Comment Set B0041, cont.
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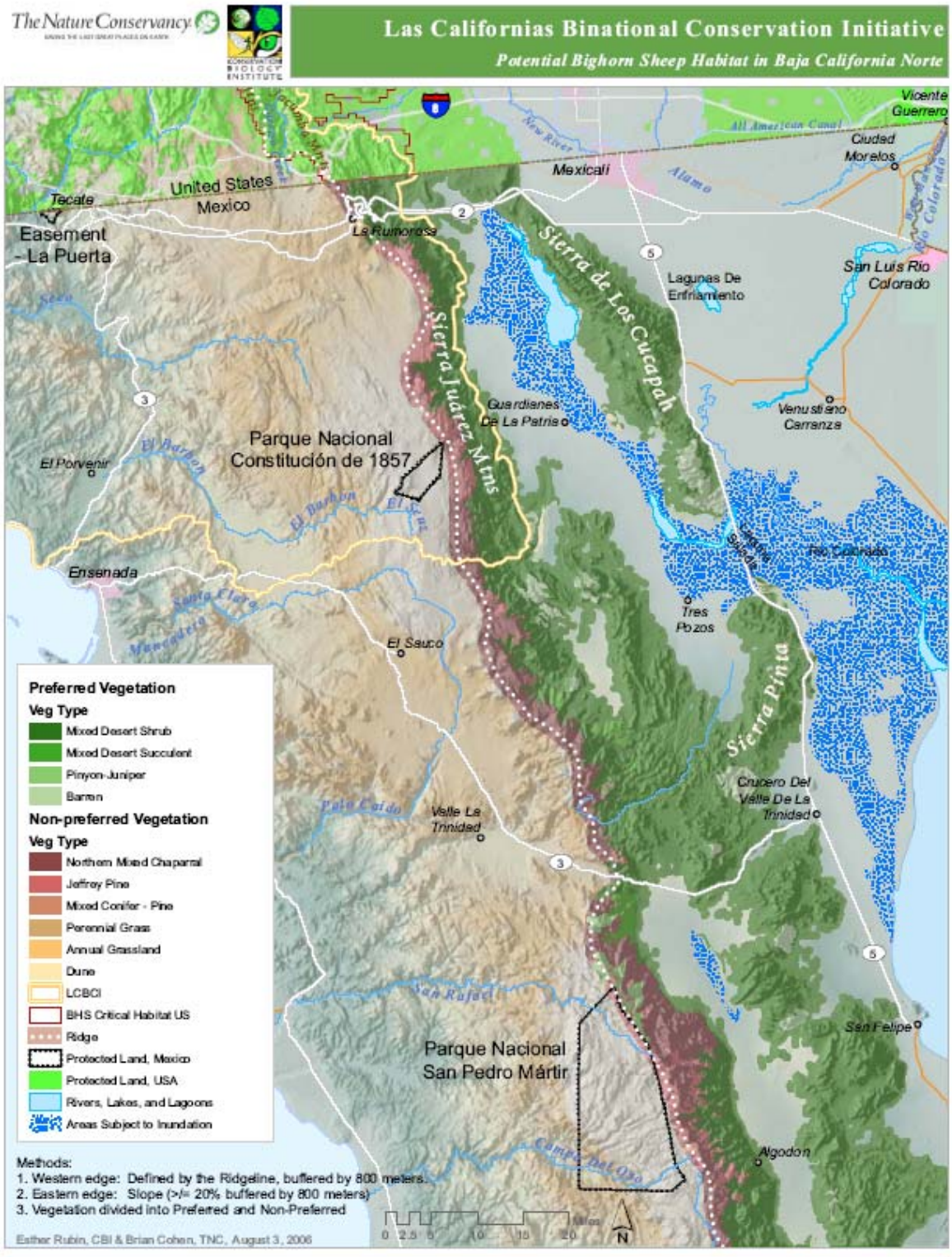

MAP 3
Testimony of Jerre Ann Stallcup

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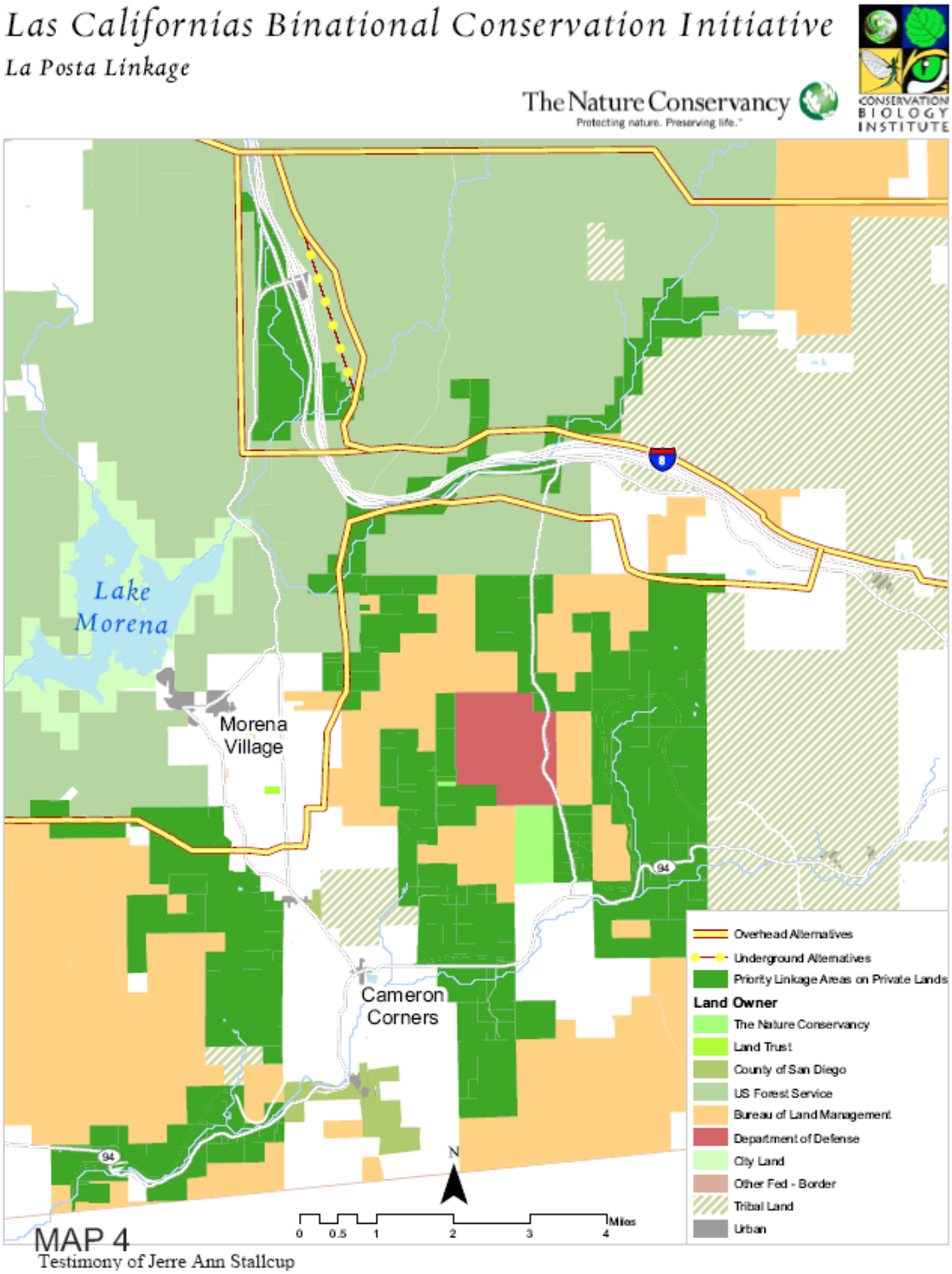
Center for Biological Diversity/Sierra Club



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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

In the Matter of the Application of San Diego Gas & Electric Company (U 902-E) for a Certificate of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project	Application 06-08-010 (Filed August 4, 2006)

PHASE II DIRECT TESTIMONY OF ESTHER RUBIN ON BEHALF OF THE CENTER FOR BIOLOGICAL DIVERSITY AND THE SIERRA CLUB

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Center for Biological Diversity/Sierra Club

Critical Review of Bighorn Sheep Impacts Described in the Draft Environmental Impact Report/Environmental Impact Statement, January 2008

Testimony of Esther S. Rubin, Ph.D., Conservation Biology Institute

My name is Esther Rubin. I am an ecologist with the Conservation Biology Institute, a nonprofit organization that provides scientific expertise to support conservation and recovery of biological diversity in its natural state through applied research, education, planning, and community service (www.consbio.org). I have studied bighorn sheep (*Ovis canadensis*) in the Peninsular Ranges of southern California for 14 years. I conducted my doctoral research on this population (2000, dissertation title: "The Ecology of Desert Bighorn Sheep [*Ovis canadensis]* in the Peninsular Ranges of California", University of California, Davis), conducted post-doctoral research on their habitat use and social behavior (Millennium Post-doctoral Program, 2000-2005, Conservation and Research for Endangered Species, Zoological Society of San Diego), and have published multiple peer-reviewed scientific articles related to bighorn sheep in these mountains. As part of these projects, I have conducted field work in the desert regions where the project and alternatives are proposed. In 1999, I was invited to be a member of the USFWS Recovery Team for this population, and was lead author on the USFWS Recovery Plan for bighorn sheep in this population (USFWS 2000). I continue to work with team members from the Zoological Society of San Diego, California Department of Fish and Game (CDFG), U. S. Fish and Wildlife Service (USFWS), California Department of Parks and Recreation, and other collaborators to guide recovery actions for this population. I am also an invited member of the Independent Science Advisors Panel for the San Diego County Multiple Species Conservation Plan (MSCP).

