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February 13, 2009
File #654.01

Mr. John Kessler
Project Manager
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Wildlife Corridor Study for the Carrizo Energy Solar Farm Project, Docket No. 07-AFC-8

Dear Mr. Kessler:

In response to your request, we are providing comments on behalf of OptiSolar, Inc. regarding the Habitat Connectivity study being conducted by SC Wildlands under contract with the California Energy Commission (CEC) as part of the review of the Carrizo Energy Solar Farm project.

Background

The Habitat Connectivity study approach presented by SC Wildlands (SCW) in their proposal and scope of work lists three components: "modeling baseline conditions of habitat connectivity in the Carrizo Plain for select focal species (kit fox, tule elk, and pronghorn sheep [sic]); evaluating three proposed solar projects to measure and illustrate the impacts to connectivity; and modeling proposed mitigation strategies to evaluate their effectiveness to offset habitat loss and fragmentation."

Information reviewed for this commentary includes:

The SC Wildlands proposal and scope of work titled, "Draft Habitat Connectivity Planning for Selected Focal Species in the Carrizo Plain"

Files available on the CEC website, posted on January 29, 2009:

1. Carrizo vegetation map legend – pdf
2. Vegetation map - kmz file for Google Earth
3. Criteria rankings – excel file
4. Google Earth maps for protected lands, roads, and study area

Data files sent to our office on February 5, 2009 at our request:

1. Road layer - shape file
2. Vegetation layer - shape file

Emails with Kristeen Penrod, SCW, regarding tables and methodology.

General comments

Habitat connectivity modeling can be a useful tool, however we have concerns with the use of a corridor model in this application. A clear, compelling statement of the appropriateness of modeling a corridor in this specific location for the target species should be articulated.

Regarding connectivity analysis, Kareiva (2006) has asked, "connectivity for what purpose?", and, "Like so many ideas in conservation biology, there is often more marketing than critical analysis and more wishful thinking than incisive models and data." He goes on to say that if the purpose of the study is to determine the likelihood of re-colonization events, then those events must be measured. If maintenance of genetic variability is the question, gene flow is a non-issue because even very rare dispersal can maintain genetic variability. If ability to overcome population fluctuations is the interest, then population fluctuations should be measured.

Specifically, why a GIS corridor model is the appropriate tool to assess impacts of the project, and not a comparative analysis of the existing suitability of lands affected and the ability of habitat remaining in the region to support target species, should be addressed.

No data have been presented to support the idea that regular movement between the Carrizo National Monument and the Palo Prieto Conservation Bank is important to metapopulation viability of the target species for the study (kit fox, tule elk, and pronghorn antelope). These species are not migratory, and may not engage in regular movements out of their home ranges. The corridor analysis between the Monument and the Palo Prieto Conservation Bank may not accurately portray the movement patterns and characteristics of these species. The study does not refer to any actual measures of individual movement. The measurement of connectivity must include measures of the movement of individuals. Without knowing if animals move between locations, connectivity has no meaning (see Fagan and Calabrese 2006).

Specific comments

1. Habitat rankings

- The SCW corridor study looks at the least cost path for a species based on input data that describes ability to move across the landscape, not habitat preference. As a result, the conclusion must be tempered with the understanding that the target species may make movement decisions that are influenced by preferred habitat, not just by the ease at which they can pass through an area. Using a

permeability standard results in vegetation variables such as row crops being assigned a "1", or best rating, when lands planted in row crops are "indisputably sub-optimal environments to maintain native wildlife", as stated in the SCW habitat suitability table. Movement paths may be strongly influenced by the presence of preferred habitat, not just by permeability. Since the species of interest in this study are not migratory, but typically move to find food, water, or denning habitat, a plowed field may not be the chosen movement path if an alternate route, although not as direct, contains preferred habitat. Habitat preference is the appropriate measure rather than permeability because the species examined do not migrate, rather they move around within the area as appropriate habitat is available.

- The rank assignments in the criteria table do not account for seasonal variation in permeability. For example a field planted to grain (ranked "1", or best) is very easy for a kit fox to cross (dependent on the distance) when first planted, but may be very difficult to cross when crops are taller during the kit fox dispersal period in the summer. The seasonal variability of the rankings was explicitly noted by the kit fox expert, Brian Cypher (personal communication), but is not accounted for in the rankings or analysis. Since kit fox young disperse in August and September (USFWS 1998) it seems the condition of agricultural fields should be ranked for that time period.

