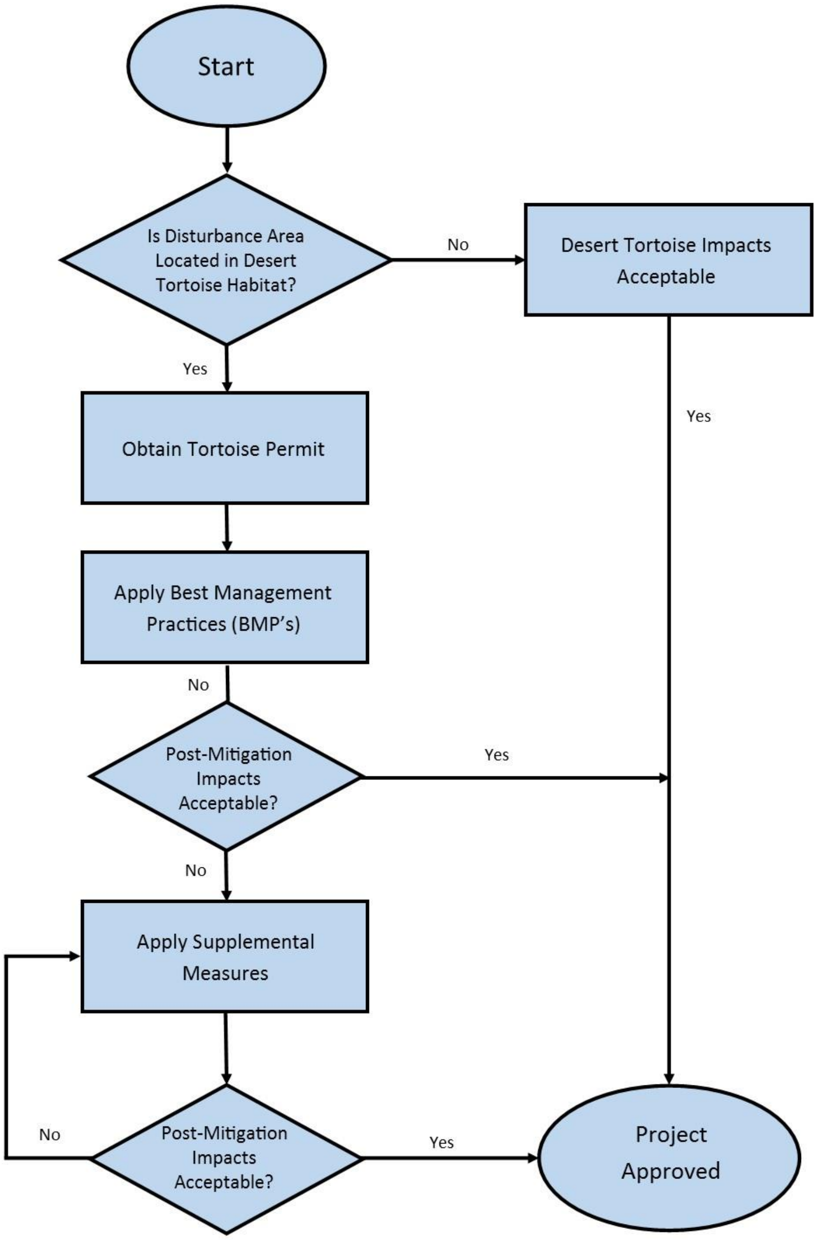
## Contents

This document was prepared to provide support to the US Fish and Wildlife Service (USFWS) and land management agencies in developing Biological Opinions for projects that could affect desert tortoise (*Gopherus agassizii*). Multiple Biological Opinions were reviewed to compile this suite of consistently employed Best Management Practices (BMPs).

Project-specific BMPs adopted by the USFWS would become Terms and Conditions in a Biological Opinion and be the federal requirements for project construction. This document may also prove useful to project proponents in making their project development decisions because knowing the BMPs could allow them to minimize or avoid potential impacts to desert tortoise and its habitat. The document is organized as follows:

- **1.0 Best Management Practices Process Flowchart** – A flowchart depicting the process for application of mitigation measures and the agency decision process if provided as a summary.
- **2.0 Best Management Practices** – the BMPS are presented in this section.
- **3.0 References –** Literature reviewed for summarizing the BMPs.

# 1.0 Best Management Practices Process Flowchart



# 2.0 Best Management Practices

This compilation of BMPs was prepared to aid federal agencies by providing a suite of consistent measures and to aid project proponents in understanding the requirements needed to protect the desert tortoise in accordance with the Federal Endangered Species Act of 1973 (ESA; 16 U.S.C. § 1531 et seq.). The ESA was designed to protect critically imperiled species from extinction as a "consequence of economic growth and development untempered by adequate concern and conservation." The U.S. Supreme Court found that "the plain intent of Congress in enacting" the ESA "was to halt and reverse the trend toward species extinction, whatever the cost."

Under the ESA, USFWS had been charged with evaluation of the potential effects on species that have been federally listed as threatened or endangered with extinction including the desert tortoise. To accomplish this they consult with the federal “Action” or “Lead” agency proposing the action, resulting in a Biological Opinion that either finds the action would not jeopardize the species or that it would result in jeopardy. Examples of federal lead agencies include the Bureau of Land Management, National Park Service, Federal Highway Administration, Army Corps of Engineers, and Department of Defense. Under a jeopardy Opinion the project would be denied federal approval and the USFWS would be required to identify “Reasonable and Prudent Alternatives” that could avoid the jeopardy. A non-jeopardy Opinion typically contains a number of Terms and Conditions designed to reduce potential impacts to a non-jeopardy level. A number of recent Biological Opinions were reviewed during preparation of this document to compile a standard suite of BMPS. BMPs adopted by USFWS in a Biological Opinion become mandatory Terms and Conditions that must be implemented for project construction.

## 2.1 Field Contact Representative

The Applicant will designate a Field Contact Representative (FCR) who shall be responsible for overseeing compliance with the Biological Opinion. The FCR will be onsite during all active construction activities that could result in the “take” of a desert tortoise. The FCR will have the authority to briefly halt activities that are in violation of the desert tortoise protective measures until the situation is remedied.

## 2.2 Authorized Desert Tortoise Biologist

Authorized desert tortoise biologists shall be onsite during all construction activities to ensure compliance with this Biological Opinion. Prospective authorized desert tortoise biologists will submit their statement of qualifications to the USFWS and allow a minimum of 30 days for response. Use of authorized desert tortoise biologists will be in accordance with the most up-to-date USFWS guidance and shall required for monitoring of any pre-construction, construction, operation, or maintenance activities that may result in take of the desert tortoise. The current guidance is provided in Chapter 3 of the Desert Tortoise (Mojave Population) Field Manual (herein “USFWS 2009”).

The Applicants will employ authorized desert tortoise biologists, approved by the USFWS, to ensure compliance with protective measures for the desert tortoise. As such, all authorized desert tortoise biologists are functionally agents of the USFWS and shall report directly to the USFWS, the federal land management partner, and the proponent concurrently regarding all compliance issues and take of desert tortoises; this includes all draft and final reports of non-compliance or take.

## 2.3 Biological Monitors

Biological monitors shall employed and responsible for ensuring that all compliance measures in this Biological Opinion are properly implemented, including: reporting all non-compliance issues; reporting all tortoises found in harm's way; ensuring that project vehicles and equipment remain in designated areas; and minimizing the risk to tortoises on project access roads.

Working under the supervision of an authorized desert tortoise biologist, Biological Monitors would be present in all active construction locations. Biological monitors would provide oversight to ensure proper implementation of protective measures, record and report desert tortoise and desert tortoise sign observations in accordance with approved survey protocols, and report incidents of non-compliance in accordance with this Biological Opinion and other relevant project permits.

Authorized biologists will capture and handle desert tortoises in compliance with the most up-to-date guidance from the USFWS (2009). An authorized desert tortoise biologist shall be responsible for recording each observation of desert tortoise handled in the tortoise monitoring reports. This information will be provided directly to the USFWS and the federal lead agency.

## 2.4 Desert Tortoise Fencing

Installation of tortoise-proof fencing that is designed to protect desert tortoises by excluding them from construction zones may be warranted. Depending on the specifics of the project, USFWS will determine whether fencing is required and if so whether it is permanent, temporary, or of both types. See Chapter 8 in USFWS (2009).

### 2.4.1 Permanent Fencing

Permanent desert tortoise exclusionary fencing shall be installed around the boundary of the facility. An authorized desert tortoise biologist will monitor construction of exclusionary fencing in order to relocate all tortoises in harm's way to outside the fenced impact area.