I provide this testimony to clarify and expand the discussion of potential impacts of the proposed Sunrise Powerlink and alternatives to bighorn sheep presented in the Draft Environmental Impact Report/Environmental Impact Statement (DEIR/EIS). My CV is included as Attachment A.

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Summary

The Proposed Project would have significant negative impacts on bighorn sheep in the Peninsular Ranges as described in the DEIR/EIS and in my comments below. However, other alternatives would also have adverse impacts on this population. All Southwest Powerlink (or I-8) Alternatives, the basis of the current "Environmentally Superior Southern Route (SWPL) Alternative", would bisect critical habitat, fragment connectivity, and cause direct or indirect loss of bighorn sheep or their habitat. The current "Environmentally Superior Northern Route Alternative" would also negatively impact bighorn sheep, primarily through disturbance from construction activities, damage to habitat, and possible abandonment of traditional lambing and foraging habitat. I agree with the DEIR/EIS's conclusion that the Proposed Project and these alternatives would have significant adverse impacts on bighorn sheep that can not be mitigated to below significant levels. The New In-Area Renewable Generation alternative, although causing less risk to bighorn sheep than the Proposed project or the Environmentally Superior Northern and Southern routes, could have negative impacts due to construction and maintenance activities within critical habitat, as correctly stated in the DEIR/EIS. Two other alternatives identified in the DEIR/EIS as environmentally superior alternatives (New In-Area All-Source Generation Alternative and the LEAPS Transmission-Only Alternative) would create less impact to endangered bighorn sheep in the Peninsular Ranges.

Background

Bighorn sheep are a native species inhabiting the Peninsular Ranges from the San Jacinto Mountains near Palm Springs south to Volcan Tres Virgenes near Santa Rosalia, Baja California, Mexico. In the United States portion of their range, they are distributed into at least 8 subpopulations, or ewe groups, that inhabit, from north to south, the San Jacinto Mountains, the Santa Rosa Mountains northwest of State Highway 74 (Hwy 74), the Santa Rosa Mountains southeast of Hwy 74, Coyote Canyon, the north San Ysidro Mountains (north of County Road S-22), the south San Ysidro Mountains (south of County Road S-22), the Vallecito Mountains, and Carrizo Canyon (Rubin et al. 1998). These subpopulations are connected via male movement and to a lesser extent by occasional movement of female bighorn sheep (DeForge et al. 1997, Rubin et al. 1998, CDFG unpublished data). In the U.S. Peninsular Ranges, bighorn sheep typically inhabit arid canyons, slopes, washes, and alluvial fans, and are most frequently found at

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elevations below 1,400 m (Jorgensen and Turner 1975), resulting in use of a narrow north-south band of habitat vulnerable to fragmentation and urban encroachment.

Bighorn sheep in the U.S. Peninsular Ranges declined to precariously low numbers in 1996, and were listed as a Federally Endangered population (distinct population segment) in 1998; they are also State listed as threatened (USFWS 2000). A number of factors may have caused their decline, and their recovery is threatened by disease, lion predation, habitat loss and fragmentation, and human disturbance.

The Recovery Plan for this population delineates a number of recovery strategies, designed to address the various threat factors. Priority 1 recovery actions include, but are not limited to, protection of essential habitat, maintenance and re-establishment of habitat connectivity, removal of exotic and invasive plants, reduction of mortality, reduction of disease and competition from domestic livestock grazing, protection of water sources, and development of a trails management program to reduce disturbance (USFWS 2000).

As part of the Recovery Plan, the Recovery Team delineated essential habitat for this population, which subsequently formed the basis of "critical habitat" designated in 2001. Under the Endangered Species Act of 1973, the U.S. Fish and Wildlife Service is required to designate critical habitat for each species listed under the Act, unless designation would not be prudent, with critical habitat defined as a specific geographic area that is essential for the conservation of a threatened or endangered species and that may require special management and protection. As a precursor to critical habitat, delineation of essential habitat was based on the team's collective knowledge of this population's habitat use, and recognition that habitat connectivity was important for the long-term persistence of the population; that subpopulations needed room to shift their habitat use in response to seasonal and long-term environmental changes, and that the long-term viability of the population was dependent on gene flow and demographic interchange between subpopulations (USFWS 2000). A long-term recovery goal stated in the Recovery Plan is to re-establish connectivity between bighorn sheep inhabiting the U.S. Peninsular Ranges, with bighorn sheep inhabiting areas to the south of the U.S. – Mexico international border.

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Based on population estimates generated by CDFG, the population has increased from a low of 280 animals in 1996 to an estimated 793 animals in 2006 (USFWS 2000, CDFG unpublished data). Tracking of radiocollared animals indicates that all 8 subpopulations are connected via movement of males and, in some cases, occasional moves by females (Rubin et al. 1998, CDFG unpublished data, E. Rubin personal observation). It also appears that animals have recently, perhaps as a result of increased population size, started to move into areas that were historically inhabited but that were vacant in the 1990s (Rubin et al. 1998). Habitat near Interstate 8 (I-8) is one example of this re-established range use. Although the population has increased in recent years, half of the subpopulations, including the south San Ysidro Mountains subpopulation, remain far below the minimum number of animals required for recovery (CDFG, unpublished data, USFWS 2000), and a number of factors continue to threaten the viability of the population.

Implications of the Powerlink to Bighorn Sheep in the Peninsular Ranges

Decisions related to the Sunrise Powerlink and its various alternatives will have tremendous implications for the future of bighorn sheep in the Peninsular Ranges. The DEIR/EIS correctly concluded that construction of the Proposed Project and several alternatives would have significant and unmitigable adverse impacts on the population. The extent of these impacts may be under-estimated in a number of cases, however, so in this testimony I provide additional clarification and information regarding the implications of various alternatives on the long-term viability of bighorn sheep in the Peninsular Ranges in California, and I comment on selected mitigation options presented in the DEIR/EIS.

Proposed Project, Connected Actions, and Alternatives

As concluded in the DEIR/EIS, the Proposed Project would have significant and unmitigable adverse impacts on bighorn sheep. These would result from project construction and maintenance activities (noise disturbance from heavy equipment and other vehicles, helicopters, habitat loss due to road construction, degraded habitat due to increased invasion of exotic plants, etc.) described in the DEIR/EIS, and I do not repeat those impacts in this testimony. Additional adverse impacts not presented (or not explicitly described) in the DEIR/EIS may occur however. These impacts include those related to modification of bighorn sheep behavior and those

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impacting habitat quality. The following concerns, not adequately discussed in the DEIR/EIS, should be carefully considered:

- According to the DEIR/EIS, construction of the Proposed Project is scheduled to begin early in 2008 and continue during a 24-month period. It is therefore possible that construction would occur during the spring lambing season (defined as January 1 through June 30 in the USFWS Recovery Plan; USFWS 2000). Females in the south San Ysidro Mountains subpopulation are known to give birth and raise lambs along the Proposed Project area (e.g., on Pinyon Ridge and Yaqui Ridge) and to feed extensively on the slopes and alluvial fans along the Proposed Project path. I have observed females foraging on the alluvial fans within the Proposed Project's footprint, more than 1000 meters from steep terrain. Disturbance during these periods could cause them to abandon these important areas. This would be significant because this subpopulation already inhabits a relatively constrained area (between County Road S-22 and Highway 78) and therefore has limited options for lambing and foraging areas.

- The DEIR/EIS correctly states concerns that noise from the overhead lines could cause bighorn sheep to avoid areas in proximity to the powerline. The DEIR/EIS suggests that noise may occur during wet and moist periods. However, it is possible that bighorn sheep may hear, or otherwise sense, the lines under all conditions and that they will abandon habitat near the line and/or avoid moving under the lines. This could have devastating impacts on the population. Although the DEIR/EIS correctly states that the two subpopulations on either side of the Proposed Project (the south San Ysidro Mountains and Vallecito Mountains subpopulations) would be impacted by the Proposed Project, and that all bighorn sheep in the Peninsular Ranges may be at risk, the latter point needs further reinforcement. Significance Criterion 4.c., "Impacts that result in fragmentation of a species' population" (DEIR/EIR, p. D.2-72), should be considered with careful attention.

