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3 December, 2003

California Fish and Game Commission
1416 Ninth Street
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RE: Evaluation of petition to list the Burrowing Owl as threatened or endangered

Dear Commissioners,

Below are my comments on the California Department of Fish and Game's (CDFG) evaluation of the burrowing owl listing petition submitted by The Center for Biological Diversity et al. My qualifications for making comments include a Ph.D. in ecology from the University of California at Davis and nearly 20 years of professional experience in wildlife ecology. I have performed original research in areas of animal ecology and research methodology which are central to the CDFG's premises underlying its conclusion. Many of my research results have been published in peer-reviewed journals and other professional outlets. Also, I have worked with burrowing owls at multiple locations in California, including at one of the sites identified by the CDFG as a core population area. My resume is attached with this letter.

The CDFG relied mostly on three premises for its conclusion that listing of the burrowing owl under the California Endangered Species Act (CESA) is not warranted. The first premise is the claim by the CDFG that a shift in population density has occurred, with increased densities appearing in the Imperial Valley and reduced densities at other locations in California. The implication is that the shift in density has served to balance out the absolute numbers of burrowing owls in the State, and that the species is not at risk of extinction due to the capacity of the Imperial Valley to maintain the species.

The CDFG's second premise is that the listing petition provided insufficient data of burrowing owl distribution and abundance prior to the recent research of DeSante et al., and the third is that burrowing owls are habitat generalists and are highly adaptable to land use changes and human facilities. Below I will explain how all three of these premises are fallacious.

Shifting Density

The CDFG inappropriately used density as an indicator of burrowing owl success. It has been known for two decades that density is a poor and potentially misleading indicator of success (Van Horne 1983), and it has been known for four decades that animal species routinely exhibit a shifting mosaic pattern of abundance (Taylor 1961, Taylor and Taylor 1977, 1979, Taylor et al. 1978). Animal density is a function of the size of the area examined by the research investigator(s) (Smallwood and Schonewald 1996, 1998) and the level of demographic

organization composing the estimate (Smallwood 1999, 2001). One should not assume that today's observed distribution of burrowing owls will be tomorrow's distribution, because animal species are naturally dynamic in their spatial distributions for reasons that have been hypothesized but not yet clearly understood. Denying a species the capacity to shift its populations can result in temporarily high densities on portions of the landscape that are normally not favored by the species, and that are not necessarily sustainable over significant periods into the future (Smallwood 2002). Site occupancy and even relatively high densities can be documented at sites that are ecological sinks, which are locations where mortality exceeds production, but where recruitment levels sustain the mortality.

Density estimates at research sites should not be extrapolated to larger regions without adjusting for the effect of study area size on the density estimate (Smallwood 1997). Such unadjusted extrapolations will be biased too high because animal species are naturally clustered in distribution, and researchers have almost always studied animal species at sites known to support high density. This is the case for burrowing owls (Figure 1), which can vary 100,000-fold in density between sites of 0.1 hectares to 100,000 hectares. The CDFG's evaluation relies on its comparison of Rosenberg's density estimates of burrowing owls in the Imperial Valley, Lemoore Naval Air Station, a site in the San Francisco Bay area, and the Carrizo Plain (page 6), but the conclusions drawn from this comparison were wrong if the sizes of study area varied substantially among locations. I have not reviewed Rosenberg's reported estimates, so I am unaware of his study area sizes or study design, but I suspect that the study area sizes used to estimate density were much smaller in the Imperial Valley than on the Carrizo Plain. The different densities reported may be an artifact of study design.

Even if the sizes of study areas used to estimate densities between sites were relatively similar, there are additional reasons why a comparison of densities between sites could have been misleading (Van Horne 1983, Smallwood 2002), including the fact that densities in ecological sinks will be greater than zero. Numerical abundance is a poor indicator of habitat selection for numerous reasons (Smallwood 2002), and this relationship between habitat selection and numerical abundance is much more complicated than the CDFG evaluation would lead some readers to expect. The uncertainty associated with the density estimates and their comparison is no less than the uncertainty in population trend estimated by the CDFG for burrowing owls in the Imperial Valley.

