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July 5, 2015

Rob Simpson
Executive Director
Helping Hand Tools

Dear Mr. Simpson:

I am responding to your email in which you brought to my attention citation to my research on avian collisions with regard to the Carlsbad Energy Center Project Amendment: Final Staff Assessment. As I understand the project, it would involve replacing one 400-ft stack with six 90-ft stacks that would emit high-velocity, high-temperature plumes extending several thousand feet into the air. I looked over relevant sections of the Final Staff Assessment and have the following observations, which you are welcome to share with the California Energy Commission. I have prepared this letter for you *pro bono* as an effort to ensure that the best available science is used in the environmental review process. My use of letterhead is meant to provide contact information and establish my identity. It does not represent any endorsement by the University of Southern California as an institution. The contents of this letter are my professional opinion and not the position of my employer.

The Final Staff Assessment relies on our paper in *The Auk* (Longcore et al. 2008) to conclude that avian collisions with the new stacks would be less than with the old stacks. The *Auk* paper addresses avian collisions with tall communication towers and therefore is limited to the impacts on the species that tend to collide with those towers, which are almost entirely nocturnally migrating songbirds. The proposed project is adjacent to a wetland, which poses collision risks for a different suite of avian species. Our 2008 research was updated with a quantitative estimate of mortality by tower height classes (Longcore et al. 2012), but this work was not cited. Ignoring any potential impacts of the thermal plumes and looking at the potential collisions resulting from the height of the stacks themselves, both configurations (existing and proposed) would kill very few of the birds for which risk of collision increases with height (i.e., nocturnally migrating songbirds). A 400-ft obstruction lit only with strobe lights might result in 4 collisions per year, while a 90-ft obstruction similarly lighted would result in less than 1 collision per year, but these numbers apply to the suite of species that are sensitive to obstruction height and do not take into account collision risk that derives from proximity to the wetland habitat or the impacts of the thermal plumes.

The issue of nocturnally migrating songbirds colliding with the proposed stacks is not the most relevant impact at the project site, which is located adjacent to a significant coastal wetland with large numbers of migratory waterbirds, waterfowl, and shorebirds. The impacts to waterbirds and other species associated with the lagoon and Pacific Ocean are much more relevant than potential collisions by nocturnal migrant songbirds. Our research does not address collisions with structures next to wetlands. Avian collisions with structures are generally higher next to wetland sites (Drewitt and Langston 2008) and indeed researchers are particularly concerned about collisions with power lines that are located next to wetlands, where waterbirds, waterfowl, and shorebirds collide with obstructions (Willard and Willard 1978, Erickson et al. 2005). A study of effects of the project on waterbirds, waterfowl, and shorebirds as they approach and take off from Agua Hedionda Lagoon, which is bisected by the project site, would be far more relevant to the impact analysis than is our research. It is critically important that impact analysis concentrate on the different groups and species of birds that will be impacted and not on a generalized idea of "birds" that obscures differential impacts on different groups (Longcore et al. 2013, Longcore and Smith 2013).

Our research does not address the impacts of production of high-velocity, high-temperature plumes extending upward from the stacks into the atmosphere. As described in the Final Staff Assessment, these plumes would extend several thousand feet up into the air and the shorter height of the tower does not offset this feature. The Final Staff Assessment refers to an unpublished white paper to argue that these plumes have no significant impact on birds:

> The Energy Commission closely monitors all projects under its jurisdiction, including solar thermal, coal- and gas-fired. Evidence of significant and predictable injury or mortality from thermal or exhaust plumes has not been reported or documented at other power plants; has not been noticed at the Encina plant, and is not expected to occur with the proposed CECP project. The question of impacts associated with thermal plumes and/or exhaust stacks has been raised in previous siting cases. In 2009, the Contra Costa County Airport Land Use Commission (ALUC), filed a letter with the Energy Commission requesting data on potential avian—specifically raven-attraction to the Mariposa Energy Project (MEP) cooling stacks. The MEP consultants performed a literature review investigating avian interactions exhaust stacks and plumes (CH2M Hill, 2010). This technical paper included interviews with CEC senior biologist Rick York, and failed to identify any significant mortality or injury associated with these project features at operating power plant sites. Staff has conducted an updated literature review, and, as mentioned, has no further internal Energy Commission data or published data that would indicate impacts would occur with a frequency or intensity that would have an adverse biological effect. It is not uncommon for raptors and scavenging species such as vultures to utilize thermal currents to search for prey and carcasses. While it is possible that a raptor may be attracted to a thermal upcurrent emanating from the stacks, there is no data to suggest that a raptor could be injured or killed while doing so, and staff is unaware of any significant documented events of this nature; although it certainly is possible. The stacks would not provide roosting or nesting opportunities for birds or bats, and given the industrial characteristics and pervasive human presence on the CECP site, the data indicates that most wildlife would have sufficient environmental cues to avoid the site (Final Staff Assessment, p. 4.3-21).