  In relation to the other alternatives, the Proposed Project presents the greatest risk to bighorn sheep in the Peninsular Ranges. If bighorn sheep avoid areas near the powerline and do not move below the line, the Proposed Project could sever the entire

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U.S. population into two. We know from field observations and from genetic analysis (Boyce et al. 1999) that gene flow has historically occurred throughout the range, and that it continues today. Severing the population into two may increase the entire population's risk of genetic and demographic extinction, because smaller and isolated populations tend to have a higher risk of extinction than larger and interconnected populations (Gilpin and Soulé 1986). Small populations have an increased risk of inbreeding and reduced genetic fitness, they are at greater risk of random events in birth and death rates that could, for example, result in skewed sex ratios, and, because of their small overall size, they may succumb more quickly to periods of disease and predation. Habitat fragmentation may also result in a loss of habitat heterogeneity (Wilcove et al. 1986), by restricting bighorn sheep from using the full range of resources they need to survive. Desert bighorn sheep live in a harsh environment and their survival depends on the ability to move among various resources over short and longer time periods. For example they may need to shift their distribution in response to changes in food quality or abundance as a result of localized summer rain showers, or they may need to shift to a neighboring canyon because a water source dried up. Fragmentation would cut them off from these crucial resources. For all the above reasons, habitat fragmentation is seen as a major threat to bighorn sheep (Schwartz et al. 1986, Bleich et al. 1996), and it is particularly risky to bighorn sheep in the Peninsular Ranges due to the narrow elevational band of suitable habitat in these mountains (USFWS 2000).

By implementing the Proposed Project we would essentially be conducting an experiment on a Federally endangered species, because we do not know how bighorn sheep will react to the presence of the 500 kV powerline. To my knowledge, no research has been done on the impact of powerlines on bighorn sheep, however, previous research on other ungulate species has reported avoidance of powerlines. Lee and Reiner (1983, cited in Reimers et al. 2000) found that domestic cattle, although not showing any adverse behavioral changes when feeding or moving near a transmission line, used the areas under the powerline more when the line was periodically turned off, and that use decreased when the line was re-energized. Nellemann et al (2001) found that reindeer (*Rangifer tarandus tarandus*) density was

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lower within 2.5 km (1.6 miles) of powerlines as compared to more distant areas, even when forage availability was good near powerlines. Vistnes and Nellemann (2001) reported that reindeer avoided areas within 4 km (2.5 miles) of powerlines, even when associated human activity along the powerline was minimal, and that avoidance of powerlines appeared to be highest among females with offspring. In contrast, Reimers et al. (2007) observed reindeer moving under powerlines and feeding near them, and concluded, based on indirect measures of lichen (forage) use, that reindeer preferentially used areas near the powerline. They acknowledged however, that their observations may have been influenced by a topographical corridor which channeled animals into a migration corridor between seasonal ranges, and that constriction of this corridor near the powerline may have increased grazing pressure, counteracting possible aversion effects (Reimers et al. 2007). Research on the impacts of transmission lines is clearly in its infancy, and it is difficult to predict the response of bighorn sheep to the Proposed Project. Given this uncertainty, it would be unwise to experiment with a Federally endangered population, and we should therefore err on the side of caution to protect bighorn sheep in the Peninsular Ranges.

- Increased traffic and construction disturbance will increase the risk of invasion by exotic invasive plants, such as Saharan mustard (*Brassica tournefortii*), tamarisk (*Tamarix* spp.), and cheatgrass (*Bromus tectorum*), which will over time decrease habitat quality for bighorn sheep. Tamarisk, in particular, has adversely impacted bighorn sheep habitat by out-competing native plans and reducing surface water available to bighorn sheep; therefore, removal of exotic vegetation and prevention of invasion of exotic plants is listed as a Priority 1 recovery strategy in the Recovery Plan for bighorn sheep in the Peninsular Ranges (USFWS 2000).

- The area of habitat impacted, or the distance within which bighorn sheep are disturbed, by construction and maintenance activities may be greater than estimated in the DEIR/EIS because bighorn sheep have keen eyesight and sound travels uphill extensively. Project impacts may therefore extend upslope to include the viewshed around the Proposed Project. Although the DEIR/EIS discusses the fact that noise, in

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general, may cause disturbance to wildlife, and the report discusses the impact of noise to specific bird species and that crackling noises from wet powerlines may disturb bighorn sheep, the DEIR/EIS does not address or estimate the distance that construction and maintenance sound may travel uphill onto nearby slopes.

I agree with the conclusion of the DEIR/EIS that impacts to bighorn sheep and their habitat would be significant and not mitigable. I also agree with the statement that the suggested mitigation measures would not reduce impacts to below significant levels. For example, if the Proposed Project causes the population to be severed into two, no amount of monitoring, habitat restoration, or habitat acquisition will re-establish that connectivity.

Connected Action – La Rumarosa Wind Project

The La Rumarosa Wind Project is considered a connected action of the Proposed Project because it is closely linked to the Proposed Project (DEIR/EIS, p.B-5) . A long-term goal stated in the Recovery Plan for bighorn sheep in the Peninsular Ranges is to re-establish connectivity with populations of bighorn sheep south of the US-Mexico border (USFWS 2000, p.79). Although suitability of current conditions south of the border (in terms of livestock grazing, disease risk, and land management practices, etc.) must first be assessed, re-establishing connectivity to populations south of the border will increase the long-term viability of the U.S. Peninsular Ranges population. This goal is consistent with the *Las Californias Binational Conservation Initiative* (LCBCI), a collaborative project of CBI, The Nature Conservancy, Terra Peninsular, and Pronatura, which strives to protect ecological integrity and connectivity for the full complement of natural communities, processes, and wide-ranging species in the Las Californias region (CBI et al. 2004). The LCBCI has been adopted by the U.S. Bureau of Land Management, California State Parks, and the California Biodiversity Council, among others, as part of their agency planning visions. As part of the LCBCI, a trans-boundary park has been proposed which would link Anza-Borrego Desert State Park with Parque Constitución de 1857 in Baja California (CBI et al. 2004). As part of this planning effort, we have developed a preliminary bighorn sheep habitat model, to evaluate where bighorn sheep habitat (and targets for protection) might occur south of the border. The attached map (Attachment B) indicates potential bighorn sheep habitat south of the border. La Rumorosa and the proposed wind

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generation plant to its east are both in potential bighorn sheep habitat, within a rather narrow ribbon of habitat that provides the crucial link between bighorn sheep populations on either side of the border. This is consistent with statements in the DEIR/EIS (p. D.2.-248) that bighorn sheep likely occur in the Mexican right-of-way (ROW) for this project, according to Mexican government records. The proposed wind generation plant could therefore have negative impacts on bighorn sheep in the area, and provide an obstacle to movement of bighorn sheep through this area. Although the impact of wind generation turbines on species such as bighorn sheep is not well understood, it is likely that the infrastructure required to support a large array of turbines (such as roads, transmission lines, and substations), and the construction and maintenance activities associated with this infrastructure, can result in extensive habitat loss and fragmentation (Kuvlesky et al. 2007).

The DEIR/EIS is correct in stating that development of the La Rumarosa wind project, as a connected action of the Proposed Project, could have significant and unmitigable adverse impacts on bighorn sheep. Although bighorn sheep in Mexico are not part of the U.S. Federally listed population, negative impacts to their populations jeopardize a long-term recovery goal for Federally listed bighorn sheep in the U.S. (namely, to re-establish connectivity to Mexican populations). Although sources cited in the DEIR/EIS (Bighorn Institute 2007) state that there are many more bighorn sheep in Baja California, Mexico, accurate estimates for the entire population do not exist, and very little is known about abundance and distribution of bighorn sheep just south of the international border (J. Deforge, Bighorn Institute and R. Lee, Foundation for North American Wild Sheep, personal communication). In addition to mitigation measures listed in the DEIR/EIS, impacts of this project may be minimized by conducting surveys to determine bighorn sheep distribution in the region, and then locating the wind project and associated infrastructure outside of bighorn sheep habitat.

Partial Underground 230kV ABDSP SR78 to S2 Alternative, with/without All Underground Option

This alternative would have less negative impacts than the Proposed Project, because of the lack of a 500kV overhead line. However this alternative still would have adverse impacts on bighorn sheep from extensive construction activities, as correctly described in the DEIR/EIS. I do not list

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all the impacts here again, but emphasize that construction activities undertaken as part of this alternative (regardless of whether the All Underground Option is included or not) have the potential to interfere with the normal use of foraging and lambing habitat in the area, and could cause abandonment of habitat. Construction activities may also negatively impact San Felipe Creek and nearby riparian areas in Sentenac Canyon. These areas provide important foraging and watering resources for bighorn sheep, and I have observed animals feeding and watering in the area. Future transmission system expansion, likely requiring overhead transmission lines, would further impact bighorn sheep. In addition to the mitigation measures stated in the DEIR/EIS, I would stress that construction and maintenance activities should not be conducted during the lambing season or during summer. Mitigation measures are not likely to reduce adverse impacts to less than significant levels.

Overhead 500kV ABDSP Within Existing ROW, with/without East of Tamarisk Grove Campground Option

This alternative would have much the same impacts on bighorn sheep as the Proposed Project, with the exception of less impact from the direct footprint of the project. My above comments in relation to the Proposed Project therefore apply to this alternative.