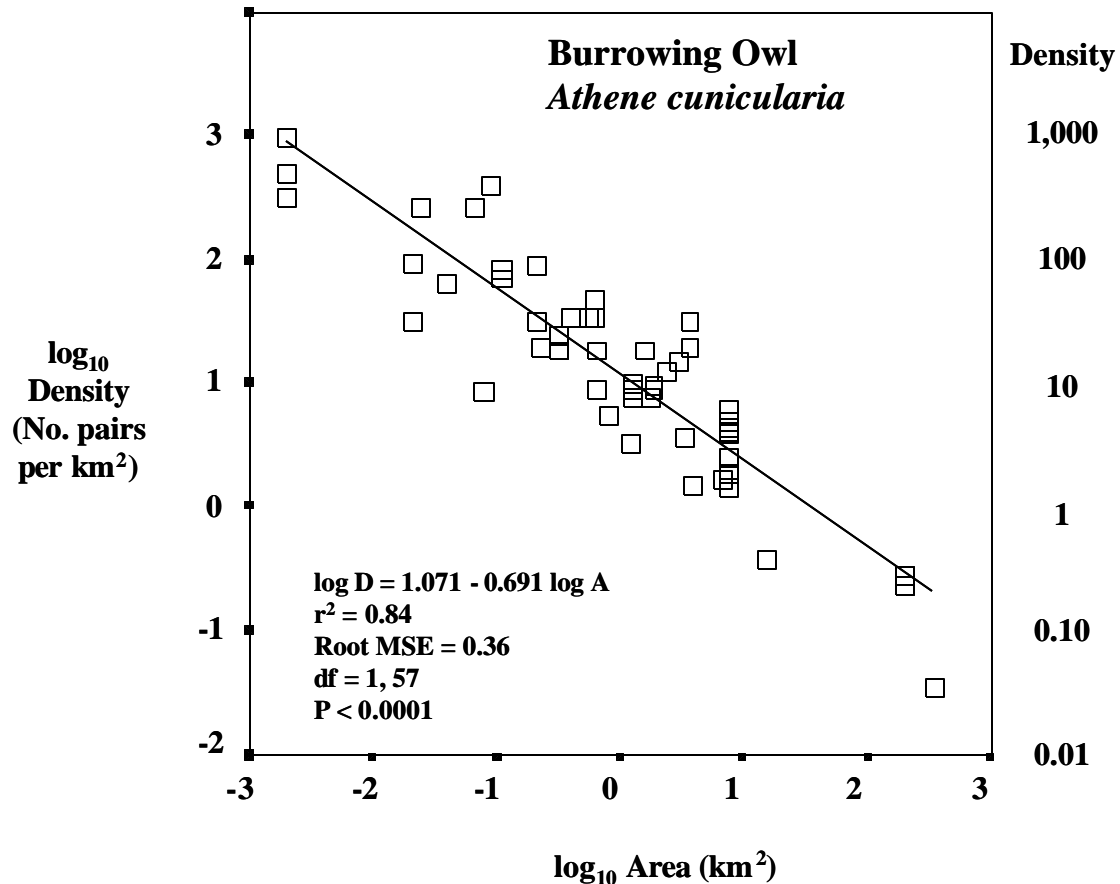


Figure 1. Burrowing owl density declines with increasing study area size as an inverse power function (copyright Smallwood 2003). Data used in this analysis were from Coulombe (1971), Thomsen (1971), Martin (1973), Butts (1976), Gleason and Johnson (1985), Haug and Oliphant (1990), Rodriguez-Estrella and Ortega-Rubio (1993a, b), Trulio (1993), Leptich (1994), Desmond and Savage (1996), Botelho and Arrowood (1998), and Wiley (1998).

Insufficient Data

The CDFG evaluation dismissed critical evidence presented in the listing petition related to population trend. The CDFG pointed to the lack of pre-DeSante scientific sampling and monitoring of burrowing owl numbers (page 9). However, the CDFG evaluation then goes on to claim that the densities in the Imperial Valley reported by Rosenberg represent a substantial increase from the past (page 14). The CDFG appears willing to rely on anecdotal information when it serves its argument that density has increased in the Imperial Valley, but it is willing to dismiss anecdotal information used by the petitioner to point out declines elsewhere. That the CDFG is willing to rely on anecdotal information in support of its arguments was also revealed on pages 8, where it relies on a general observation in Grinnell and Miller (1944) that burrowing owls are more abundant in low-lying areas, and on page 11, where it discusses a shift in abundance in the Sierra Nevada foothills due to the encroachment of exotic weeds. This sort of inconsistency in application of a standard of data sufficiency suggests bias (see Smallwood et al. 2001).

