

STATE OF CALIFORNIA
Energy Resources Conservation
and Development Commission

DOCKET

07-AFC-5

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In the Matter of

The Application for Certification for the
Ivanpah Solar Energy Generating Station

Docket No. 07-AFC-5

INTERVENOR DEFENDERS OF WILDLIFE

REBUTTAL TESTIMONY

January 4, 2009

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STATE OF CALIFORNIA

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In the Matter of

Docket No. 07-AFC-5

The Application for Certification for the
Ivanpah Solar Energy Generating Station

REBUTTAL TESTIMONY OF RONALD MARLOW

To the best of my knowledge, all of the facts contained in this testimony (including all referenced documents) are true and correct. I am personally familiar with the facts and conclusions described within this testimony and if called as a witness, I could testify competently thereto.

Topic area: Biological Resources

Qualifications

I have a B.A. and a Ph.D. in Zoology from the University of California Berkeley. My Ph.D. was on the physiological ecology of the desert tortoise in Southern California. I have published in the academic literature, largely in the field of conservation (see attached c.v.). I have recently retired from the University of Nevada, Reno where I was a Associate Research Professor of Biology. My duties were to conduct research, and supervise post-doctoral and graduate student research, on various aspects of desert tortoise biology and conservation associated with the Clark County Desert Conservation Program. I supervised field work and participated in analysis and interpretation of the U.S. Fish and Wildlife Service Rangelwide Desert Tortoise Monitoring Program from 2001-2005. Prior to this I conducted efficacy research with colleagues in the United States Geological Survey on desert tortoise survey techniques resulting in the adoption of the current program.

I began research activities on desert tortoise biology in 1968 as part of an undergraduate research project. I continued that work for my graduate studies. In 1975 I began studies on the evolutionary genetics of the Galapagos giant tortoise and several species of South America tortoises. I have conducted field studies of tortoise populations in Southwestern U. S., Mexico, Galapagos, South America and Turkmenistan in Central Asia.

I am familiar with the extensive literature on the desert tortoise and have attended and presented at Annual Desert Tortoise Council Symposia, and other local, regional and international conferences and symposia on turtle and tortoise biology and Conservation. I am a member of the International Union for Conservation of Nature (IUCN) Freshwater Turtle and Tortoise Specialist Group (FTTSG).

I have visited the Ivanpah Valley many times, including conducting extensive translocation and desert tortoise survey methodology efficacy research.

Statement

I have reviewed the project applicant's relevant documents and find them inadequate in several regards:

1. The FSA Does Not Adequately Analyze the Status of the Desert Tortoise in the Northeastern Mojave Recovery Unit.

The Desert Tortoise is declining throughout its range. The most serious threats facing the remaining desert tortoise populations in the Mojave region (the area occupied by the Mojave population of the desert tortoise) is the cumulative load of human caused and disease-related mortality accompanied by habitat destruction, degradation, and fragmentation (William I. Boarman. 2002. Threats to Desert Tortoise Populations: A Critical Review of the Literature). Almost every extant desert tortoise population has been affected by one or more of these threats. As a result of cumulative impacts, desert tortoise populations have been extirpated or almost extirpated from large portions of the western and northern parts of their geographic range in California (e.g., Antelope, Indian Wells, and Searles valleys). Population declines or extirpations attributable to cumulative impacts have occurred in and near the California communities of Mojave, Boron, Kramer Junction, Barstow, Victorville, Apple Valley, Lucerne Valley, and Twentynine Palms. Similar patterns are evident near Las Vegas, Laughlin, and Mesquite, Nevada; and St George, Utah. Future extirpations can be expected in the vicinity of all cities, towns, and settlements (Fish and Wildlife Service. 1994. Desert tortoise (Mojave population) Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. Page 3). The Ivanpah Valley was proposed as a DWMA in the 1994 Desert Tortoise Recovery Plan. (Fish and Wildlife Service. 1994. Desert tortoise (Mojave population) Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. Page 41).

On the Ivanpah Valley plot, densities declined from 368 tortoises per square mile in 1970 to 249 in 1990, but this trend was not statistically significant (Berry 1990, as amended). Nine of 18 desert tortoises monitored in Ivanpah Valley from 1989 to 1991 succumbed to drought-related stress (Nagy et al. 1990, Berry 1992, Jacobson and Gaskin 1990). In addition, the proportion of juvenile desert tortoises declined from the 1970's to the 1990's at the Ivanpah Valley plot, probably as a result of high predation rates by ravens (Berry et al. 1986b, Berry 1990, as amended, 1991, BLM et al. 1989) (Fish and Wildlife Service. 1994. Desert tortoise (Mojave population) Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon. F13).