Fence specifications shall be consistent with those approved in Chapter 8 of USFWS (2009) or most current version.

### 2.4.2 Temporary Tortoise Fencing

Should it be necessary to temporarily fence an area to exclude desert tortoises during construction, the temporary fencing would consist of: 1) portable stand-alone chain-link fence modules or plastic snow fencing supported by standard metal fencepost, and 2) desert tortoise fencing in compliance with Chapter 8 of USFWS (2009).

## 2.5 Desert Tortoise Site Clearance

Once desert tortoise exclusionary fencing is installed, the fenced area shall be cleared under the direction of authorized desert tortoise biologists who will survey the area to ensure that no tortoises or active burrows are present within the fenced area as per Chapter 6 in USFWS (2009).

### 2.5.1 Desert Tortoise Clearance Surveys and Translocation Plans

After installation of desert tortoise exclusionary fencing and prior to any surface-disturbing activities, authorized desert tortoise biologists shall conduct a clearance survey to locate and remove all desert tortoises from harm's way, including those areas to be disturbed, using techniques that provide full coverage of construction areas (see Chapter 6 in USFWS 2009).

If more than 5 desert tortoises are to be moved a distance of more than 500 meters then a separate Translocation Plan must be prepared and approved by USFWS.

Desert tortoises found during the clearance survey will either be relocated outside the project impact area or translocated to a recipient site in accordance with the Biological Opinion and Translocation Plan, if applicable. In some cases where the proponent owns contiguous lands or those lands are managed by the BLM (which would require prior approval of the BLM), tortoises may be relocated a short distance onto those lands and monitored by either the Authorized Biologist or monitor until which time the tortoise(s) is judged to be out of harm's way. In some cases, an artificial burrow will need to be constructed by qualified biologists (see Chapter 6, Subsection 7 in USFWS 2009).

Authorized desert tortoise biologists will perform desert tortoise clearance surveys of all unfenced work areas outside the main project site immediately prior to the onset of pre-construction, construction, operation, or maintenance activities for project facilities. Desert tortoise monitoring shall be conducted during all related work activities in accordance with USFWS (2009), Biological Opinion, and Translocation Plan, if applicable.

### 2.5.2 Worker Environmental Awareness Program

A Worker Environmental Awareness Program (WEAP) shall be presented by an authorized desert tortoise biologist to all project personnel prior to them starting work on the project site. This program will contain information concerning the biology and distribution of the desert tortoise, desert tortoise activity patterns, its legal status, and occurrence in the proposed project area. The program will also discuss the definition of "take" and its associated penalties, measures designed to minimize the effects of construction activities, the means by which employees may limit impacts, and reporting requirements to be implemented when tortoises are encountered. Personnel shall be instructed to check under vehicles before moving them as tortoises often seek shelter under parked vehicles. WEAP training shall be mandatory, and as such, workers shall be required to sign in and wear a sticker on their hard hat to signify that they have received the training and agree to comply.

### 2.5.3 Access Roads

Construction access would be limited to the project right-of-way (ROW) and established access roads as defined in pertinent permitting documents or as identified with the construction supervisor. The Applicants will prohibit project personnel from driving off road or performing ground-disturbing activities outside of designated areas during construction, operation, maintenance, or decommissioning.

### 2.5.4 Speed Limits and Signage

Until the desert tortoise exclusionary fence has been constructed (where applicable), a speed limit of 15 miles per hour shall be maintained during the periods of highest tortoise activity (March 1 through November 1), and a limit of 25 miles per hour maintained during periods of lower tortoise activity. This will reduce dust and allow for observation of tortoises in the road. Speed limit and caution signs would be installed along access roads and USFWS roads.

Where tortoise exclusionary fence is installed and desert tortoise clearance surveys have been completed, speed limits within the fenced and cleared areas shall be established by the construction contractor. Limits should be based on surface conditions and safety considerations. Vehicle travel in unfenced areas will adhere to speed limits established above.

### 2.5.5 Trash and Litter Control

A trash and litter control program shall be implemented and managed by the construction contractor and monitored by authorized desert tortoise biologists to reduce the attractiveness of the area to opportunistic and subsidized predators such as desert kit foxes, coyotes, badgers, and common ravens. Trash and food items shall be disposed of properly in predator-proof containers with re-sealing lids. Trash containers shall be emptied and construction waste shall be removed daily from the project area and disposed of in an approved landfill, recycling, or compost facility.

### 2.5.6 Dogs and Firearms

Firearms and domestic dogs shall be prohibited on the project site.

### 2.5.7 Raptor Control

Authorized biologists are responsible for inspecting structures annually for nesting ravens and other predatory birds and report observations of nests to the USFWS. Transmission line support structures and other facility structures shall be designed to discourage use by raptors for perching or nesting (e.g. by use of anti-perching devices) in accordance with the most current Avian Power Line Interaction Committee guidelines (APLIC 2006). BMPs to discourage the presence of ravens onsite include trash management, elimination of available water sources, designing structures to discourage potential nest sites, use of hazing to discourage raven presence, and active monitoring of the site for raven presence.

### 2.5.8 Habitat Compensation

Desert tortoise compensation fees will likely be required by the federal lead agency. The total acres of permanent and temporary disturbance shall be adjusted by the federal lead agency based upon final site design and disturbance acreage at the time a Notice to Proceed has been issued for the project (an increase in habitat disturbance may require re-initiation of consultation).

Compensation fees are used to support desert tortoise recovery, which may include the following actions: habitat restoration and recovery; monitoring of habitat, populations, and effectiveness of conservation and recovery actions; applied research to promote conservation/recovery; public outreach; predator management; and other actions recommended by USFWS approved Desert Tortoise Recovery Implementation Teams.

### 2.5.9 Overnight Hazards

An authorized desert tortoise biologist or Biological Monitor will inspect any excavations that are not within desert tortoise exclusion fencing on a regular basis (several times per day) and immediately prior to filling the excavation. If project personnel discover a desert tortoise in an open trench, an Authorized Biologist or Biological Monitor working under the supervision of an Authorized Biologist will move it to a safe location. To prevent entrapment of desert tortoises during non-work hours, the applicants will cover or temporarily fence excavations that are outside the permanently fenced project areas at the end of each day (e.g. trenches for water pipeline).

### 2.5.10 Checking for Tortoises Beneath Vehicles

All project personnel shall be instructed to check under vehicles before moving them as tortoises often seek shelter under parked vehicles. Vehicle door magnets or stickers that remind vehicle operators to look beneath tires before driving shall be prepared and distributed by the Authorized Biologist. If project personnel encounter a desert tortoise, they will contact an authorized desert tortoise biologist. The desert tortoise will be allowed to move a safe distance away prior to moving the vehicle. Alternatively, an authorized desert tortoise biologist or Biological Monitor may move the desert tortoise to a safe location to allow for movement of the vehicle.

### 2.5.11 Construction Area Flagging

Designated areas to protect desert tortoises and their habitat will be identified by an Authorized Biologist. An Authorized Biologist, Biological Monitor, of construction survey personnel, will flag boundaries of these areas for avoidance. Restricted areas may be identified and shall be monitored to ensure desert tortoises are protected during construction. ROW boundaries shall be flagged prior to beginning construction activities, and disturbance shall be confined to the ROW. In some cases, an Authorized Biologist or Biological Monitor shall escort all survey crews on site prior to construction. All survey crew vehicles will remain on existing roads and stay within flagged areas. In cases where construction vehicles are required to go off existing roads, an authorized desert tortoise biologist or Biological Monitor (on foot) would precede the vehicles and clear the area.

### 2.5.12 Blasting

If blasting is required in desert tortoise habitat, detonation shall only occur after the area has been surveyed and cleared by an authorized desert tortoise biologist no more than 24 hours prior. A 200-foot radius buffer area around the blasting site shall be surveyed, and all desert tortoises above ground within this 200-foot buffer shall be moved at least 500 feet from the blasting site, placed in unoccupied burrows, and temporarily penned to prevent from returning to the site. Tortoises located outside of the immediate blast zone and that are within burrows would be left in their burrows. All burrows, regardless of occupied status, will be stuffed with newspapers, flagged, and the location recorded using a GPS unit. Immediately after blasting, newspaper and flagging will be removed. If a burrow or cover site has collapsed that could be occupied, it shall be excavated to ensure no tortoises have been buried and are in danger of suffocation. Desert tortoises removed from the blast zone would be returned to their burrow if it is intact or placed in a similar unoccupied or constructed burrow.