The standard of data sufficiency used by the CDFG in this case could not have been used in making the listing decision for most other rare and declining species. For example, it could not have been applied to the Swainson's hawk (*Buteo swainsoni*) because no estimates of numerical abundance existed for this species in California prior to Pete Bloom's estimate. Most likely CDFG has usually relied on anecdotal trend information when deciding to list species as threatened or endangered under CESA. If the CDFG is going to shift its policy on data sufficiency for listing decisions, then I recommend that it fund scientific monitoring for many rare species in California, because otherwise there will be no chance to list species that are in, or will be in, dire need of the protections afforded by listing.

Habitat Generalists

The CDFG states that burrowing owls are "habitat generalists and can respond favorably to resource management practices" (page 2). At various places in the evaluation the CDFG goes on to state that burrowing owls are known to reside under airport runways, along roadways, in irrigation canals, and etc. It cites research results demonstrating that burrowing owls thrive in vacant parcels in low-density areas undergoing residential development. (However, the citation for this research did not appear in the reference section of the CDFG's evaluation, so I cannot comment on the legitimacy of the research.) Citing a study performed at Lemoore Naval Air Station, it also claims that burrowing owls show no avoidance of cover crop types on agricultural landscapes. The implication of these anecdotes of adaptability is that burrowing owls are simply adjusting to the recent and ongoing human activities in California.

However, this portrayal of burrowing owls is unsupported by evidence and is contradicted by other conclusions made in the CDFG's evaluation report. Burrowing owls are not habitat generalists, as explained clearly in the CDFG's evaluation on page 15, where it quotes its own Wildlife Habitat Relationship data base: "the species is a yearlong resident of grassland and desert habitats, and in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats." This range of conditions is only a small subset of habitat types defined in WHR. Burrowing owls do not occur in conifer forests, woodland forests, riparian forests, any of the chaparrals, wetlands, coastal sage scrub, or alpine meadows, as examples. Burrowing owls only occur in short-stature grasslands, some desert conditions, along the margins of agricultural fields, and in ruderal settings where vegetation is generally sparse. This species resides in a relatively narrow range of environmental conditions. These conditions are declining in spatial extent in California.

Contrary to the claim made on page 7 of the evaluation, burrowing owls do avoid crop cover types. On page 21 the evaluation states that burrowing owls avoid vineyards and orchards. The CDFG's citation of Gervais et al. (2003) was misleading in its association with the claim that burrowing owls do not avoid any crop cover types. Gervais et al. (2003) reported on foraging patterns of burrowing owls on a small area including only alfalfa and cotton as the main crops. It was a mistake for the CDFG to extrapolate the findings of this study to all intensive agricultural landscapes in California, where many crop cover types are likely useless to burrowing owls (e.g., safflower, corn, wheat, rice, kiwis). In fact, burrowing owls do not reside on any land under cultivation, but rather on the water conveyance systems and road embankments at the margins of

agricultural fields. On agricultural landscapes burrowing owls are restricted to narrow bands of land along fences and railroad berms, as examples. Most of the land on agricultural landscapes is entirely unsuitable as den sites.

The CDFG's evaluation points to observations of burrowing owls residing and breeding successfully on vacant parcels within areas undergoing residential development, but neglects to point to the many known cases of burrowing owls being displaced shortly after these encouraging observations were made. Brenda Johnson's study at the Burrowing Owl Reserve at the UC Davis campus is a case in point. Burrowing owls did reside and reproduce on this vacant parcel within an area undergoing land conversions to human facilities, but this population could not persist. It was extirpated. After the owls vanished, the University built student housing on the former Burrowing Owl Reserve, thereby making the extirpation permanent. This scenario replays itself repeatedly on vacant parcels throughout the geographic range of burrowing owls in California.

Another example of burrowing owls residing and breeding on a vacant parcel was on the Mace Ranch site in eastern Davis. Whereas burrowing owls did indeed reside on this vacant parcel of land that was surrounded by new homes, the developer who owned title to the parcel disked the owls and destroyed some of them and their burrows during nesting season. The Davis City Council has since approved of the developer's plans to permanently convert that land and again to displace a population of breeding burrowing owls. This process of repeated evictions of burrowing owls from such vacant parcels has left the City of Davis with very few burrowing owls remaining.

Summary of Comments on CDFG's Premises

The CDFG inappropriately compared density estimates of burrowing owls between sites to support its argument that burrowing owls are habitat generalists, they benefit from intensive agriculture, they are most abundant in the Carrizo Plain, and that density has increased in the Carrizo Plain. The premise resulting from these comparisons of density is flawed, along with the premise that burrowing owls are habitat generalists and therefore highly adaptable to human-caused land use changes. Also flawed is CDFG's premise that insufficient data exist in support of petitioner's claim of large-scale population declines and geographic range reductions, and this flaw is evidenced by the inconsistency of the CDFG in assessing anecdotal information in this and in past listing petitions. All three of CDFG's premises for its listing recommendation are flawed. Therefore, I believe CDFG came to an unsound conclusion that the burrowing owl listing is not warranted.