Southwest Powerlink Alternative and Alternatives

The Southwest Powerlink Alternative, also referred to as the Interstate 8 (I-8) Alternative, avoids ABDSP but does not avoid impacts to bighorn sheep, since it bisects their critical habitat in at least two areas. It bisects critical habitat in the southern portion of the Coyote Mountains and in the Jacumba Mountains (both areas inhabited by the Carrizo Canyon subpopulation). It would also cross a small portion of critical habitat under the BCD alternative. Critical habitat would be bisected in the Coyote Mountains and in the Jacumba Mountains under all the I-8 alternatives, so the following comments apply to all I-8 alternatives. My previous comments in relation the Proposed Project and the impacts of an overhead 500 kV transmission lines also apply to transmission lines along these alternatives.

Bighorn sheep inhabited areas south of I-8 (and north of the international border) in the 1960s and 1970s, with an estimate of $\geq$ 22 and 30 animals in 1968 and 1979, respectively (Weaver et

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al. 1968, Cunningham 1982). Although the DEIR/EIS stated that those sheep represented a separate subpopulation (or "ewe group"), this is unknown and it is just as likely that they were individuals from the Carrizo Canyon subpopulation. Surveys in the early 1980s detected only a small number of animals south of I-8, and surveys after the mid-1980s have detected no animals south of I-8. It is possible that disappearance of bighorn sheep in that area was linked to increased traffic along I-8, other human activities in the area, or an overall decline in population size, but their disappearance south of I-8 also coincided with the onset of energy transmission along the Southwest Powerlink in 1984. The Southwest Powerlink runs along the I-8 corridor where I-8 intersects bighorn sheep habitat in the Jacumba Mountains.

In the past 1-2 years, a number of sheep sightings have confirmed that animals, including females with lambs, and most likely from the Carrizo Canyon subpopulation, are once again using areas near I-8. Between approximately MP I8-22 and MP I8-31, the Southwest Powerlink and I-8 alternatives of the Sunrise Powerlink run through an area where the interstate temporarily splits into separate east-bound and west-bound lanes, creating an "island" between east- and west-bound lanes. Bighorn sheep have recently been using areas to the north of the interstate (and north of the Southwest Powerlink and I-8 alternatives to the current project), primarily between Mountain Spring and where Devil Canyon passes under the interstate to the east). Some individuals have moved into the island (via a large underpass at Devil Canyon), and sheep sign (pellets) suggests that some individuals may have moved to the south of I-8, via unknown routes.

As discussed above, re-connection of bighorn sheep populations in the U.S. and in Mexico is a long-term goal stated in the USFWS Recovery Plan for Peninsular bighorn sheep, and the *Las Californias Binational Conservation Initiative* (CBI et al. 2004). The panel of Independent Science Advisors for the East San Diego County Multiple Species Conservation Plan (MSCP) also recommended that the MSCP should facilitate and promote connectivity across the international border to the extent feasible, and that linkages to Mexico (and other important conservation targets outside the study area) should be hard-coded into reserve design (Noss et al. 2007). If bighorn sheep in the U.S. Peninsular Ranges population are to be re-connected to populations south of the border, use of this area and habitat south of the interstate is critical (Attachment B). Although serious obstacles to bighorn sheep movement exist here, it is

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encouraging that bighorn sheep are once again using areas near I-8 (although mostly to the north of the interstate and the Southwest Powerlink), and that at least some animals have moved south. Long-term planning should include overpasses and other freeway modifications to facilitate safe passage across I-8. The barrier posed by the Southwest Powerlink is not well understood, but it is likely that construction and maintenance of a second parallel transmission line will decrease the chances of bighorn sheep moving through this area (for reasons discussed in the DEIR/EIS and in my additional comments related to the Proposed Project), and this would reduce the effectiveness of crossing structures (overpasses or underpasses) designed to allow bighorn sheep to safely cross the interstate. Vistnes et al. (2004) suggested that construction of powerlines, "…and particularly parallel power lines…" negatively impacted habitat use of wild reindeer. In the absence of data on responses of bighorn sheep to transmission lines, reindeer can provide some clues as to how bighorn sheep may respond, because they are also wide-ranging ungulates that rely on their keen senses and gregarious behavior to detect and evade predators.

Some mitigation measures suggested in the DEIR/EIS, such as timing of construction to avoid lambing seasons (January 1 through June 3; USFWS 2000) and periods of high water use (June 1 through September 30; USFWS 2000), may minimize the impact to the population, but it is likely, as stated in the DEIR/EIS, that mitigation measures will not mitigate impacts to less than significant levels. Although I strongly encourage construction of vegetated overpasses to provide safe passage over I-8, the presence of additional transmission lines, as yet another potential barrier, along with associated construction and maintenance disturbance, may cause bighorn sheep to abandon the area.

The I-8 alternatives also present a potential negative impact to bighorn sheep to the west of Mountain Springs. Near approximately MP I8-34 and MP I8-36, the proposed I-8 alternatives passes through upper sections of the Carrizo Canyon watershed. Although the route is not in bighorn sheep critical habitat at this location, construction and maintenance activities at this site could negatively impact the Carrizo Canyon watershed, with key bighorn sheep habitat downstream. These impacts may include erosion, introduction and perpetuation of invasive plant species (e.g., tamarisk), and potential barriers to water flow north into Carrizo Canyon. The seeds of tamarisk, which grows readily in disturbed soils and can be introduced by vehicles, may

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spread downstream by water and by air, into bighorn sheep habitat, where it can out-compete native forage plants, usurp tremendous amounts of precious water, and provide increased cover for predators. Increased soil erosion near transmission maintenance roads could result in siltation of downstream watersources crucial to bighorn sheep, and barriers to waterflow could alter or restrict waterflow to downstream areas within bighorn sheep habitat. Measures to minimize these impacts should include removal of tamarisk and other invasive exotic plants, control of construction erosion, and avoidance of unnatural waterflow barriers.

New In-Area Renewable Generation

According to the DEIR/EIS, the New In-Area Renewable Generation alternative would involve construction of approximately 11 miles of underground line (mostly under existing roads) and construction of approximately a two-mile stretch of new transmission lines, all within critical habitat. While much less threatening to bighorn sheep than the Proposed Project and alternatives discussed above, I agree with the DEIR/EIS in its conclusion that this could cause significant and unmitigable impacts on bighorn sheep, according to Significance Criterion 1.d. Although mitigation measures may not reduce impacts to less than significant levels, I suggest that, in addition to mitigation measures listed, construction and maintenance activities are not conducted during the lambing season or periods of high water need.

Conclusions

Based on my knowledge of bighorn sheep and review of the DEIR/EIS, it is my conclusion that the Proposed Project would have significant negative impacts on bighorn sheep in the Peninsular Ranges as described in the DEIR/EIS and my comments above. However, other alternatives would also have adverse impacts on this population. All Southwest Powerlink (or I-8) Alternatives, the basis of the current "Environmentally Superior Southern Route (SWPL) Alternative", would bisect critical habitat, fragment connectivity, and cause direct or indirect loss of bighorn sheep or their habitat. The current "Environmentally Superior Northern Route Alternative" would also negatively impact bighorn sheep, primarily through disturbance from construction activities, damage to habitat (e.g., in Sentenac Canyon), and possible abandonment of traditional lambing and foraging habitat. The New In-Area Renewable Generation alternative, although causing less risk to bighorn sheep than the Proposed project or the Environmentally

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Superior Northern and Southern routes, could have negative impacts due to construction and maintenance activities within critical habitat. Two other alternatives identified in the DEIR/EIR as environmentally superior alternatives (New In-Area All-Source Generation Alternative and the LEAPS Transmission-Only Alternative) would create less impact to endangered bighorn sheep in the Peninsular Ranges.

I declare under penalty of perjury this testimony and attached Appendices are, to the best of my knowledge, true and correct.

/s/ Esther S. Rubin_____

Esther S. Rubin, Ph.D.
Conservation Biology Institute

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List of Attachments

Attachment A: Curriculum Vitae of Esther S. Rubin

Attachment B: Map of Potential Bighorn Sheep Habitat in Baja California Norte

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Attachment A

Esther S. Rubin, Ph.D.—Curriculum Vitae

Conservation Biology Institute
P.O. Box 369
Borrego Springs, CA 92004
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EDUCATION

Ph.D. Ecology. University of California, Davis. 2000. Dissertation: The Ecology of Desert Bighorn Sheep (*Ovis canadensis*) in the Peninsular Ranges of California.

Bachelor of Science. Zoology. University of California, Davis. 1983.

EMPLOYMENT HISTORY

December 2005 – present. Ecologist, Conservation Biology Institute, San Diego, California. Conservation Biology Institute is a nonprofit organization with 501(c)(3) status (www.consbio.org). In this position, I provide scientific expertise to support the conservation and recovery of biological diversity through applied research, education, planning, and community service.