This analysis, and the report upon which it relies, are insufficient to conclude that the high-velocity, high-temperature plumes would not have an impact on birds and bats at the project site. The cited memorandum is focused on attraction of ravens to thermal plumes and relies on anecdotal reports from staff at power stations to assess any adverse impacts to wildlife. It is not clear that the observations were at stacks with high-velocity, high-temperature plumes from gas-fired turbines. The text of the report does not specify that any of the power plants described in that report were in fact of the type proposed for the Carlsbad Energy Center Project Amendment. The conclusion that birds will "avoid the site" is likewise tenuous, given that the project site is adjacent to wetlands and in fact birds might fly over the site to get from one part of the lagoon to another or to move from the ocean to the lagoon. Furthermore, the plumes reaching up several thousand feet would provide no visual cues whatsoever and birds approaching the lagoon would have no warning of them until they were encountered.

As a scientist interested in bird collision issues and anthropogenic avian mortality in general, I am unaware of any published studies addressing the impacts of high-velocity, high-temperature thermal plumes on birds, especially in sensitive locations such as next to wetlands. The information put forth in the Final Staff Assessment is unconvincing, especially because the main focus of the reference cited in support of the evaluation has to do with raven attraction to thermal plumes and not the potential for accidental flight through high-temperature plumes causing injury or death, such as what occurs when birds encounter the solar flux at concentrating solar power plants (McCrary et al. 1986, Kagan et al. 2014). No information is presented on the effects of thermal plumes from gas-fired power plants on small passerines, shorebirds, waterbirds, waterfowl, or bats, all of which might attempt to fly over the project site.

As a final item, I noticed that the Final Staff Assessment uses the "60-decibel rule" in assessing impacts to wildlife from noise. This threshold does not have biological validity and is not supported by current scientific research. The 60 dB(A) Leq threshold for impacts on avian species was first put forward in 1991 in an unpublished study conducted for the San Diego Association of Governments in which "it was theoretically estimated that noise levels in excess of 60 dB(A) Leq in [Least Bell's] vireo habitat would mask the bird's song, subsequently reducing the reproductive success of this species during their breeding season...." (County of San Diego 2000). This study has never been published or peer reviewed. The only citation in the scientific literature to the rule is a conference presentation by Bowles and Wisdom (2005), and this paper did not support the 60 dB(A) Leq standard:

> The rule was originally intended to prevent masking of species-typical songs of endangered birds such as the Coastal California Gnatcatcher. However, no research is available to demonstrate the effectiveness of the rule for any noise-related impact. Although A-weighting is probably a conservative estimator of bird exposure in the range from 125 Hz to 8 kHz, it may underestimate exposure at very low frequencies. Its utility as a weighting function has not been tested against other possible weighting procedures, such as use of the species-typical auditory threshold function. Additionally, where sources are intense but intermittent, Leq is unlikely to be a useful metric (Bowles and Wisdom 2005).

Scientific understanding of the effects of noise on birds has improved greatly, with studies published that present heuristic and mathematical models that quantify the pattern of impacts caused by noise (Hill 1990, Reijnen and Foppen 1994, Reijnen et al. 1996, Reijnen et al. 1997, Forman et al. 2002, Peris and Pescador 2004, Slabbekoorn and Ripmeester 2008, Barber et al. 2010, Naguib 2013, Halfwerk and Slabbekoorn 2015). Evidence shows that breeding bird habitat can be degraded at noise levels as low as 36 dB(A) (Reijnen et al. 1996, Reijnen et al. 1997). Rather than relying on undocumented research that has never been published in a peer-reviewed journal, the CEC should incorporate published scientific evidence of the impacts of noise on wildlife into its analysis.

Sincerely,

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