Errors and Inconsistencies in the Evaluation

The CDFG is in error in its description of the status of burrowing owls at NAS Lemoore (page 12). The 50 acres of reclaimed landfill are not designated as Fresno kangaroo rat habitat. Also, the evaluation is misleading by implying that 1,070 acres of the naval base are burrowing owl habitat that is permanently available. The truth is that most of this acreage is subject to land use changes as the Navy decides are necessary in order to fulfill its mission. Only 106 acres are permanently protected as Fresno kangaroo rat habitat, and this parcel (Resource Management

Area 5 and a portion of RMA3) has supported burrowing owls in 6 to 23 burrows, the number appearing to vary with vegetation conditions (the smallest number corresponded with overcrowding by exotic grasses and tumbleweed, and the largest number with the opening up of the canopy due to a controlled burn). The CDFG evaluation should have explained that burrowing owls only have 106 acres of habitat guaranteed them into the future at the Lemoore Naval Air Station.

The CDFG is also in error in its description of my study of avian mortality at the Altamont Pass, although I appreciate that the CDFG noticed the study. On page 27, CDFG claims that changes in land use management “under and adjacent to wind turbines has helped to minimize the attraction of raptors to these areas by reducing prey densities,” and then the evaluation cites Smallwood et al. in press (2003). This summary of my and my colleagues’ research at the Altamont Pass is opposite of what we found. We found that the rodent control program at the Altamont Pass has increased the degree of prey species contagion around wind turbines, which has drawn more raptors to their deaths at the wind turbines. Also, please note that the reference to Smallwood et al. is incorrect. The truth is that the report cited and referenced in the back of the evaluation report does not exist because it has not been written yet. It is not “in press” nor is there a 2003 report to the California Energy Commission. We have a report submitted to the National Renewable Energy Lab, and I have reported results at professional meetings, but CDFG inaccurately portrayed and referenced our research at the Altamont Pass.

The CDFG is in error in its portrayal of Gervais et al.’s study of foraging burrowing owls at NAS Lemoore. CDFG claimed that there was no indication that burrowing owls selected fields recently treated with pesticides, but Gervais reported otherwise at the Burrowing Owl Symposium held in Sacramento three weeks ago. Burrowing owls did forage into a field recently treated with a pesticide.

The CDFG freely speculates when it appears to serve its arguments in the evaluation of the listing petition. For example, on page 11 it speculates that conservation lands acquired for endangered species may also provide suitable habitat for burrowing owls. However, the CDFG provided no examples of any place or real circumstance where such collateral benefits to the burrowing owl has been achieved. In another example, the CDFG speculates that burrowing owls are organized in core populations, and that these populations identified in CDFG’s evaluation report are in fact the species’ core populations (page 19). In truth, the CDFG has little basis for concluding that burrowing owls have core populations or where they are located. What is a core population?

On page 35 the CDFG speculates that populations of burrowing owls are much larger than the petitioner believes occur on large tracts of public lands due to the difficulty of detecting burrowing owls in these areas. However, no sound scientific evidence was presented in support of this conclusion, which appears, rather, to be speculation. The CDFG also speculates that burrowing owls used to occur at lower densities along some of the coastal counties (page 36), but no information was presented in support of this implied suggestion that the declines of burrowing owls in coastal counties were of lesser magnitude than suggested by the petitioner. In truth nobody knows how abundant burrowing owls used to be in coastal counties, but there is evidence that the species occurred in them and now it does not.

The CDFG states belief in certain of its conclusions, but its beliefs are sometimes not founded in any evidence. For example, CDFG (page 23) states its belief that at this time rodent control programs pose no risk to burrowing owls, but there is no explanation for why CDFG has this belief. Rodent control is extensively and often intensively applied across much of the lowland areas in California that were occupied or are currently occupied by burrowing owls. The loss of ground squirrel burrows to control programs was identified as a threat to California red-legged frog (U.S. Fish and Wildlife Service 2002), as well as to multiple other threatened and endangered species overlapping in geographic range with burrowing owls (U.S. Fish and Wildlife Service 1998), so it is unclear to me why CDFG concluded that rodent control programs pose no risk to burrowing owls. At the Altamont Pass, my colleagues and I noted that on land parcels where ground squirrels were effectively eradicated, burrowing owls were absent, and we also noted that ground squirrel burrows collapsed within only a few months following eradication. The rodent control program at the Altamont Pass appears to be a threat to the continued presence of burrowing owls there.