December 2000 – December 2005. Post-doctoral Research Fellow, Zoological Society of San Diego, California. Conducted research on habitat use, social behavior, and mountain lion predation of bighorn sheep in the Peninsular Ranges, California. Provided invited recommendations to state and federal biologists and managers regarding management issues related to this population and land use decisions in their desert habitat. Frequently presented invited lectures for university ecology and biology courses, and for grade school, high school, and public audiences.

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July 1994 – December 2000. Scientific Aide, California Department of Fish and Game, Sacramento, California. Conducted field studies on bighorn sheep in the Peninsular Ranges, California, to determine distribution, abundance, recruitment, survivorship, and causes of mortality. Worked closely with California State bighorn sheep program coordinator and other parties (state and federal agencies, universities, and NGOs) to develop a management program for this population.

August 1998 – January 1999. Contractor, U. S. Fish and Wildlife Service, Carlsbad, California. Prepared a draft Federal recovery plan (adopted by the US Fish and Wildlife Service) for Peninsular bighorn sheep, a Federally endangered population. Worked closely with a variety of agencies and organizations (State, Federal, Indian, NGO, University, and private) to compile existing knowledge and develop conservation strategies.

September 1987 – September 1993. Senior Keeper, Zoological Society of San Diego, San Diego Wild Animal Park, Escondido, California. Hand-raised exotic ungulates that had been orphaned, injured, or rejected by their dams. Formulated diets and provided complete care for neonates. Developed new techniques and protocols and presented information at workshops, scientific meetings, and in peer-reviewed journals.

April 1991 – July 1991. Senior Hospital Keeper, Senior Keeper, Zoological Society of San Diego, San Diego Wild Animal Park, Escondido, California. Cared for mammals, birds, and reptiles that were housed at the hospital as medical patients or in quarantine as new animals to the Society's collection. Researched husbandry protocols, housing, and diet for each species, and assisted veterinarians during medical procedures and with medical care of patients.

April 1985 – September 1987. Children's Zoo and Nursery Attendant, Zoological Society of San Diego, San Diego Zoo, San Diego, California. Provided daily care for neonates in zoo nursery and Children's Zoo, supervised interactions between animals and the public, and educated the public about wildlife and conservation.

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PEER-REVIEWED PUBLICATIONS

Ostermann-Kelm, S., E. R. Atwill, E. S. Rubin, M. C. Jorgensen, and W. M. Boyce. In Press. Interactions between feral horses and desert bighorn sheep at water. Journal of Mammalogy 00:000-000.

Ostermann, S. D., E. S. Rubin, J. D. Groom, J. R. DeForge, G. Wagner, P. Sorensen, S. G. Torres, M. C. Jorgensen, A. J. Byard, and O. Ryder. 2005. Flawed model has serious conservation implications: Response to Turner et al. Wildlife Society Bulletin 33:1456-1464.

Boyce, W. M., C. S. O'Brien, and E. S. Rubin. 2003. Response of bighorn sheep (*Ovis canadensis*) to feral honey bees (*Apis mellifera*) at water. The Southwestern Naturalist 48(1):81-84.

Boyce, W. M., E. S. Rubin, and C. S. O'Brien. 2002. A scientific note on the distribution of Africanized honey bees and *Varroa destructor* in feral honey bee populations in California. Apidologie 33:581-582.

Rubin, E. S., W. M. Boyce, and E. P. Caswell-Chen. 2002. Modeling demographic processes in an endangered population of bighorn sheep. Journal of Wildlife Management 66(3):796-810.

Rubin, E. S., W. M. Boyce, C. J. Stermer, and S. G. Torres. 2002. Bighorn sheep habitat use and selection near an urban environment. Biological Conservation 104:251-263.

Ernest, H. B., E. S. Rubin, and W. M. Boyce. 2002. Fecal DNA analysis and risk assessment of mountain lion predation of bighorn sheep. Journal of Wildlife Management 66:75-85.

Hayes, C. L., E. S. Rubin, M. C. Jorgensen, R. A. Botta, and W. M. Boyce. 2000. Mountain lion predation of bighorn sheep in the Peninsular Ranges, California. Journal of Wildlife Management 64(4):954-959.

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Rubin, E.S., W.M. Boyce, M.C. Jorgensen, S.G. Torres, C.L. Hayes, C.S. O'Brien, and D.A. Jessup. 1998. Distribution and abundance of bighorn sheep in the Peninsular Ranges, California. Wildlife Society Bulletin 26(3):539-551.

Rubin, E.S. and K.J. Michelson. 1994. Nursing behavior in dam-reared Russian Saiga (*Saiga tatarica tatarica*) at the San Diego Wild Animal Park. Zoo Biology 13:309-314.

Mooring, M.S. and E.S. Rubin. 1991. Nursing behavior and early development of impala at San Diego Wild Animal Park. Zoo Biology 10:329-339.

REPORTS AND BOOK CHAPTERS

Rubin, E. S., V. J. Bakker, M. G. Efford, B. S. Cohen, J. A. Stallcup, W. D. Spencer, and S. A. Morrison. 2007. A population monitoring framework for five subspecies of island fox (*Urocyon littoralis*). Prepared by the Conservation Biology Institute and The Nature Conservancy for the Recovery Coordination Group of the Integrated Recovery Team. 145pp. + maps + app.

Spencer, W., E. Rubin, J. Stallcup, V. Bakker, B. Cohen, S. Morrison, and R. Shaw. 2006. Framework Monitoring Plan for the San Clemente Island Fox. Prepared by the Conservation Biology Institute, University of California, Davis, and The Nature Conservancy, for the United States Navy Region Southwest. 88pp and Appendices.

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by South Coast Wildlands, Idyllwild, CA (www.scwildlands.org) in cooperation with California State Parks.

Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, and E. Rubin. 2006. South Coast Missing Linkages Project: A Linkage Design for the Palomar-San Jacinto/Santa Rosa Connection. South Coast Wildlands, Idyllwild, CA (www.scwildlands.org).

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Penrod, K., C. Cabañero, P. Beier, C. Luke, W. Spencer, and E. Rubin. 2005. South Coast Missing Linkages Project: A Linkage Design for the San Bernardino-Little San Bernardino Connection. South Coast Wildlands, Idyllwild, CA (www.scwildlands.org).

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SCIENTIFIC PRESENTATIONS

Rubin, E. S., C. J. Stermer, W. M. Boyce, and S. G. Torres. Development of a predictive habitat model for bighorn sheep in the Peninsular Ranges, California. Biennial meeting of the Desert Bighorn Council. April 2007, Las Vegas, Nevada.

Rubin, E. S. Behavior is a necessary consideration in conservation: sexual segregation as an example. Annual meeting of the Society for Conservation Biology. July 2005. Brasilia, Brazil.

Rubin, E. S., C. J. Stermer, C. Chun, S. G. Torres, and W. M. Boyce. Mountain lion predation on bighorn sheep: an examination of risk factors and seasonal mortality patterns. Biennial meeting of the Desert Bighorn Council. April 2005, Alpine, Texas.

Rubin, E. S. and C. J. Stermer. A closer look at sexual segregation in bighorn sheep: what do the patterns tell us about causal factors? Biennial meeting of the Desert Bighorn Council. April 2005, Alpine, Texas.

Rubin, E. S. and L. Aubery. Data acquisition success rates of GPS collars: an evaluation in desert bighorn sheep habitat. Poster. Biennial meeting of the Desert Bighorn Council. April 2005, Alpine, Texas.

Ostermann, S. D., E. R. Atwill, E. S. Rubin, and W. M Boyce. Direct and indirect interference competition between feral horses and desert bighorn sheep at water. Poster. Biennial meeting of the Desert Bighorn Council. April 2005, Alpine, Texas.

Rubin, E. S. Sexual segregation and its relation to mating systems: bighorn sheep (*Ovis canadensis*) as an example. Invited presentation. The XIXth International Congress of Zoology. August 2004, Beijing, China.

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Rubin, E. S. Further examination of sexual segregation in bighorn sheep: preliminary results from an ongoing study. Invited presentation. Workshop on Sexual Segregation. Cambridge University. September 2002, Cambridge, England.

Rubin, E. S., W. M. Boyce, and E. P. Caswell-Chen. A simulation model for exploring demographic processes in an endangered population of bighorn sheep. Annual meeting of the Desert Bighorn Council. April 2002, Palm Springs, California.

Rubin, E. S., W. M. Boyce, D. Shaari, L. L. Jee, R. A. Botta, A. J. Torres, and M. C. Jorgensen. A pilot study to evaluate the utility of GPS radiocollars. (poster). Annual meeting of the Society for Conservation GIS. July 2001. Borrego Springs, California.

Rubin, E. S., W. M. Boyce, and V. C. Bleich. Reproductive strategies of desert bighorn sheep. Annual Conference of The Wildlife Society – Western Section. January 2000, Riverside, California.

Rubin, E. S. and W. M. Boyce. Seasonality of breeding in bighorn sheep in a low latitude desert environment. 78th Annual Meeting of the American Society of Mammalogists. June 1998, Blacksburg, Virginia.