### 2.5.13 Penning

Penning of desert tortoises shall be accomplished by installing a circular fence, approximately 20 feet in diameter, to enclose and surround the occupied tortoise burrow (USFWS 2009). The pen should be constructed with 1-inch horizontal by 2- inch vertical, galvanized welded 16-gauge wire. Steel T-posts or rebar should be placed every 5 to 6 feet to support the pen material. Pen material will extend 18 to 24-inches above ground. The bottom of the enclosure will be buried 6 to 12 inches or bent towards the burrow, have soils mounded along the base, and other measures implemented to ensure zero ground clearance. Care shall be taken to minimize visibility of the pen by the public. An authorized desert tortoise biologist or Biological Monitor shall check the pen at least daily to ensure the desert tortoise is secure and not stressed. No desert tortoise shall be penned for more than 48 hours without written approval by the USFWS.

Because this is a relatively new technique, all instances of penning or issues associated with penning shall be reported to the USFWS by phone and email within 24 hours by an authorized desert tortoise biologist. Desert tortoises shall not be penned when conditions are favorable for desert tortoise activity unless approved in advance by the USFWS. Pens for juvenile and hatchling-sized desert tortoises will consist of ½ inch by ¼ inch fencing with a cover to prevent predators, including smaller predators from gaining access to the tortoise (USFWS 2011).

All pens will be approved by USFWS and appropriate agencies, and the authorized desert tortoise biologist shall check pens daily to ensure all desert tortoises within the pens are present and no damage to the pens has occurred. Any impacts to penning or desert tortoises shall be reported to USFWS within one day. USFWS shall be contacted within one day of observation of desert tortoise injury or mortality.

### 2.5.14 Timing of Construction

The federal lead agency shall ensure that when possible, the project proponent schedules and conducts construction, operation, and maintenance activities within desert tortoise habitat during the less-active season (generally November 1 to March 1) and during periods of reduced desert tortoise activity (typically when ambient temperatures are less than 60° or greater than 95°F).

### 2.5.15 Confine Activity to Delineated Area

The applicants will confine all project activities, project vehicles, and equipment within designated areas or delineated boundaries of work areas that authorized desert tortoise biologists or Biological Monitors have identified and cleared of desert tortoises. The applicants will confine all work areas to previously disturbed areas, and if none is available, to the smallest practical area, considering topography, placement of facilities, location of burrows, public health and safety, and other limiting factors. During activities at the completed project site, the applicants will confine all vehicle parking, material stockpiles, and construction-related materials to the permanently fenced project sites and construction logistics areas.

### 2.5.16 Noise Reduction

Noise reduction devices (e.g. mufflers) will be employed to minimize impacts to tortoises and other protected species. Explosives will be used only within specified times and at specified distances from sensitive wildlife or surface waters as established by the relevant federal and state agencies. Operators will ensure that all equipment is adequately muffled and maintained in order to minimize disturbance to wildlife.

### 2.5.17 Installing Shade Structures and Shelters

If interior fences are in place during the active season and prior to the removal of desert tortoises from within the area, the applicants will install shade structures along these fences. Shade structures will also be installed outside tortoise exclusionary fence to protect desert tortoises that have been relocated from within the project site, as well as desert tortoises occurring in the wild outside the project perimeter. The shelters will be designed and installed to provide shelter for both small and large tortoises. The shelters will be installed at approximately 1,000-foot intervals (or as approved by the USFWS), with one smaller sized shelter placed in between each larger shelter in order to provide additional locations for subadults and juveniles.

Shelters will be made from either PVC tubes, wood, or similar material with a diameter of 14 inches or greater for the larger shelters and 6-8 inches for the smaller ones. Tubes should be cut into 2-3 foot minimum lengths and then cut horizontally to mimic a naturally occurring burrow. Each shade structure would be partially buried and covered with a minimum 4 inches of soil and rocks to keep them from being blown away and to assist with thermoregulation within the shelter. Alternatively, the PVC tubes may be wired to the exclusionary fence. During all fence monitoring, these structures will be inspected regularly for their effectiveness and adjusted as needed to increase their effectiveness. These inspections will continue until either no tortoises are found consistently walking the fence during an entire active season or until the end of the project’s construction period, whichever is earlier.

### 2.5.18 Moving Construction Pipes

When outside the fenced project areas, project personnel will not move construction pipes greater than 3 inches in diameter if they are stored less than 8 inches above the ground, until they have inspected the pipes to determine whether desert tortoises are present. As an alternative, the project proponent may cap all such structures before storing them outside of fenced areas.

### 2.5.19 Spill Prevention/Fire Management Plan

A Spill Prevention and Emergency Response Plan will be developed that considers sensitive ecological resources. Spills of any toxic substances will be promptly addressed and cleaned up before they can enter aquatic or other sensitive habitats as a result of runoff or leaching. A Fire Management Plan will be developed to implement measures that minimize the potential for a human-caused fire to affect ecological resources and that respond to natural fire situations.

### 2.5.20 Water Storage

Water needed for construction should be stored in tanks. If evaporation ponds are used, they will be fenced to prevent use by wildlife and treated in a manner approved by the federal lead agency partner and USFWS to prevent drowning. Wildlife escape ramps will be installed and the liner will be textured sufficiently to ensure that all wildlife can escape if they enter the pond. The ponds and fence shall be inspected at least daily. The Authorized Biologist will be responsible for monitoring for raven use and coordinate with the federal lead agency of appropriate action.

### 2.5.21 Non-emergency Expansion

Any non-emergency expansion of activities into areas outside of the areas considered in this Biological Opinion will require approval by the federal land management partner and USFWS, as well as necessary desert tortoise clearance surveys. These expanded activities may require re-initiation of consultation with the USFWS.

### 2.5.22 Geotechnical Testing

An authorized desert tortoise biologist or Biological Monitor will be at each of the geotechnical test sites for all necessary activities. Appropriate desert tortoise clearance will be conducted, and the authorized desert tortoise biologist or Biological Monitor will have the authority to micro-site the geotechnical test locations and stop work, if necessary, to avoid sensitive resources.

### 2.5.23 Translocation Strategy

Desert tortoises located during protocol clearance surveys of the project site may be relocated to areas outside the project site or transferred to an off-site quarantine facility (ex situ) for translocation, or monitored on the project site (in situ) via telemetry. If ex situ monitoring is selected, the off-site facility would be constructed and operated according to USFWS Translocation Guidance (2011). Transmitters and unique identifiers would be affixed to each desert tortoise following USFWS guidance.

A record of all desert tortoises encountered and translocated during project surveys and monitoring would be maintained. The record would include the following information for each desert tortoise: location (narrative, vegetation type, UTM coordinates, and maps) and dates of observations; burrow data; general conditions and health; appropriate measurements; any apparent injuries and state of healing; if moved, the location at which it was captured and the location at which it was released; voiding of the bladder and rehydration method/duration; and diagnostic markings (i.e. identification numbers).

### 2.5.24 Reporting

Depending on the scale of the project, agencies may require reports either at project close or quarterly during the duration of construction and annual updates after that. The federal lead agency may delegate this responsibility to the applicants. In addition, a final construction report will be submitted to the USFWS within 60 days of completion of construction of the project. All quarterly reports are due by the 10th of each of the following months (January, April, July, October), and annual reports are due February 1 of each year. If required, annual status updates shall be provided to the USFWS following completion of construction

Specifically, all reports must include information on any instances when desert tortoises were killed, injured, or handled; the circumstances of such incidents; and any actions undertaken to prevent similar incidents from reoccurring. Additionally, the reports should provide detailed information regarding each desert tortoise handled or observed, with the names of all authorized desert tortoise biologists or Biological Monitors (and the authorized desert tortoise who supervised their actions) involved in the project. Information will include the following: location (UTM), date and time of observation, whether desert tortoise was handled, general health, and whether it voided its bladder, re-hydration method and duration if applicable, location the desert tortoise was moved from and location moved to, unique physical characteristics of each tortoise, and effectiveness and compliance with the desert tortoise protection measures.

Any incident occurring during project activities that was considered by the authorized desert tortoise biologist or Biological Monitor to be in non-compliance with this Biological Opinion will be documented immediately and reported to the FCR by the authorized desert tortoise biologist.

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Tennessee Valley Authority v. Hiram G. HILL, Jr., et al. 437 U.S. 153. June 15, 1978. https://law.resource.org/pub/us/case/reporter/US/437/437.US.153.76-1701.html (Accessed 08/17/2016).

## Comment via ePlanning: Oberon Renewable Energy Project

August 13, 2021

Thank you for the information. I am especially interested in this project.