- The variables utilized have unexplained contradictions. For instance, a rating of best ("1") is assigned to cropland, because in seasons when a crop is not present and ground is plowed bare, permeability is high. However, bare ground is listed as a "5". Cropland is very poor habitat (no prey or forage) during some seasons. When a crop is present, permeability for kit fox is lower, certainly lower than the "3" that is assigned to annual grassland, which is often grazed on private land, and is a preferred habitat type.

- The criteria table does not explain the distinctions between agriculture (rated "9") and cropland, dryland grain crops, irrigated grain crops, irrigated row and field crops, and pasture, which are rated "1".

- The citation utilized 13 times for kit fox habitat, Cypher and Frost 1999, is an incorrect citation. The paper has nothing to do with habitat, but reports physical condition of kit fox as measured by body mass, blood chemistry, and viral antibodies.

- The citation for elk habitat is only California Department of Fish and Game (CDFG) telemetry and flight data. Some literature support is a reasonable expectation and is stated in the SCW scope of work as a necessary component.

- The citation for O'Gara and Yokum 2004, utilized 14 times in the criteria table, is not provided in literature cited. There are two citations listed in error in the table for Longshore and Lowry as published in years 2010 and 2011.

2. Model execution and inputs

- The exact methodology for the model should be spelled out for review. The data input tables provided by SCW are nearly identical to those in the Corridor Designer programs by Majka, D., J. Jenness, and P. Beier (2007). The Corridor Designer program is widely used by government and academia, and provides tools that shortcut steps in the ArcGIS spatial analyst. To our inquiry regarding methods, SCW replied that they are not using any of the Corridor Designer tools. It is not clear to us whether SCW is using any other components from Corridor Designer. SCW provided Althouse and Meade with a series of fundamental steps that use spatial analyst tools in ESRI GIS programs. If only the spatial analyst tools are used in ArcInfo, complete step by step methods should be provided for review.
- We would like to see all reclassification data for the model.
- The Carrizo vegetation map legend lists 34 types, while the model table includes 58 types. This discrepancy should be cleaned up. Based on habitat types listed, the table looks like it was from the Tejon Ranch.
- The model does not include any data regarding fencing, an important factor in the movement of animals. The lack of this factor makes analysis of baseline conditions incomplete when the test is for permeability. We understand that the County of San Luis Obispo is preparing a fence data layer. When will fencing data be available for review?
- Start and end point selection are critical to the end product of the permeability model. We suggest that numerous iterations of the model using various start and end points based on known population centers is a more realistic representation of likely movement paths. There are many ways to move into and out of the Carrizo Plain, and without comparing multiple destinations from known population centers any conclusion regarding the importance of one end point will be questionable.

3. Data layers

- The vegetation layer initially provided was a kmz file for Google Earth. It was not possible to distinguish areas for some vegetation variables on the Google overlay. We requested and received the GIS shape file for the vegetation layer so

that vegetation types could be distinguished by changing the map colors. Other reviewers may not have been able to do this, and may not have the opportunity to comment on the accuracy of the vegetation layer.

- The source of the vegetation layer was not provided. We would like to see the specific sources of the SCW vegetation layer and a list of changes made to the vegetation layer, with sources documented.

- There is no indication that any field truthing was conducted to test the reliability of the data. Although it has been suggested that habitat does not change much in the Carrizo area, agricultural operations do change from year to year. Because agriculture is a variable of importance in the analysis, we suggest that ground truthing is necessary.

- Lands classified as pasture, grassland, and dry land crop can vary widely in the height of vegetation and thus varying in their level of permeability. During the initial phone conference for the project it was suggested that soil type or some other index of vegetation robustness in grassland and pasture habitats be utilized. We have not seen an attempt to address this issue in the SCW study. This is another reason to ground truth vegetation data.

- The road layer provided included dirt roads and ranch roads, not just paved roads. In our communications with SCW, they confirmed that just paved roads would be used, but the data for this layer does not specify roads to be used in the analysis.

- We suggest that the more appropriate analysis to use is distance from roads rather than road density.