Rubin, E. S. and W. M. Boyce. Seasonality of breeding in bighorn sheep in a low latitude desert environment. 42nd Annual Desert Bighorn Council Meeting. April 1998, Las Cruces, New Mexico.

Rubin, E., W. Boyce, M. Jorgensen, S. Torres, C. Hayes, and C. Green. The distribution, abundance, and population trends of bighorn sheep in the Peninsular Ranges of California. 41st Annual Desert Bighorn Council Meeting. April 1997, Grand Junction, CO.

Rubin, E., W. Boyce, and C. Hayes. Reproductive success of Peninsular bighorn ewes in southern California. 40th Annual Desert Bighorn Council Meeting. April 1996, Holtville, California.

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Rubin, E., W. Boyce, and C. Hayes. Reproductive success of Peninsular bighorn ewes in southern California. 10th Biennial Symposium of the Northern Wild Sheep and Goat Council. April 1996, Silverthorne, Colorado.

Boyce, W., E. Rubin (presenter), C. Hayes, S. Torres, and M. Jorgensen. Mountain lion predation on bighorn sheep in the Peninsular Ranges of California. 10th Biennial Symposium of the Northern Wild Sheep and Goat Council. April 1996, Silverthorne, Colorado.

Rubin, E., W. Boyce, C. Hayes, S. Torres, and M. Jorgensen. Mountain lion predation on bighorn sheep in the Peninsular Ranges of California. Fifth Mountain Lion Workshop. February 1996, San Diego, California.

Rubin, E. and K. Michelson. The 1991 Saiga Neonate Study (video presentation). National Conference of the American Association of Zoo Keepers. September 1992, San Diego, California.

Rubin, E. Barasingha Fawn Development. Zoological Society of San Diego Non-domestic Neonatal Husbandry and Medical Care Symposium. October 1990, San Diego, California.

Rubin, E. Applying Behavioral Observations to Hand-raising Neonates. Zoological Society of San Diego Non-domestic Neonatal Husbandry and Medical Care Symposium. March 1989, San Diego, California.

INVITED LECTURES, TEACHING, AND SERVICE

November 2005-present. Member of the Independent Science Advisors Panel for the San Diego County Multiple Species Conservation Plan (MSCP).

March 2005-present. Graduate student guidance committee member. Janene Colby (M.S.), Comparison of GPS and VHF Telemetry Methods to Study the Habitat Use and Selection of Southern Mule Deer (*Odocoileus hemionus fuliginatus*). California State University, San Marcos.

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April 2005: invited lecture in ecology. Point Loma Nazarene University, San Diego, CA.

April 2004: invited lecture in ecology. Point Loma Nazarene University, San Diego, CA.

March 2004: invited lecture on bighorn sheep ecology. Anza-Borrego Institute, Borrego Springs, CA.

January 2004: invited presentation and lab discussion on wildlife research. U. C. Davis Veterinary School's Wildlife Genetics Division, Davis, CA.

November 2003: invited lecture on animal behavior. Point Loma Nazarene University, San Diego, CA.

November 2002: invited presentation, hike, and overnight camp for "Women in Science", an educational program for grade-school girls. San Diego Zoo Education Department, San Diego, CA.

January 2002: invited lecture on research and recovery of bighorn sheep. Desert Protective Council, San Diego, CA.

August 2001: invited lecture on conservation of bighorn sheep. American Association of Zoo Keepers, San Diego Chapter, San Diego, CA.

April 2001: invited lecture in ecology. Point Loma Nazarene University, San Diego, CA.

November 2000: invited presentation on "The role of habitat protection and connectivity in the recovery of bighorn sheep in the Peninsular Ranges of southern California". Missing Linkages Workshop, organized by South Coast Wildlands Project, San Diego, CA.

May 2000: invited lecture on bighorn sheep ecology, part of the "Desert Ecology Workshop". Anza-Borrego Desert State Park, Borrego Springs, CA.

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April 2000: invited lecture in ecology. Point Loma Nazarene University, San Diego, CA.

1999 – 2000. Provided invited guidance to researchers at the Autonomous University of Baja California on the development and initiation of a bighorn sheep study in the San Pedro Martir Mountains of Baja, Mexico.

July 1999. Participated in a 4-day workshop entitled "Population and Habitat Viability Assessment for the Desert Bighorn Sheep in New Mexico", New Mexico Department of Game and Fish, and The Conservation Breeding Specialist Group (SSC/IUCN), Santa Fe, New Mexico.

Adhoc reviewer for the Journal of Wildlife Management.

Adhoc reviewer for the Journal of Zoo and Wildlife Medicine.

Adhoc reviewer for the journal, Restoration Ecology.

Adhoc reviewer for the journal, Acta Biologica.

PROFESSIONAL ORGANIZATIONS AND AFFILIATIONS

American Society of Mammalogists

Anza-Borrego Foundation and Institute, Borrego Springs, California (member, Board of Trustees)

Anza-Borrego Institute, Borrego Springs, California (invited member of Research Committee)

Desert Bighorn Council (elected Secretary)

Society for Conservation Biology

South Coast Wildlands (Board member and elected Secretary)

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The Wildlife Society

United States Fish and Wildlife Service (invited member of Recovery Team for bighorn sheep in the Peninsular Ranges)

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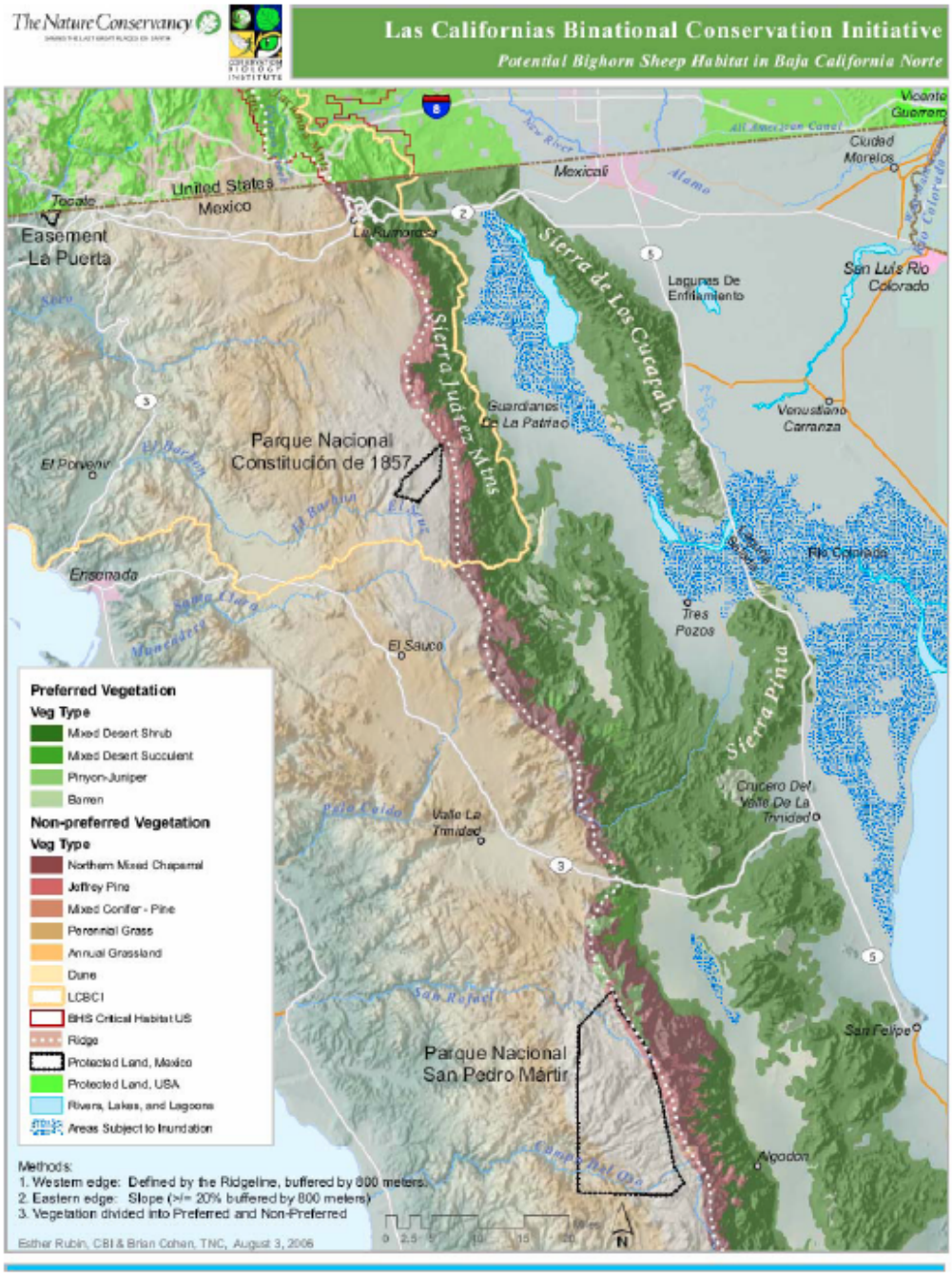
Attachment B



Conservation Biology Institute 28 March 12, 2008

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Center for Biological Diversity/Sierra Club

BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

In the Matter of the Application of San Diego Gas & Electric Company (U 902-E) for a Certificate of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project	Application 06-08-010 (Filed August 4, 2006)

PHASE II DIRECT TESTIMONY OF RICHARD HALSEY ON BEHALF OF THE CENTER FOR BIOLOGICAL DIVERSITY AND THE SIERRA CLUB

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Dated: March 12, 2008

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Testimony of Richard W. Halsey
Director of the California Chaparral Institute
Comments relating to the Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Sunrise Powerlink Project

My name is Richard W. Halsey. I am the director of the California Chaparral Institute, a research and educational organization focusing on the ecology of California's shrubland ecosystems, the dynamics of wildland fire in both natural and human communities, and the importance of nature education. I have been trained as a Type II wildland firefighter with the US Forest Service and have been studying San Diego County's dominant ecosystem, the chaparral, for more than 20 years. My qualifications are further described in Attachment 1.