[Identifying information withheld at commenter's request]

## Comment via ePlanning: Oberon Renewable Energy Project

August 27, 2021

The BLM should not amend the CDCA Plan in order to exempt the proposed Oberon Solar project from the existing applicable CMAs.

Howard Whitaker
2041 Campton Circle
Gold River, California 95670
hjameswhitaker@att.net

## Comment via ePlanning: Oberon Renewable Energy Project

August 27, 2021

Regarding the proposed alternatives for development of the Oberon solar project as presented in this EA, a primary concern is that BLM MUST NOT EXEMPT THIS PROPOSAL FROM ANY APPLICABLE CONSERVATION MANAGEMENT ACTIONS (CMAs) SET FORTH IN THE CA DESERT CONSERVATION AREA PLAN. The CMAs established in the CDCA are critical to that plan's approval and proper implementation across the California Desert, and there is no adequate justification for exempting this project from adhering to these necessary and essential environmental safeguards. Any action alternative that is eventually adopted MUST conform to all CMAs set forth in the CDCA, or face significant challenge from multiple stakeholders concerned about the adverse environmental impacts associated with this project.

[Identifying information withheld at commenter's request]

## Comment via ePlanning: Oberon Renewable Energy Project

August 28, 2021

Re: OBERON SOLAR PROJECT

Dear Sir or Madam,

As a lifelong Southern Californian and one who visits our wondrous deserts frequently, I am concerned that the BLM will allow exemptions to the CDCA plan. To that end, the BLM should not amend the CDCA Plan in order to exempt the proposed Oberon Solar project from the existing applicable CMAs. Doing so will do much more harm than good to the fragile desert environment for which the CDCA Plan was intended, in addition to creating a precedent for which other exemptions may occur.

Thank you for considering my comments.

Thank you.

[Identifying information withheld at commenter's request]

## Comment via ePlanning: Oberon Renewable Energy Project

August 28, 2021

BLM should not amend the CDCA Plan in order to exempt the proposed Oberon Solar project from the existing applicable CMAs.

Margot Lowe

## Comment via ePlanning: Oberon Renewable Energy Project

August 28, 2021

To whom it may concern,

As a U.S. citizen and California resident, I am concerned that if the BLM proceeds with an amendment to the CDCA Plan to allow the Oberon Solar Project to be approved and constructed through an exemption for compliance with CMAs, it will potentially establish a precedent for the BLM’s acceptance and authorization of future applications for renewable energy projects in DFAs by means of exemptions from certain CMAs. This would incrementally undermine the intent and function of the DRECP amendments to the CDCA Plan, in direct opposition to more than a decade's work with the BLM and other agencies to complete and implement the DRECP. Even more concerning is the fact that this is the first solar project being proposed under the requirements of the DRECP, and yet it violates those very requirements. The BLM should not amend the CDCA Plan in order to exempt the proposed Oberon Solar project from the existing applicable CMAs.

Thank you for your careful consideration,

Tim Lawnicki

[Identifying information withheld at commenter's request]

## Comment via ePlanning: Oberon Renewable Energy Project

September 11, 2021

Please do not move forward with this project. The desert tortoise is an endangered species that is very vulnerable to this development. We need to respect other beings on this planet instead of taking it all for ourselves.

[Identifying information withheld at commenter's request]

## Comment via ePlanning: Oberon Renewable Energy Project

September 11, 2021

I believe that you REALLY need to more carefully consider your desert tortoise translocation plan. Scientists have shown desert tortoises do not reproduce well when translocated (https://insider.si.edu/2017/05/smithsonian-study-shows-relocated-desert-tortoises-reproduce-lower-rate/) and that you need to ensure that suitable habitats are found (which include burrows) for the tortoises (https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/1365-2664.12774) -- more than just keeping them penned. Furthermore, juvenile tortoises are far more likely to remain in translocated areas compared to adult tortoises who often try to "get back home" to their original home range. This means you NEED to ensure that you are finding and translocating juvenile tortoises (< 10 cm) if you are to continue this population. I also note that you have not sufficiently considered the population genetics of the tortoises in this range. To properly conserve these tortoise populations, especially for an endangered species which likely already suffers from inbreeding, you need to make sure you're collecting an accurate representation of the genetic diversity (allelic diversity) of this population.

Thank you for considering my comments and I hope that my tax dollars are not wasted.

Clare Adams

## Comment via ePlanning: Oberon Renewable Energy Project

September 12, 2021

These are comments we are making as individuals and residents of the California desert.

The proposed Oberon Solar Project is to be located in scarce microphyll woodland in an area that was supposed to be protected under DRECP. (That's the same DRECP that was signed by all parties to the compromise agreement that took seven years to reach.) It is outrageous that this proposal is even being heard.

Please disapprove this project.

Thank you for the opportunity to comment.

Arch McCulloch
Morongo Valley, California
arch_mc@yahoo.com

**From:** Heather Brandhorst
**To:** PS_OberonSolar, BLM_CA
**Subject:** [EXTERNAL] Oberon Solar Project Public Comment
**Date:** Tuesday, September 14, 2021 10:06:00 PM



I am writing to ask that the Oberon Solar project be stopped immediately. You need to more carefully consider your desert tortoise translocation plan.

The relocation of tortoise and turtles has the potential of killing them because they can spend the rest of their time looking for home. They get disoriented and pace the new fence which can lead to hyperthermia (overeating) and they often get killed by predators trying to get back.

This is unconscionable! The desert tortoise, like our gopher tortoises are a keystone species, their burrows providing shelter for many other desert dwelling species. Leaving the young ones in their burrows and plowing over their means of escape while they slowly suffocate is typical cruelty allowed by the BLM. And moving the adults off of their familiar territory is also cruel. If an ordinary citizen with no political clout were to commit half the heinous acts of abuse the BLM is guilty of, they would be thrown in jail!

Apart from the desert tortoise, the very vulnerable desert horned lizard, Gila monster, desert iguana, chuckwalla, etc. etc. along with native plant species (creosote bushes, etc.) are all either going to be killed on site due to construction or will be “relocated” which will likely cause mortality due to the stress of being placed in unfamiliar territories. This construction area next to the Muddy mountains wilderness and the Valley of fire state park is a very ecologically rich area teaming with hundreds of very delicate and beautiful reptile species such as the desert tortoise, desert iguana, chuckwalla, Gila monster, western banded gecko, desert horned lizard, etc. it’s very outrageous and hypocritical that in the name of “clean energy” they’re willing to clean off this rich land of its indigenous animals and plants in order to accomplish this agenda.

The tortoises will be moved, but many of the young ones will be missed and possibly crushed during construction. And not all moved desert tortoises survive. Most will be so frightened they will release their stored “water” and be in even more peril.

Scientists have shown desert tortoises do not reproduce well when translocated and that you need to ensure that suitable habitats including burrows are found - more than just keeping them penned. Furthermore, juvenile tortoises are far more likely to remain in translocated areas compared to adult tortoises. Therefore you need to ensure that you are finding and translocating the juveniles (< 10 cm) if you are to continue this population.

You need to make sure you’re collecting an accurate representation of the genetic diversity of this population, in order for it to continue.

In Germany and France, they're requiring all commercial roofs built to have solar and in some cases, green roofs. There are tens of thousands of acres of space on distribution centers being built ever year in the US, few with solar. There's gigawatts of potential power there that should be utilized before any green space is covered.

There is 1670 acres of solar panels sitting useless near Tonopah. Why not use these instead of building more and taking from our deserts?

There are now enough solar projects land that amount to the entire size of Clark Country/Vegas city territory. How many more projects does this state need for an entire population of 2.6 million citizens? Every surrounding state is doing the same thing which is to sell the over draw to other neighboring states.

The solar panels can also go on rooftops, over parking lots, on old mine sites - plenty of alternative locations that won’t have as many adverse effects on wild animals.

I oppose utility-scale solar, along with requiring lots of new transmission lines, heat and light pollution, it continues to be held hostage by huge, politically-connected corporations. I want site-specific or community solar using existing infrastructure if solar is necessary.

Bureau Land Management has become nothing but a real estate agent for the feds, selling OUR land to the highest bidders, to the detriment of what makes our country so great, and the only thing worth staying in this country for these days... It's nature. They are no longer an asset to the people but a detriment.

Thank you for considering my comments and I hope that my tax dollars are not wasted.