4. Habitat suitability tables

- Step 2 of the proposed work is to produce a habitat suitability model. However, the SCW ranking table is for habitat permeability. Habitat suitability rankings would be very different than permeability rankings. For example, dryland grain habitat is not very suitable for kit fox. Kit fox are known to be residents adjacent to grain fields, but tilling, lack of prey and den sites, active rodent control programs, harvesting and tilling again make them poor habitats. However, when just planted, dryland grain habitat is permeable to kit fox. If the rankings are not changed the model will tend towards showing the agricultural uses as suitable patches or core areas, when in actuality they are not. Will the information in the habitat suitability discussion table that states some types of agriculture are, "indisputably sub-optimal" be used to change the least cost path? Our

communications with SCW indicate that they will use the same rankings for habitat suitability as were used for the permeability analysis.

- Habitat suitability elevation criteria in the SCW table for kit fox sets the upper elevation range at 473 meters. Soda Lake is at an elevation of approximately 580 meters. The elevation should be corrected for the Carrizo kit fox population.
- Information in the SCW table regarding habitat suitability for pronghorn antelope seems to rely on Wyoming and Montana populations. Since habitat conditions in California are vastly different with respect to weather and seasonal availability of food, we suggest habitat suitability information should primarily rely on data from California populations.
- Again, for elk, the information listed in the SCW table concerns elk from other locations, including Wyoming (for dispersal distance). Tule elk in California are a different sub-species. CDFG data is cited in the permeability ratings, but is not translated into the habitat suitability discussion here. We suggest habitat suitability information should primarily rely on data regarding the local populations.
- It is not clear how the information in the habitat suitability tables will be re-classified into "suitable" or "not suitable" classifications. For instance, for elk, will home range be based on information from Wyoming, or Point Reyes, or from the four sub-herds in the Carrizo? How is the information regarding topography and antelope (e.g., "prefer open country") translated into suitable habitat distinctions in the Carrizo area? The steps for determining suitability of habitat need to be thoroughly explained.

Comments on the upcoming analysis

1. SCW Task 2.

The SCW scope of work description says it will evaluate, "the configuration and extent of each project as proposed in relation to baseline conditions for the selected focal species to measure and illustrate impacts to connectivity, and to determine each project's proportion of the cumulative impacts." However, it is not stated how it will do this. A proposal to evaluate is not a statement of methodology. Will the outline of the projects be imposed over the permeability map and a percentage calculated, or will the project plans with the projects' proposed corridors be utilized? Will a percentage of project impacts be calculated on a preferred corridor utilizing 0.1% of the landscape area or a preferred corridor utilizing 10% of the landscape area? Will impacts be calculated separately for the three target species or as the union? How

will habitat suitability affect conclusions regarding project impacts? How will a fence porous to kit fox of the type proposed for OptiSolar's Topaz Solar Farm site be modeled?

2. SCW Task 3

It is not clear how a model of mitigation strategies will be done. If mitigation is the purchase of conservation easements on private land, will the model be to simulate a barrier fence around the land, and then remove the fence? If a mitigation strategy is to create corridors, this step should be included in the impact analysis. If the only difference in a mitigation property is the removal of fences, the benefit to movement will not appear using the variables in the current model, since fencing is not included. How might a mitigation measure such as planting a field of grain for elk be modeled?

3. SCW Task 4

Who is on the Science Advisory Board that will review the product?

4. SCW Task 5

Who are "project partners"? Will the final report include comments from non-scientists or be focused on the technical aspects of the modeling analysis?

Thank you for the opportunity to comment on this work. We understand that protection of rare species is essential and a primary goal for any activity. We hope that our comments encourage a process that provides realistic answers to important questions about habitat and species protection related to the proposed solar plants.

Sincerely,

Daniel E. Meade, Ph.D.
Principal scientist

References

Fagin, William F. and Justin M. Calabrese. 2006. Quantifying connectivity: balancing metric performance with data requirements. pp. 297-317 *In* Connectivity Conservation, Kevin R. Crooks and M. Sanjayan, eds., Cambridge Press, New York.

Kareiva, Peter 2006. Introduction: Evaluating and quantifying the conservation dividends of connectivity. pp. 293-295 *In* Connectivity Conservation, Kevin R. Crooks and M. Sanjayan, eds., Cambridge Press, New York.

Majka, D., J. Jenness, and P. Beier. 2007. Corridor Designer: ArcGIS tools for designing and evaluating corridors, available at http://corridordesign.org