Background

I would like to compliment Aspen Environmental Group, and Forester's Co-Op in particular, for producing a well researched, and objective analysis in the Fire and Fuels Management component of the Draft EIR for the Sunrise Powerlink Project. By dividing up the project's area into individual firesheds and examining each as to their unique resources and wildfire risks, a more accurate estimate was made regarding the proposed Project's environmental impacts.

It is important to mention that I contributed to the initial fireshed analysis in sections D.15.1 and 15.2 of the Fire and Fuels Management portion in the Draft EIR. I conducted field research and collected data that I used to assist in writing those sections. However, as my work proceeded, it became increasingly clear to me that the risks posed to both biological resources and human communities from the proposed Project's impacts were truly unmitigatable. Some of the impacts, such as introducing non-native species to pristine ecosystems, could certainly be reduced, but the mitigation efforts required to reduce fire risk would dramatically increase the proposed Project's negative impacts in other areas, especially the ecological health of the region's dominant plant community, the chaparral.

While chaparral is referred to pejoratively as "brush" by the applicant, it is an essential natural resource that is under increasing threat by development and fire. For reference, chaparral is a

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special plant community dominated by drought-hardy shrubs, shaped by a Mediterranean-type climate (summer drought, winter rain) and wildfire. It is the most extensive ecosystem in California (Fig. 1).

Chaparral is important because it provides critical watershed necessary to maintain Southern California's quality of life. Without the shrubs, rain would slam into the ground with greater energy causing increased levels of erosion and flooding negatively impacting water quality, drainage infrastructure, and waterways. Grass covered slopes do not provide the same benefits as deep-rooted shrubbery and have their own sets of problems such as being easier to ignite, lengthening the fire season, and reducing biodiversity. Huge numbers of people enjoy chaparral as a wildlife habitat for a wide variety of activities including hunting, bird watching, hiking, and solitude. The capital required to deal with the loss of chaparral would be enormous.

Although San Diego County has more chaparral than any other county in the state, increasing fire frequencies are threatening the ecosystem's future. To maintain the ecological health of San Diego County's chaparral ecosystems, it is essential to reduce the number of fires on the landscape. The proposed Project would compromise this ecosystem through proposed vegetation management requirements and increased fire risk. Because of these concerns, I discontinued my involvement with the Draft EIR process after I had finished the initial analysis of the individual firesheds. I did not want to participate in the next phase of the Draft EIR which would determine possible mitigations for the project impacts that I believed were unmitigatable.

Indeed, it has been determined in the Draft EIR that within every wildland dominated fireshed (except for the desert links which were not considered potential firesheds), two or three of the four listed impacts of the proposed Project regarding fire are classified as being Class I (significant, cannot be mitigated to a level that is less than significant).

Class I Impacts: Proposed Project will increase wildfire risk

In the majority of the proposed firesheds (PFS-1, 2, 3, 4, and 5), the two most important fire related impacts of the proposed Project determined to be Class I were:

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- The presence of the overhead transmission line would increase the probability of a wildfire (Impact F-2).
- The presence of the overhead transmission line would reduce the effectiveness of firefighting (Impact F-3).

The Draft EIR could not make the importance of these classifications any clearer when it determined that, **"The unavoidable sources of ignition from the presence of the overhead transmission line would remain, however, and therefore the potential for the project to ignite a catastrophic wildfire during severe fire weather would remain significant overall"** (D.15-149).

While the suggested mitigations such as defensible space grants (F-1e), establishment and maintenance of adequate line clearances (F-2a), and the construction and maintenance of fuel breaks (F-3a), will assist in reducing fire risk during typical weather patterns, these methods have proven to be ineffective in halting the spread of a Santa Ana wind-driven wildfire. This was demonstrated during both the 2003 Cedar fire and the 2007 Witch fire, both of which jumped over major interstate highways (Interstate 8 and 15), lakes (San Vicente Reservoir), and broad expanses of bare ground or irrigated farmland (San Pasqual Valley).

It is the Santa Ana wind-driven firestorm that causes catastrophic damage and it is for this reason efforts to mitigate the proposed Project's negative impacts will ultimately fail. This will make the suggested mitigation of creating landscape scale vegetation modification projects in the form of fuel breaks not only ineffective, but counterproductive because the fuelbreaks will increase the environmental damage from wildfire that the mitigations are partially intended to prevent.

Both the Proposed Route and the two alternative routes impacting the Cleveland National Forest (Route D Alternative - Boulder Creek Fireshed, and Modified Route D Alternative – Dulzura Fireshed), suffer similar problems in relation to extreme Santa Ana wind events as well as being within very high fire hazard severity zones.

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Changes in the Environment

An inherent flaw that any environmental document of this kind suffers is that it is static. Once the analysis is done, significant changes that occur after its publication may alter the environment enough to require a new examination. I believe this is the case for the Draft EIR in question. The western halves of Proposed Fireshed 2 (PFS 2) and PFS 3, in addition to the northern portion of PFS 4, were burned during the 2007 Witch fire. This event has radically altered the biological landscape and increases the level of risk the proposed Project creates.

As mentioned in the analysis of the San Felipe Fireshed (PFS 2),

> (The) fireshed represents one of the last remaining areas in San Diego County with extensive stands of old-growth chaparral. Consequently, it represents a valuable natural resource to the region. The Lake Sutherland area in particular includes scattered rare concentrations of 3- to 5-meter tall big berry manzanita . . . (D.15.31).

These "redwoods of the chaparral" are now gone, having burned during the 2007 Witch fire (Fig. 2). The primary land management responsibility for this area now is to insure fire is kept out of the ecosystem for at least 30 years to allow the chaparral to recover to the point where there will be a sufficient seed bank for the manzanita to recover. This is one of the few areas in San Diego County that have the promise of restoring an old-growth stand of manzanita chaparral. The increased fire risk the proposed Project represents with its associated access roads and maintenance activity is not consistent with the efforts required to protect this area from fire.

Some of the dramatic landscape changes caused by the 2007 fires include:

- elimination of many old-growth chaparral stands
- elimination of some of the last, large manzanita specimens remaining in San Diego County
- soil composition
- increased erosion potential
- increased potential for type-conversion (see explanation below)

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Center for Biological Diversity/Sierra Club

- increased spread of non-native weeds leading to an increase in ignition risk due to the presence of flashy fuels

In addition to the 2007 fire, future changes in regional climate patterns due to global warming also make the static nature of the Draft EIR problematic. Without appropriate estimates about habitat change and the estimated impact of increasing fire frequency due to climate change, it is difficult to properly assess the proposed Project's impact on the fire environment.

As stated in the Draft EIR, "southern California has been characterized as having one of the most fire-prone landscapes in the world." And according to the California Climate Change Center, "…wildfires in the grasslands and chaparral ecosystems of southern California are expected to increase by approximately 30 percent toward the end of the century…" (CEC 2006). Not only is the region in which the proposed Project planned prone to wildfires, but it is projected to become even more so in the future.

One possible cause for increased fire frequency would be a drying climate. As periods of drought are extended and moisture is pulled out of vegetation, plant communities become more flammable. Low live fuel moistures caused by extended drought periods are one of the most important variables in determining whether or not a fire can be controlled by firefighters.

Live fuel moisture is the water content within living plant stems as compared to the oven-dried weight of the sample. It is expressed as a percentage. A live fuel moisture reading of 100% indicates half of the stem's weight is contributed by its moisture content. A live fuel moisture reading of 60% or less is considered critical and leads to extreme fire behavior. Both the Cedar and the Witch fires occurred during periods with extremely low live fuel moistures (Fig. 3).

Since Santa Ana winds are the primary drivers of catastrophic wildfires in Southern California, the impact of climate change on these winds is critical to make predictions about future fire patterns in the region. It has been estimated by using two global climate models that Santa Ana wind events will shift from earlier (September-October) to later (November-December) in the

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season, increasing the number of such wind events during critically dry periods (Miller and Schlegel 2006). This may increase the chances of having larger firestorms.