Desert tortoises are not randomly or evenly distributed. Tortoise distributions are clumped within areas of suitable habitat. A spatial analysis of the distribution of living tortoises and tortoise carcasses in the Ivanpah Valley from transect data showed a large area in which only carcasses were found, and a much smaller area in which live tortoises were found (Tracy, C.R., R. Averill-Murray, W. I. Boarman, D. Delehanty, J., Heaton, E. McCoy, D. Morafka, K. Nussear, B. Hagerty, P. Medica. 2004. Desert Tortoise Recovery Plan Assessment. Page 87 & Fig. 4.29). Tortoise carcasses degrade with time and are usually undetectable after 5-10 years. The implication of this finding is that the Ivanpah Valley has recently experienced a significant population decline with only small pockets of tortoises persisting. The remaining living tortoises are important to recovery of the Ivanpah Valley tortoise population. The U. S. Fish and Wildlife Service has concluded that the evidence of extirpation of tortoises in large parts of Ivanpah Valley and other areas throughout the range of the desert tortoise indicate that specific management actions taken to benefit tortoise populations have not been effective (U.S. Fish and Wildlife Service. 2008. Draft revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). U.S. Fish and Wildlife Service, California and Nevada Region, Sacramento, California. Page 6).

2. The FSA Does Not Adequately Analyze the Cumulative Impacts of All Past, Present and Future Foreseeable Projects in the Ivanpah Valley.

Staff states that without mitigation the ISEGS project would be a substantial contributor to the cumulatively significant loss of Ivanpah Valley's biological resources, including the threatened desert tortoise and other special-status species. However, it does not include separate mitigation measures to reduce the cumulatively significant impact, but rather relies on mitigation measures such as BIO-17, which is designed to reduce direct impacts, not cumulative impacts (Final Staff Assessment [FSA], p. 6.2-95).

The Ivanpah Valley tortoise population is severely depleted from historical levels and has been extirpated from large portions of its former range. Minimizing direct impacts on an already severely impacted population is inadequate and may result in the local extinction of tortoises in the Valley. Mitigation needs to address the cumulative impacts on the tortoise and the contribution the proposed project will make to those impacts.

3. The Proposed Site Contains High Quality Habitat Supporting a Genetically Distinct Subpopulation of Desert Tortoises.

Desert Tortoises in the Northeastern Recovery Unit, which includes Ivanpah Valley, were found to be genetically distinct. The Northeastern Recovery Unit, along with Virgin River Recovery Unit, showed the greatest genetic differentiation among tortoise populations in a recent study (Murphy, R.W., Berry, K. H., Edwards, T. and Mcluckie, A. M. 2007, A Genetic Assessment of the Recovery Units for the Mojave Population of the Desert Tortoise, *Gopherus agassizii*, Chelonian Conservation and Biology 6(2): 229–251). This analysis also suggested a recent population decline.

The Ivanpah Valley is one of the highest elevation areas supporting desert tortoises. Desert tortoise behavior varies significantly throughout its range. Tortoises construct deep and extensive burrows in areas subject to low winter temperatures. In areas with high summer temperatures tortoises restrict activity to early morning or they become inactive. The extent to which these behaviors are genetic is not known. Populations that occupy geographical, elevational or environmental extremes can be important refugia for species during periods of climate change. This area may therefore be important to the species in adapting to increased temperatures as a result of climate change. (Bury, R. B. and D. J. Germano (editors). 1994. *Biology of North American tortoises*. U. S. Dept. Interior, National Biol. Surv., Fish and Wildlife Research 13, Washington, DC).

A recent USGS study found that the proposed project site contained excellent habitat, scoring a 0.9/1.0 on a habitat quality index. (Nussear, K.E., Esque, T.C., Inman, R.D., Gass, Leila, Thomas, K.A., Wallace, C.S.A., Blainey, J.B., Miller, D.M., and Webb, R.H., 2009, Modeling habitat of the desert tortoise (*Gopherus agassizii*) in the Mojave and parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona: U.S. Geological Survey Open-File Report 2009-1102, p. 13).

The Applicant states that, “based on USFWS’s recommended maximum density, the Ivanpah site could support six hundred fifty-one (651) Desert Tortoise, not twenty-five (25). This is twenty-six times the number of Desert Tortoises actually found during on-the-ground surveys of the Project site.” (Applicant’s testimony, page 42). This statement seems to imply that areas with lower desert tortoise densities are somehow not important. On the contrary, because the species is declining throughout its range, for multiple reasons, it is very important to remove threats and recover the species in areas with lower density.

Desert tortoises are long-lived, slow to mature to reproductive age, and have a low annual reproductive output. As a result desert tortoise population recovery, if any, from declines or crashes is slow and difficult to detect. We know that desert tortoises have declined or crashed asynchronously throughout the tortoise’s range. These characteristics of tortoise populations and these circumstances make connectivity of extant populations and maintenance of tortoise habitat that previously supported populations, but is currently unoccupied, important for recovery of tortoise populations (U.S. Fish and Wildlife Service. 2008. Draft revised recovery plan for the Mojave population of the desert tortoise (*Gopherus agassizii*). U.S. Fish and Wildlife Service, California and Nevada Region, Sacramento, California. Page 88). We know that the desert tortoise population in Ivanpah Valley has crashed recently because we find large areas where only tortoise carcasses, and no live tortoises, are found.