Sincerely,
Heather Brandhorst

**From:** Brittany Michelson
**To:** PS_OberonSolar, BLM_CA
**Subject:** [EXTERNAL] Tortoises/ solar project- URGENT
**Date:** Tuesday, September 14, 2021 4:53:19 PM

Dear BLM supervisor,

I am writing to you with great concern over the 215 adult desert tortoises and 900 desert tortoise babies whose peaceful lives will be destroyed by the solar project. These animals have lived for decades in this area—it is their natural home— and it is extremely unfair to disrupt their life in regards to this human driven project. The babies especially will certainly face death and all of the tortoises will suffer from displacement. Tortoises are creatures of habit, who operate within a certain radius their whole lives, and they will be greatly impacted by being moved. Not to mention the hundreds of babies who will likely be overlooked or lost in the shuffle. The desert tortoise is a threatened species and we need to do all that we can to protect the species and their habitat. I greatly urge you to make changes to this proposed project so that these gentle and beautiful creatures will not suffer.

Thank you for your care and consideration.

Sincerely,

Brittany Michelson

**From:** Cooper Rae
**To:** PS_OberonSolar, BLM_CA
**Subject:** [EXTERNAL] Find a better place
**Date:** Tuesday, September 14, 2021 12:00:51 PM



I am writing to oppose the Oberon Solar project because of the potential known harm to the desert tortoise population. There are so many other options and smart people can come up with a smart solution so that animals are not harmed.
Thank you
Cooper

**From:** Lisa Zazzarino
**To:** PS_OberonSolar, BLM_CA
**Subject:** [EXTERNAL] Turtles
**Date:** Tuesday, September 14, 2021 11:01:31 AM

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**This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.**

Greetings,

Please do not move the turtles, it's devastating to them.

Respectfully yours,

Lisa Zazzarino
PSC 2 Box 7354
APO AE 09012
lisazazzarino@yahoo.com

Sent from Yahoo Mail on Android

| | |
|---|---|
| **From:** | Rae |
| **To:** | PS_OberonSolar, BLM_CA |
| **Subject:** | [EXTERNAL] PLEASE DO NOT RELOCATE THE DESERT TORTOISES!! |
| **Date:** | Monday, September 13, 2021 4:56:28 PM |



I am a firm believer in solar energy being promoted, but not at the cost of the lives of the tortoises! Please do not allow the solar company or anyone to relocate the tortoises! They will not survive the relocation because they are habituated to their current environment.

Please allow any experts on tortoise behavior to weigh in on this.

Thank you, Rae Sikora

**From:** Sarah Eastin
**To:** PS_OberonSolar, BLM_CA
**Subject:** [EXTERNAL] Comments for DOI-BLM-CA-D060-2020-0040-EA
**Date:** Monday, September 13, 2021 1:00:20 PM



Hello,

Thank you for accepting comments on the EA for the Gemini Solar Project in Southern Nevada.

Can the solar facility at this location be designed so the species of animals that reside at this location and the panels can co-exist? Does mass grading for the construction have to occur? Couldn't the panels be anchored in a way that would prevent the relocation of the desert tortoise and all the other species that will be impacted?

Additionally, it is almost impossible to get sensitive plant communities like those in southern Nevada re-established once destroyed. It would be much better to work with the micro ecology rather than destroying it by mass grading. Many of the onsite species of plants have taken years to establish and grow and serve a very important role in the local ecosystem.

Many animal species will also not do well when moved and may die as a result.  They  may spend the rest of their time just looking for home causing excessive amounts of stress and a prolonged and miserable death. They may get disoriented and pace the new fence which can lead to hyperthermia (overeating) and they often get killed by predators trying to get back.

Please consider every design possibility and choose one that will cause the least impact to the sensitive plant and animal species that reside in this area.

Thank you,
Sarah Eastin
Colorado

| | |
|---|---|
| **From:** | Trish |
| **To:** | PS_OberonSolar, BLM_CA |
| **Subject:** | [EXTERNAL] Please do not remove the turtles |
| **Date:** | Monday, September 13, 2021 7:01:02 PM |



Turtles become very confused when they are moving and spend the rest of their life trying to get back this is cruel and unnecessary you can relocate your solar panels and it won't hurt anyone.

**Commenter:** [redacted]
**From:**
**To:** PS_OberonSolar, BLM_CA
**Subject:** [EXTERNAL] Oberon Renewable Energy Project Draft EIR Comments
**Date:** [redacted]

Dear Brandon Anderson,

To: BLM project manager Brandon G. Anderson
Re: DOI-BLM-CA-D060-2020-0040-EA, Oberon Solar Project To: Colorado River Basin RWQCB c/o Logan Raub
Re: Oberon Renewable Energy Project Draft EIR Comments

I am writing out of concern over the design of the Oberon Solar Project. While I support the development of renewable energy on our public lands to tackle the urgent climate crisis, doing so in a way that jeopardizes the important ecological functions of our desert landscapes will set us back not only on our climate goals but also in our efforts to ensure our these landscapes are preserved for biodiversity health and future generations.

While the Oberon project has appropriately applied to build in a Development Focus Area (DFA), it proposes to encroach upon sensitive desert microphyll woodlands and a designated wildlife corridor. Other recent projects in this DFA have complied with DRECP's Conservation Management Actions , which were carefully negotiated over many years by a range of stakeholders – environmentalists, the renewable energy industry, local and state governments, and more across the ten million acres of DRECP public lands – to ensure solar projects can get successfully built without unduly destroying sensitive habitats, migration corridors and cultural sites. I ask that you consider the following:

The BLM must require the Oberon project to be redesigned to meet the requirements of the DRECP. One way to make this work is through the development of a smaller project that would not encroach on microphyll woodlands, such as Alternatives 3 and 4 which comply with DRECP.Another option is to utilize the 1500 acre parcel to the north that was part of Oberon's original application, rather than relinquishing it for a separate project by the same developer..

Oberon's developer does not need to squeeze out another 600 acres for Oberon when it has two other projects plus many thousands more acres available in this DFA to choose from that would not encroach on sensitive microphyll woodland.

Oberon is benefitting from the clear and streamlined process of the DRECP and as such should not be allowed to undermine -- and subsequently jeopardize -- the DRECP's carefully crafted framework. Desert communities count on the DRECP to facilitate solar development in the lowest conflict places, while still protecting sensitive and irreplaceable resources. Allowing the Oberon project to break the rules would create a dangerous precedent for future development, which could set us back on our goals to rapidly develop solar.

Renewable development on public lands is one of many methods needed to meet carbon reduction goals, including energy conservation, efficiency, and ramping up renewable energy and storage at load centers. BLM has an obligation to protect our public lands from undue degradation by ensuring renewable development facilitated by DRECP respects its conservation framework.

Sincerely,
[redacted]

# COLORADO RIVER INDIAN TRIBES

*Colorado River Indian Reservation*

26600 MOHAVE ROAD
PARKER, ARIZONA 85344
TELEPHONE (928) 669-9211
FAX (928) 669-1216

***Via Electronic Mail Only***

September 9, 2021

Email: blm_ca_ps_obersonsolar@blm.gov

Attn: Brandon G. Anderson
Bureau of Land Management
1201 Bird Center Drive
Palm Springs, CA 92262
Email: bganderson@blm.gov
Phone: (760) 833-7100

RE: **Comments of the Colorado River Indian Tribes re the Environmental Assessment for the Oberon Renewable Energy Project**

Dear Mr. Anderson:

On behalf of the Colorado River Indian Tribes (CRIT or the Tribes), I write to provide comments on the Environmental Assessment (EA) for the Oberon Renewable Energy Project ("Project"). The Project consists of a 500-megawatt solar PV electricity generating station, battery energy storage facility, electrical substation, 4.5-mile-long 500 kV gen-tie line connecting the Project to the Southern California Edison Red Bluff Substation, and associated access roads.

As a preliminary matter, the Colorado River Indian Tribes are a federally recognized Indian tribe comprised of over 4,440 members belonging to the Mohave, Chemehuevi, Hopi and Navajo Tribes. The almost 300,000-acre Colorado River Indian Reservation sits astride the Colorado River between Blythe, California and Parker, Arizona. The ancestral homelands of the Tribes' members, however, extend far beyond the Reservation boundaries. Significant portions of public and private lands in California, Arizona, and Nevada were occupied by the ancestors of the Tribes' Mohave and Chemehuevi members since time immemorial. These landscapes remain imbued with substantial cultural, spiritual, and religious significance for the Tribes' current members and future generations. For this reason, we have a strong interest in ensuring that potential cultural resource and other environmental impacts associated with the Project are adequately considered and mitigated.