The CDFG states that it believes that existing regulations and guidelines help to conserve burrowing owl populations in California (page 29), but it offers no substantial evidence in support of this belief. No monitoring results are offered, not even anecdotal information is offered – only a belief. It claims (page 32) that the Staff Report on Burrowing Owl Mitigation has helped to conserve numerous burrowing owls and their habitat over the past eight years, but no examples or numbers of owls were presented as evidence that this Staff Report has indeed helped to conserve burrowing owls.

CDFG “believes” that certain sections of the Fish and Game Code provide protection for burrowing owls, and it cites 60 citations handed out in 1994 as examples of enforcement of this Code. However, the evaluation did not mention that any of these citations were for violations involving burrowing owls, nor did it present any information at all that CDFG enforces these sections of the Code with respect to burrowing owls.

CDFG claims that the Species of Special Concern designation has resulted in the consideration and mitigation of burrowing owls affected by most CEQA projects, and that this designation has resulted in a greater level of conservation than achieved for species lacking the designation. However, again the CDFG offers no evidence to back up either of these claims. Most EIRs and Negative Declarations I have reviewed – and I have reviewed many of these – have inadequately considered burrowing owls and have provided dismally inadequate mitigation, and many of these projects have not even complied with the CDFG mitigation guidelines. The CDFG has not offered one shred of evidence that the Species of Special Concern designation increased the level of conservation for burrowing owls, or that burrowing owls are any better off compared to species lacking this designation.

CDFG describes the NCCP Act as a conservation mechanism for burrowing owls, and it goes so far as to describe the Act as of “extreme value” to wildlife and habitat conservation in areas of rapid urbanization. Again, I point out that this claim was founded by no evidence. Not one example of the success of an NCCP was provided in CDFG’s evaluation. There is no effort made to demonstrate that no net loss was achieved with the implementation of an NCCP, or that

there was a net gain in burrowing owls in the planning area or even a net loss – there was no information to this regard.

Conservation Banks are claimed by CDFG to offset project impacts that cannot be mitigated onsite. However, CDFG provided no evidence that conservation banks have or ever will achieve a no net loss or an improvement in the distribution and abundance of burrowing owls, or that these banks will at all impede the decline of burrowing owls in California. The CDFG evaluation neglected to mention that the Haera Conservation Bank is too small to support more than a couple of pairs of burrowing owls, and that the usefulness of the Bank will be questionable once the Tesla Power Project is constructed and comes on line. The Tesla Power Project will be a 1200 megawatt power plant that will issue constant noise in excess of 60 dBA across the Haera Conservation Bank, which is situated immediately adjacent to the future power plant. Given such a case, and CDFG's apparent willingness to authorize the sale of credits to this bank, I cannot understand why CDFG would state its faith that conservation banks will make any difference to the status of burrowing owls.

Whereas the CDFG claims that the Migratory Bird Treaty Act provides a strong legal basis when making recommendations on CEQA projects, the CDFG provided no evidence that the MBTA has conserved any burrowing owls in California. In fact, the U.S. Fish and Wildlife Service has never enforced the MBTA at the Altamont Pass Wind Resource Area, where wind turbines have been killing at least 146 burrowing owls per year, and where, assuming equal mortality through time, 2,916 to 5,832 burrowing owls were killed by wind turbines over the past 20 years of operations. (It is also important to note that the Altamont Pass is likely a migration corridor, as implied by CDFG's discussion of known long-distance movements of burrowing owls [page 36], so many of the burrowing owls killed at the Altamont Pass might be from other parts of California.) What does the legal basis of the MBTA matter to CEQA projects when it is never enforced?

Conclusions

I recommend that the CDFG re-evaluate the listing petition before them, as well as any relevant supplemental information provided by commenters. The main arguments presented by CDFG are wrong, and the evaluation report is fraught with inaccuracies, speculation and inconsistencies. Its handling of uncertainty was unbalanced and biased in favor of its arguments against listing. Most importantly, the stakes are high, involving the persistence or extinction of one of California's most charismatic species of wildlife. It would be prudent for CDFG to provide a more rigorous evaluation of the evidence presented in the petition and supplements to the petition, and it would be prudent and more scientific to err on the side of caution.

Thank you for your consideration,



Shawn Smallwood

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