It is clear that Ivanpah Valley has historically supported a denser and more widely distributed tortoise population. The applicant’s statement concerning a “USFWS’s recommended maximum density” for a tortoise population in Ivanpah Valley is not correct. There is no evidence to support any estimate of a maximum capacity for tortoises in Ivanpah Valley or anywhere else. The potential for any habitat to support tortoise

populations is not understood. Recent habitat modeling studies have started to examine the relationships among tortoise populations and presumed important habitat parameters (Nussear, K.E., Esque, T.C., Inman, R.D., Gass, Leila, Thomas, K.A., Wallace, C.S.A., Blainey, J.B., Miller, D.M., and Webb, R.H., 2009, Modeling habitat of the desert tortoise (*Gopherus agassizii*) in the Mojave and parts of the Sonoran Deserts of California, Nevada, Utah, and Arizona: U.S. Geological Survey Open-File Report 2009-1102). However, these models are untested. We know that prior to 1970 some areas that currently have tortoise densities of 5-10 tortoises/km² had densities of >100/km² (Fish and Wildlife Service. 1994. Desert tortoise (Mojave population) recovery plan. U.S. Fish and Wildlife Service, Portland, Oregon).

4. Desert Tortoise Populations Are in Jeopardy of Declining Further in the Northeastern Recovery Unit, Ivanpah Valley as a Direct Result of Habitat Loss and Fragmentation.

The Applicant states in its written testimony that the desert tortoises on the site are not lost “in perpetuity,” since the Applicant must restore the project site at the end of the Right of Way Grant and provide the BLM with a bond as security for site restoration. (Applicant’s testimony, Table BR-1, page 43). However, the Applicant has not substantiated this claim with any evidence that the site will be restored to the same habitat quality and that it will support the same population of desert tortoises.

As of 2002 the GAO found that more than \$100,000,000 had been spent on management actions to benefit tortoises by federal, state, local and private agencies. These actions have included elimination of grazing, fencing of roads, predator control, removal of roads, revegetation of disturbed areas, weed control, translocation, increased law enforcement, elimination of organized and casual off-road recreation and many other management actions. None of these have been shown to be effective in increasing tortoise populations (GAO. 2002. Research Strategy and Long-Term Monitoring Needed for the Mojave Desert Tortoise Recovery Program). There are no published studies of the effectiveness for tortoise recovery of either large-scale or small-scale (such as the proposed project) restorations of desert tortoise habitat. There is significant anecdotal evidence (my observations of many such projects and the observations of my close colleagues in this field) that habitat restoration efforts of small and large-scale projects have not been successful in restoring desert tortoise populations.

Finally, the applicant has not adequately described the direct, indirect and cumulative impacts of this project on the remaining remnant desert tortoise population. The applicant’s proposed mitigation is inadequate to address the current precarious survival prospects for this tortoise population. The applicant’s project places the Ivanpah Valley desert tortoise population in serious jeopardy.

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Education

A.B. 1973, in zoology, University of California , Berkeley.
Ph.D. 1979, in zoology, University of California, Berkeley.
Postdoctoral Fellow 1979-80 Biology Department, University of Chicago
Postdoctoral Scholar 1982-1983 Biology Department, University of Michigan

Research Interests

Conservation biology, population biology and physiological ecology of tortoises.

Professional History

1981-1982 Visiting Assistant Professor, Biology Department, University of Santa Clara, Ecology and Field Ecology.
1983-1984 Alexander von Humbolt Fellow, Institut und Museum für Geologie und Paläotologie, Universität Tübingen, Tübingen, Germany.
1984-1987 Visiting Scientist, Anatomy Department, Dalhousie University, Halifax, NS, Canada.
1988-1989 State Herpetologist, Nevada Department of Wildlife, Las Vegas, Nevada.
1996-2009 Associate Research Professor, Biological Resource Research Center, Biology Department, University of Nevada, Reno
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Membership in Professional Societies

American Society of Zoologists, American Association for the Advancement of Science, Society for the Study of Evolution, American Society of Ichthyologists and Herpetologists, European Herpetological Society, Herpetologist's League, Society for Conservation Biology, Asian Herpetological Research Society, Ecological Society of America, American Society of Naturalists, Southwestern Association of Naturalists.

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DECLARATION OF SERVICE

I, Joshua Basofin, declare that on January 5, 2010, I served and filed copies of the Attached Rebuttal Testimony of Dr. Ronald Marlow. The original document, filed with the Docket Unit, is accompanied by a copy of the most recent Proof of Service list, located on the web page for this project at:

[www.energy.ca.gov/sitingcases/ivanpah]. The document has been sent to both the other parties in this proceeding (as shown on the Proof of Service list) and to the Commission's Docket Unit, in the following manner:

(Check all that Apply)

FOR SERVICE TO ALL OTHER PARTIES:

X sent electronically to all email addresses on the Proof of Service list;

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CALIFORNIA ENERGY COMMISSION

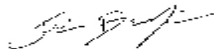
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I declare under penalty of perjury that the foregoing is true and correct.





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APPLICATION FOR CERTIFICATION
FOR THE IVANPAH SOLAR ELECTRIC
GENERATING SYSTEM

DOCKET No. 07-AFC-5
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(Revised 11/23/09)

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