In particular, the Tribes are concerned about the potential removal of artifacts from this area and the corresponding destruction of the Tribes' footprint on this landscape. As such, the Tribes request that all prehistoric cultural resources, including both known and yet-to-be-discovered sites, be avoided if feasible. As CRIT noted in its April 2021 scoping comments, the Project is likely to have significant cultural resource impacts.

## I. BLM Should Have Prepared an EIS.

One of NEPA's fundamental purposes is to guarantee that agencies take a "hard look" at the environmental consequences of their actions by ensuring that the agency carefully considers "detailed information concerning significant environmental impacts" *before* the actions occur. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989). Additionally, NEPA seeks to ensure that agencies make the relevant information available to the public so that the public "may also play a role in both decision-making process and implementation of the decision." *Id.* NEPA emphasizes "coherent and comprehensive up-front environmental analysis." *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1216 (9th. Cir. 1998), cert. denied, 527 U.S. 1003 (1999) quoting *Marsha v. Oregon Natural Resources Council*, 490 U.S. 360, 371 (1989). This duty "is more than a technicality; it is an extremely important statutory requirement to serve the public and the agency *before* major federal actions." *Foundation on Economic Trends v. Heckler*, 756 F.2d 143, 157 (D.C. Cir. 1985).

Here, the Bureau of Land Management (BLM) has concluded that there are no new significant impacts, that the conditions and environmental effects described in the DRECP FEIS are still valid, and that the EA addresses any exceptions. Because of this, BLM intends to issue a Finding of No New Significant Impact (FONNSI) for this Project. This action violates NEPA in a number of ways.

As CRIT noted in its scoping comment letter, BLM appears to have made an illegal pre-determination that the Project would have no significant impact. For instance, a BLM presentation slide circulated before this Environmental Assessment was complete listed "Review Environmental Assessment (EA) and unsigned [FONSI]" as potential "public participation opportunities." This pre-determination that the EA would not reveal any significant impacts violates the law and BLM's own policies. Per BLM's Department Manual, where an agency desires to collect sufficient evidence and conduct analysis to determine whether a project will have significant impacts, an EA may be an appropriate vehicle for doing so. *See* BLM Department Manual, 516 DM 11, §11.7(A)(1). It is only *after that analysis is complete* that BLM decides whether to prepare a full Environmental Impact Statement (EIS) or to issue a FONSI. *Id.*; *see also* 516 DM 11, § 11.7(E). BLM's pre-determination of what its EA would show undermines the entire analysis.

BLM also claims that the EA tiers from the Desert Renewable Energy Conservation Plan (DRECP) EIS because the Project would fall within a previously-identified Development Focus Area (DFA). (EA at 1-2.) Thus, BLM argues, because the DRECP EIS has already "considered impacts to all resources potentially impacted by renewable development," BLM need only prepare an EIS for the Project if it determines that the Project would result in new, previously undisclosed significant impacts. (EA at 2.) BLM then claims that "the conditions and environmental effects described in the DRECP FEIS are still valid." (EA. at 2.) Throughout the EA, BLM avoids disclosing and analyzing impacts by repeatedly claiming consistency with the DRECP EIS. (EA at 3-4, 50, 54, 73, 75, 78-80.)

An agency is only allowed to tier to a prior programmatic EIS "so long as any previously unanalyzed effects are not significant." 43 C.F.R. § 46.1409(c). Here, the EA fails to recognize significant cultural resource impacts from the Project. Though cultural resource impacts were acknowledged in the DRECP EIS, the exact location of individual projects within the Development Focus Area were not known at the time of the DRECP EIS analysis. Therefore, the DRECP EIS did not—and could not—analyze the Project's specific cultural resource impacts. BLM's own NEPA Handbook acknowledges that "[i]f there are new circumstances or information that would result in significant effects of an individual action not considered in the EIS, tiering to the EIS cannot provide the necessary analysis to support a FONSI for the individual action." (Handbook H-1790-1 at 27.) Thus, the EA may not rely on the DRECP EIS to conclude that the Project's cultural resource impacts are not significant because the DRECP EIS never addressed impacts specific to the Project's geographic location.

Furthermore, the Project's Vegetation and Wildlife Resources analysis plainly diverges from the DRECP EIS. The DRECP EIS specifies a 200-foot setback from microphyll woodlands, yet the Project will have a minimum setback of only 50 feet from the desert dry wash woodland that the Project area encompasses. (EA at 100.) In fact, the EA further admits that there will only be an average setback of 134 feet. (EA at 100.) Thus, the DRECP EIS analysis could not have adequately considered the Project because the Project is inconsistent with the DRECP. A separate, project-specific EIS is required. Despite eliminating nearly 75% of the setback requirement, the EA does not provide further analysis of the environmental impacts of doing so. Instead, the EA offers a laundry list of alleged rationales for this diversion. (EA at 100-01.) Even if these rationales justify decreasing the microphyll woodlands setback to a minimum of 50 feet, at the very least the EA should have explained why an EIS was not required to adequately consider the impacts of this change.

Numerous regulations, guidelines, and court decisions indicate that there is a low bar for preparing a more comprehensive environmental impact statement ("EIS") instead of, or after, an EA. An EIS is a detailed written statement that "provide[s] [a] full and fair discussion of significant environmental impact" of the proposed action. 40 C.F.R. §§1502.1. An EIS must be prepared if "*substantial questions* are raised as to whether a project . . . *may* cause significant degradation of some human environmental factor." *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1332 (9th Cir. 1992) (emphases added; internal quotation marks omitted). To trigger this requirement in the NEPA context, a "plaintiff need not show that significant effects *will in fact occur*," but need only raise "substantial questions whether a project may have a significant effect." *Id.* (internal quotation marks omitted); *National Audubon Soc. v. Hoffman*, 132 F.3d 7, 13 (2d Cir. 1997) (If it is a "close call" whether the proposed action will result in a significant environmental impact, "an EIS should be prepared.") (*citing Found. for N. Am. Wild Sheep v. U.S. Dep't of Agric.*, 671 F.2d 1172, 1178 (9th Cir. 1982). Moreover, an EIS is required where uncertainty about a project's impacts may be resolved by collecting more data, or where more data may prevent "speculation on potential...effects." *Ocean Advocates v. U.S. Army Corps of Eng'rs*, 402 F.3d 846, 870-71 (9th Cir. 2004) (internal quotations marks omitted).

As discussed further below, there are—at the very least—"substantial questions" about whether the Projects will have a significant effect on cultural resources, as well as other aspects of the environment. This alone is sufficient to warrant a full EIS analysis.

## II. The Projects Will Have Significant Cultural Resource Impacts.

Because of the Tribes' past, present, and future connection to the land on which the Project is proposed, CRIT has expressed ongoing concerns about the Project's potential for significant cultural resource impacts. As the EA confirms, the Project is a large-scale, intrusive solar facility that will involve substantial ground disturbance. The Project will cover a 5,000-acre area and includes a 2,700-acre solar facility, 4.5-mile-long gen-tie line, 25-acre battery energy storage system, 20-acre underground collection system, 3,000-square foot operations and management building, and numerous other ancillary facilities. (EA at 12-14.) Moreover, the EA states that the Area of Potential Effects ("APE") for direct effects 5,018 acres (EA at 45) and ground disturbance would impact 2,790 acres (EA at 50). Thus, BLM's conclusion that the Project will not significantly impact cultural resources is unsupported by its own EA.

Indeed, the EA states that its Class I record search and literature review showed there are 372 previously recorded cultural resources in the direct effects APE alone. The Class III cultural resources inventory found 182 cultural resources in the direct effects APE. (EA at 46.) An additional six resources in the indirect APE were identified as culturally sensitive. (EA at 52.) Any "disturbance or destruction of an unidentified archaeological resource could damage or destroy the resource or change its context." (EA at 50-51.)

In the same breath, the EA then tries to claim that the impacts to these cultural resources are not significant. It states that only five of the discovered and surveyed cultural resources qualify for listing in the National Register of Historic Places (NRHP). (EA at 47.) This conclusion ignores two critical considerations.

First, subsequent surveys have already uncovered previously unknown cultural resources. The EA even acknowledges that "[t]here is the potential for unknown buried archaeological resources to be encountered during ground disturbing activity...required for construction" of the Project." (EA at 50.) Thus, BLM should have conducted further surveying to accurately evaluate the Project's impacts on cultural resources. It defies logic to acknowledge the Project's likelihood for impacts and then fail to further consider these impacts.

Second, BLM's determination that nearly all of the 182 surveyed cultural resources have little or no scientific or historic value under the NRHP eligibility criteria fails to incorporate tribal perspectives and input. BLM's focus on Western scientific "value" artificially constrains its consideration of "cultural resources," and thereby undermines the accuracy and quality of any subsequent analysis. The EA ignores the tremendous cultural and spiritual significance that these cultural resources have for Tribal members, regardless of NRHP eligibility. The Mohave People believe that their ancestors—who lived, traveled, prayed, fought, and died on this landscape since time immemorial—left their possessions and belongings in the land to forever memorialize their connection to it. These possessions and belongings—which may include tools, pottery, habitation sites, intaglios, petroglyphs, rock circles, sleeping circles, and trails—form a "footprint" that serves as tangible proof of the Mohave People's ongoing connection to their ancestral territory. The disturbance of these belongings is strictly taboo in the Mohave belief system. BLM's sole focus on archaeological and data-driven characterizations of cultural resources ignores the fact that removal and/or destruction of any cultural resources—including those characterized as "isolates"—has a significant and devastating impact on the Tribes.

This failure to adequately analyze and capture the Project's potential cultural resource impacts further extends to the agency's consideration of Traditional Cultural Properties (TCP). BLM identified thirteen places of tribal cultural and religious importance in and around the Project area. Additionally, the EA acknowledges that "tribes have expressed their views and concerns about the importance and sensitive of specific cultural resources to which they attach religious and cultural significance." (EA at 49.) However, the EA then paradoxically argues that those same tribes did not provide BLM with sufficient information to analyze the cultural landscape "as a historic property under Section 106 of the National Historic Preservation Act (NHPA) or as cultural resources under NEPA for the proposed project." (EA at 49.) The EA thus ignores the countless consultations, comment letters, and even litigation declarations in which CRIT and other Tribes have articulated the importance of their ancestral landscapes as defined through songs, trails, and other traditional cultural practices. Tribes have provided sufficient information to justify a TCP designation and if BLM has specific, outstanding questions about a potential TCP, it should ask the Tribes for clarification. If anything, the EA's conclusion only demonstrates that more analysis is needed, and it is improper to move forward with the Project without knowing the full extent of its impacts on cultural resources.

BLM attempts to justify its failure by arguing that the cost of obtaining additional information required to identify a landscape-level TCP in accordance with Department of the Interior standards would be "exorbitant." (EA at 49.) However, the EA does not provide any further clarity regarding this conclusion. BLM does not explain what further costs may entail, nor does it elaborate on what constitutes "exorbitant." BLM's inadequate analysis and failure to acknowledge even a portion of the TCPs within the Project's direct and indirect APEs violates the law.

## III. **The Cumulative Impacts Analysis is Inadequate.**

As CRIT reiterated in its April 2021 comment letter, the collective and continual destruction and removal of cultural resources from the Tribes' ancestral lands due to energy projects has already caused tremendous spiritual harm to CRIT members. Energy projects, such as the Project here, are often sited in a way that severs the connectivity between cultural resource sites—a connectivity that is vital to the traditional value of these cultural resources.

The EA lists fourteen past and present projects as well as eleven other probable future projects in the area of potential impacts. (EA at 35-38.) As this list demonstrates, a vast number of solar and other utility projects have been sited within CRIT's ancestral lands. Through ground disturbance and physical intrusions on this land, each project further compounds the disastrous and permanent impacts on the area's cultural resources. Rather than examining these concerns, BLM summarily dismisses cumulative impacts by claiming that they will be adequately addressed through mitigation measure MM CUL-10. (EA at 54.) MM CUL-10 vaguely provides that "BLM shall address cumulative effects of the project in compliance" with existing management policies. Then the measure states that the project owner will pay a "compensatory mitigation fee" as established by a document for which development is ongoing. (EA at H-9). Far from providing any assurance that BLM has appropriately address cumulative impacts, this proffered "solution" demonstrates that the agency has done nothing more than sidestep its responsibilities. The measure does not contain any firm commitments from the agency or the project owner, and relies on management policies designed without full investigation of site-specific cultural resource impacts.

Although BLM frequently points to other projects to rely on past surveys and analysis, it has not examined the extensive cultural resource harm inflicted by the long list of projects in the area. The agency must analyze the Project's impacts in light of other past, present, and reasonably foreseeable future actions impacting cultural resources in this region. Furthermore, BLM should describe the methodology used to assess cumulative impacts and list out the other projects considered in analyzing cumulative impacts.

## IV. BLM's Proposed Mitigation Measures Do Not Adequately Mitigate Harm to Cultural Resources.

BLM relies on a number of mitigation measures to mitigate the Projects' cultural resource impacts, yet the proposed mitigation is inadequate and needs a number of revisions to more appropriately incorporate tribal input and respond to these harms. The Tribes further note that the only true mitigation for cultural resource harms is avoidance—something that none of the mitigation measures fully embrace. CRIT urges BLM to make the following revisions:

- Revise MM CUL-1 to state that the Cultural Resources Specialist will consult with culturally affiliated tribal groups before making any recommendation regarding the eligibility for listing in the NRHP and California Register of Historical Resources (CRHR) of any cultural resources that are newly discovered or that may be affected in an unanticipated manner.

- Revise MM CUL-1 to state that no ground disturbing activities will take place without the presence of a tribal monitor. Written notice identifying the proposed schedule of each project phase shall be provided to the Tribe supplying the tribal monitors at least one week in advance. Weekly, until ground disturbance is completed, the project construction manager shall provide to the tribal monitors' manager a schedule of project activities for the following week, including the identification of area(s) where ground disturbance will occur during that week. The Project Owner shall notify the Tribe providing tribal monitors of any changes to the scheduling of the construction phases.

- Revise MM CUL-2 to make clear that the Cultural Resources Specialist (CRS) shall consult extensively with culturally affiliated tribes in developing the Plan for Archaeological Monitoring, Tribal Participation, Post-Review Discovery and Unanticipated Effects Plan. This Plan must include a robust tribal monitoring component.

- Revise MM CUL-2 to make clear that tribal monitors shall have authority to halt ground disturbance during construction if a cultural resource over 50 years of age is found, or impacts to such a resource can be anticipated. Tribal groups shall be consulted regarding the proper treatment of the resource in question.

- Revise MM CUL-2 to remove any discussion of cultural resource removal, which causes significant harm to the Tribes, and instead add language allowing for cultural resource reburial according to traditional cultural practices known only to the Tribe. Please see the attached CRIT Reburial Policy for more information.

- Revise MM CUL-3 to state that the Project Owner shall seek tribal input and participation in compiling its Worker Environmental Awareness Program training to better incorporate tribal knowledge and perspectives.

- Revise MM CUL-4 to state that the archaeological monitor shall consult with the on-site tribal monitor. The archaeological monitor shall also consult with any culturally affiliated tribes should any cultural resources be discovered during ground disturbing activities.

- Revise MM CUL-4 to state that the CRS shall consult with culturally affiliated tribes before exercising the CRS's authority to increase or decrease the monitoring effort.

- Revise MM CUL-5 to state that culturally affiliated tribes will be contacted in the event of any unanticipated discovery and will have the opportunity to consult with the project owner, BLM, and qualified personal regarding the treatment of said resource.

- Revise MM CUL-6 to state that any reports prepared shall also be provided to culturally affiliated tribes.

- Revise MM CUL-9 to state that the CRS, alternate CRS, or field staff shall consult with a tribal monitor to re-establish the boundary of each site.

## V. BLM Failed to Fulfill Its Consultation Requirements to the Tribe.

The EA claims that BLM complied with consultation requirements by sending early notification letters inviting "[t]hirteen tribes or related entities" to consult on the Project and attend the pre-application meeting. (EA at 129, 131.) A representative from CRIT attended the meeting. (EA at 131.) BLM also claims that they held four government-to-government meetings. None of these meetings involved CRIT. (EA at 131.)

In fact, CRIT adopted a government-to-government consultation policy in May 2017, which CRIT attached to its October 8, 2020 comments on the Project and again referenced in its April 2021 comment letter. As stated therein, agency acknowledgment of the policy is required before an agency schedules a government-to-government consultation meeting with the Tribal Council. To date, the BLM Palm Springs Office has not acknowledged the policy. For this reason, any communication between BLM and the Tribes regarding this Project continues to be for informational purposes only.

Thank you for your consideration. To understand how these comments were taken into account in your decisionmaking, we ask for a written response prior to a final decision. Please copy the Tribes' Attorney General Rebecca A. Loudbear, at rloudbear@critdoj.com, Deputy Attorney General Antoinette Flora, at aflora@critdoj.com and THPO Director Bryan Etsitty, at betsitty@crit-nsn.gov, on all correspondence to the Tribes.

Respectfully,

Amelia Flores
Chairwoman, Colorado River Indian Tribes

Cc: Tribal Council of the Colorado River Indian Tribes
Bryan Etsitty, THPO Director, Colorado River Indian Tribes
Rebecca A. Loudbear, Attorney General, Colorado River Indian Tribes

*Submitted via Electronic Mail*

September 14, 2021

ATTN: Brandon Anderson
Bureau of Land Management
1201 Bird Center Drive
Palm Springs, CA 92262
BLM_CA_PS_OberonSolar@blm.gov

**RE: Comments on BLM's Environmental Assessment (EA) Analyzing the Oberon Solar Project (CACA-58539) and Draft Plan Amendment**

Thank you for the opportunity to comment on the EA for the Oberon Renewable Energy Project.

Intersect Power is one of North America's largest developers of utility-scale renewable energy and the parent company of IP Oberon, LLC, the proponent of the Oberon Renewable Energy Project. More importantly, we are a team of friends working to preserve our planet for future generations through low-carbon energy and infrastructure solutions.

Our goal is to design low-impact, high-value projects that decarbonize the U.S. economy as fast as possible, while protecting essential habitats and empowering local communities. We strongly believe that direct engagement and collaboration with stakeholders to improve design of our projects. To that end, in developing the Oberon Project we collaborated with numerous stakeholders and agency staff to identify biological, cultural, hydrologic, and other land constraints and opportunities, and through this process, we have succeeded in designing a project that maximizes clean energy *and* both onsite and offsite conservation of important resources.

The proposed 500-megawatt (MW) Oberon solar PV and battery storage project is a Desert Renewable Energy Conservation Plan (DRECP) success story:

- The project is sited entirely within a Development Focus Area (DFA)
- The project is highly land use efficient by squeezing 500 MW into only 2,700 acres, representing an exceedingly low 5.4 acres/MW, where the industry standard is closer to 8 acres/MW
- IP Oberon, LLC performed a complete set of biological resource surveys and jurisdictional delineation in advance of designing the project footprint to strategically avoid the best quality habitat for a full suite of sensitive species
- The project footprint was further refined after a complete set of cultural resources surveys were allowed to proceed to avoid important cultural and tribal historic resources

- The mitigation hierarchy of "avoid, minimize, mitigate" was employed when designing the site layout
- The proposed footprint was designed in collaboration w/ BLM, USFWS, and CDFW to ensure functionality of the multi-species linkage, avoidance of the most intact and highest quality microphyll woodlands, preserving transmission access along the west wide transmission corridor
- The project avoids ~1,200 acres of microphyll woodlands, with direct impacts on only ~100 acres of microphyll woodlands on the project site
- The project design minimizes edge effects by avoiding the best quality, contiguous microphyll woodlands with substantial seasonal surface flows, and impacts only isolated, narrow fingers of woodlands that would experience edge effects if surrounded by solar arrays, whether buffered by 50 or 200 feet
- The project design maintains connectivity through the multi-species linkage by considering cumulative projects and other barriers, focusing on maximizing functionality of the linkage and discounting "corridors to nowhere"
- IP Oberon, LLC included the specific mitigation package in the project's application, so it can be evaluated in the EA and EIR, and so the conservation community can go onsite and compare the impacted habitat with the conserved habitat, which they did in early August of 2021
- The project's compensatory mitigation package includes nearly 7,000 acres of extremely high quality habitat, including private inholdings within ACECs and Wilderness Areas, and including ~650 acres of microphyll woodlands
- The project's design proposes a human exclusion fence to keep illegal OHV uses out of the protected onsite microphyll woodlands

Approximately 1,300 acres of microphyll woodlands occur on within the project's 4,700 acre application area, and this habitat type is intermixed with creosote bush scrub. However, strict adherence to the DRECP Conservation Management Actions (CMA) that require avoidance of microphyll woodlands would result in the ability to develop only ~2,000 acres and only ~375 megawatts. By reducing the 200-foot avoidance buffer to 50 feet minimum, and 130 feet average, and by allowing for direct impacts of fences, roads, and arrays to ~65 acres of microphyll woodlands, a full 500 megawatts can be developed on 2,700 acres. The proposed project includes an offer of off-site compensatory habitat of ~7,000 acres, to be protected in perpetuity under an endowed conservation easement, a far better conservation outcome than preserving a total of about 100 acres made up of dozens of isolated microphyll woodland areas on site. The compensation package includes a higher ratio than 5:1, and is closer to a 7:1 ratio. Furthermore, the habitat quality at the mitigation site is at least twice as good as onsite using objective scoring criteria carried out by project biologists.

Despite these project design successes, several questions have arisen during the collaboration process by project stakeholders. These questions have been addressed in the field or in collaboration meetings over many months. The answers that have been provided are offered here for the sake of the record.

1. **Why can't the Oberon project avoid direct impacts to all onsite microphyll woodlands?**

   The proposed project avoids roughly 1,200 acres of onsite microphyll woodlands and has direct impacts on fewer than 100 acres. Solar arrays are fairly modular, but only up to a point, and arrays must be oriented in a north-south string direction to optimize collection of incident sunlight. Because the microphyll woodlands and other features on the project application area are highly irregular, diagonally trending features, avoidance of such features eliminates the potential to develop project components at a rate much higher than a 1:1 ratio of acres lost per acres avoided. Only the smallest, most isolated areas of microphyll woodlands with little-to-no hydrologic connectivity to other habitats were considered for development.

2. **Why can't the Oberon project incorporate additional land to avoid microphyll woodlands?**

   Adding any land to Oberon outside of the current application footprint would severely impair the project's economics because it would require (a) many more miles of transmission lines across the landscape to connect parcels of BLM land, (b) crossing private lands and triggering county jurisdiction, which would trigger a mandatory Development Agreement with Riverside County, which would trigger a mandatory payment of the County's B-29 ordinance fees, which is an annual per-acre charge for "use of the sun" which adds up to many millions of dollars of costs, severely impacting project economics.

   The 4,700 acres of Oberon's application area is the only available contiguous DFA property that can avoid the county charges. Intersect Power transferred the "P-shaped" property to the Easley project application because we're hoping to create a 2025-2026 COD project that is less competitive but hopefully at least somewhat competitive with future (2026) power prices. The P-shaped property is much less desirable than the Oberon project footprint properties because it has high flood depths that require elevated equipment and deeper foundations, all of which impair project economics.

3. **Why can't the Oberon project be smaller than 500 MW?** Oberon's economic model depends on the full 500 MW capacity to achieve the economies of scale required to support (a) a 500kV interconnection (there are no more interconnection positions left available at the Red Bluff Substation at the 230kV level, so Oberon is interconnecting at 500kV, which carries a much higher cost, and (b) being competitive with other wholesale generation projected to come online in 2023 including competing for long-term contracts with gas fired power plants, solar and wind projects sited on private land with lower land and mitigation costs, etc.

   Oberon has already entered into multiple long-term power purchase agreements with multiple off-takers.

4. **Why can't the Oberon project use any of the other 380,000 acres of DFAs identified in the DRECP process?**

   Unfortunately, there is VERY little land actually available within the DFAs, despite the DRECP's promise of up to 380,000 acres being available. Intersect Power has evaluated in detail several of the DFAs in closest proximity to existing transmission capacity for development constraints that were not considered by the DRECP but should have been.

   For example, the Riverside East DFA includes 10,314 acres of lands located within areas of extremely active hydrologic flows. There are also over 7,400 acres of microphyll woodlands within this DFA, most of which will be avoided by the Oberon project and other projects. As another example, the Imperial East and Chocolate Mountain DFAs have military operational constraints that limit the potential for solar development to around 4,000 acres despite a promise of tens of thousands of acres of potential. Most of the other DFAs have no access or only extremely remote access to transmission.

   The Oberon project was thoughtfully designed to maximize conservation (both onsite AND offsite) and maximize clean energy generation, which is desperately needed as soon as possible to prevent the worst effects of climate change.

   The DRECP designated 6.5 million acres of conservation land and only 388,000 acres of DFAs, most of which are not viable as described above. In order to meet the Administration's goals of a zero-carbon electricity sector by 2035 and a 52% reduction in GHG emissions by 2050 will require 10 million acres of land. We need to make the highest and best use of the DFAs in the DRECP planning area to ensure we have a chance of avoiding the worst effects of climate change, many of which are already upon us.

We thank BLM staff for their excellent work in processing the Oberon project application with great care, expertise, and commitment to our public lands.

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