While the Draft EIR does an excellent job modeling fire behavior and burn probability, the issue of increasing fire risk due to climatic change, the increase in fine weedy, fuels due to increased fire frequency (Brooks, et al. 2004, Keeley 2000), and future population growth needs to be examined more closely. In the nine counties that comprise southern California, fire frequency has increased in lock step with population growth (Keeley et al. 1999). It is likely the fire regime in San Diego County will be significantly altered from what it is today due to these factors.

Specific Section Comments

Fires Caused by Power Lines (Pg. D.15-2)

Missing from the Draft EIR is detailed data and analysis of powerline-caused ignitions prior to 2004 (San Diego Gas and Electric failed to provide the data). Also missing is an analysis of how powerlines were responsible for starting several fires during the 2007 firestorm.

The debate over whether or not 230 kV or 500 kV lines can be the direct cause of a fire clouds an important issue that is partially addressed in the Draft EIR. The document states that,

> The primary ignition threats associated with higher-voltage transmission lines like the Proposed Project are indirect, consisting of human-caused accidents during the construction and maintenance activities and as a result of increased access to wildlands (D.15.4).

In order to mitigate not only possible ignition threats from the lines themselves, but the associated indirect threats, the environmental impact of the proposed Project will likely need to be increased dramatically. While the construction of access roads, new fuel breaks (Mitigation F-3a), vegetation management of right of way zones, removal of an estimated 14,179 trees, and

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clearance along access roads may help to mitigate fire risk, they will also cause significant environmental harm to pristine native plant communities.

If the fire environment becomes increasingly dangerous as predicted, additional environmental impacts will likely occur beyond those suggested in the Draft EIR. In fact, SDG&E has filed a petition asking the California Public Utilities Commission (CPUC) to revise its fire safety rules for overhead lines of all types. One issue the petition specifically raised was "maintaining rights-of-way that are *free of vegetation* and of a minimum width in certain fire-prone areas" (SDGE 2007) (Italics added). Bare clearance under lines is not currently required.

The environmental impact of the proposed Project would be increased dramatically if vegetation free zones are extended beyond areas immediately around transmission towers. Thousands of acres of native habitat will be compromised by additional vegetation clearing, increased risk of non-native weed spread, and increased maintenance activity which would lead to increased fire risk.

Applicant Proposed Measures (Pg. D.15-64)

One of the fire-prevention proposal's SDG&E offers to carry out is to "Temporarily clear a 100-foot-by-100 foot area of vegetation at the base of each transmission structure, to be *restored* to an early successional stage of *native grassland* and sage scrub as appropriate at the completion of construction." Italics added. Similar statements within the Draft EIR are made in reference to the construction of fuel breaks (D.15-89).

What needs to be understood is that most of the undisturbed landscape being impacted is covered in chaparral. Chaparral does not have a successional stage composed of native grassland or sage scrub. Whatever grasses eventually do colonize around transmission towers and within fuel breaks will most likely be invasive, non-natives that create highly flammable fine fuels. Consequently, the word "restoration" is misused in this context. The process involved is better described as the elimination of a native plant community through **type-conversion**, replacing the native community with weeds.

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Type-converting native plant communities to weeds will likely be the result of any effort to eliminate native shrubland ecosystems near the proposed Project (see explanation of type-conversion in relation to increased fire frequencies in the following section).

In relation to fire risk, weeds lengthen the fire season because they are considered 1-hour fuels. This means they will respond to changing environmental conditions quickly, drying out during the day to create highly flammable fuels. This increases the fire season because these weedy fuels are generally annuals that die early in the year and leave behind fine fuels that can ignite easier than the surrounding native shrubs. Despite the Draft EIR's suggested mitigation efforts (Weed Control Plan B-3a), it will be extremely difficult for activities of the proposed Project to avoid spreading and encouraging these fine fuels over the long term.

The presence of fine fuels is one of the primary factors in firefighter fatalities because fire moves through them so quickly. From personal experience I can testify to the danger of these fuels. With a slight change in humidity and wind speed, two to three foot flame lengths in fine fuels can become 30 foot sheets of fire within moments.

Approach to Data Collection and Analysis (Pg. D.15-64)

Fire behavior and burn probability modeling can offer useful estimates about how fires move. The Draft EIR does an excellent job describing these models as well as some of the limitations in their use. However, it is important to remember that these models were developed in forested systems outside of California and base their outcomes on natural fuels. The presence of urban fuel (homes, associated structures and landscaping), the impact of spontaneous ignition from embers, and the extreme variability of Santa Ana wind conditions are not part of the model. Consequently, it is nearly impossible to predict exactly how Southern California fires will behave. They constantly surprise.

The model run used in the Draft EIR produced simultaneous ignition points every 500 feet along the transmission line corridor. Since the Draft EIR was specifically focused on the powerline, this approach makes sense. However, since it is likely a significant number of ignitions will occur along access roads due to public use and the necessary maintenance of the proposed

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Project, it would be beneficial to examine starts from those locations as well. This is because the presence of vehicles and associated passenger activities, accidents, and equipment malfunctions on roads dramatically increase fire risk (UWM 2006).

The wildfire fuels criterion used "requires that wildfire fuels be present within at least 30% of the polygon to carry a wildfire through the landscape" (pg. D.15-69). This assumption points to one of the greatest weaknesses in such a fire behavior model because in a typical, Santa Ana wind driven fire, most of the forward movement is created by embers blown far ahead of the fire front, starting spot fires. First hand firefighter accounts described the Witch fire jumping forward in quarter mile leaps due to ember ignited spot fires. Similar events occurred during the 2003 Cedar fire.

Another lesson learned during the 2007 fires is that four-year-old recovering chaparral vegetation, in the past considered by some as relatively un-burnable, was capable of carrying the Witch, Poomacha, and Harris fires into areas scorched by the 2003 fires (Figs. 4 and 5). These re-burned overlap areas of young vegetation represented about 100,000 acres overall, or about 20% of the total area burned during Southern California's 2007 firestorm. Approximately 70,000 acres of young vegetation re-burned in San Diego County (Fig. 6).

The implications of such short fire return intervals in reference to the proposed Project are significant.

1. Fire return intervals below 10 years nearly guarantee the elimination of intact, native chaparral, leading to the ecosystem's type-conversion to non-native weed lands. (Haidinger and Keeley 1993, Keeley 1995, Zedler 1995, Jacobson et al. 2004). Since the proposed Project's impact of increasing fire risk can not be mitigated to less than significant, it is likely San Diego County will see more of its valuable chaparral watershed eliminated than would be the case without the proposed Project.

2. The effectiveness of the proposed Project's vegetation modification efforts to mitigate fire risk can be seriously questioned.

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Type-conversion is an extremely serious issue for San Diego County's chaparral ecosystem. Although many falsely believe that chaparral is "adapted" to fire and "needs" fire to remain healthy, in actuality fire can completely eliminate the system if it arrives too frequently (10-20 years depending on the type), at the wrong time of year (shortly after winter rains), or is not hot enough. Too frequent fires arrive before chaparral shrub species can build up a large enough seed bank in the soil to produce an adequate seedling response. Fires during the wet season appear to create conditions that either kill seeds in the soil or fail to generate enough heat to stimulate germination of heat responsive species. Therefore, it is best to think of chaparral as being *adapted to specific fire regimes* rather than fire per se.

Once a chaparral system has been exposed to unnatural fire patterns, the seed bank is eliminated, mortality of resprouting species increases dramatically, and the ecosystem is open to the invasion of non-native weeds. Once these weeds invade an area, they perpetuate their own habitat by increasing fire frequency (they can produce enough fuel to easily carry a fire every year) and prevent the high fire intensity needed for the germination of most native chaparral species (weed species are generally killed in high intensity, chaparral fires).

Once type-conversion occurs, ecological diversity drops precipitously. Often the only native shrub species left is laurel sumac (*Malosma laurina*), surrounded by a sea of non-native weedy grasses (*Bromus species*) and forbs (*Brassica* and *Erodium species*). Many of the animals that depended on the other native species will be extirpated.

In study sites I am currently examining, obligate-seeding species (plants that recover from a fire only by seed germination) have been eliminated in areas with a fire return interval of 10 years. Within the 2003 Cedar fire scar, the areas re-burned by the 2007 Witch fire are showing similar results. Although some of the obligate resprouting species (plants that survive fire by re-sprouting only) are beginning to show new shoots from their burls, it is likely many burls will eventually die due to stress caused by the repeated fire. We will not know the complete impact for several years.

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Wildfire Containment Conflict Index (Pg. D.15-68)

The presence of overhead transmission lines poses a serious problem for firefighters on the ground. This is addressed in the Draft EIR by using the Wildfire Containment Conflict Index.

However, the model used to analyze the conflict "assumes that where no roads currently intersect the proposed transmission line, no conflict can be created by the introduction of the transmission line." This assumption does not take into consideration the serious problem transmission lines create for use of aerial assets (fire retardant/water drops). The presence of transmission lines is one of the reasons the California Department of Forestry and Fire Protection does not conduct aerial fire suppression efforts at night. In addition, during periods of low visibility due to smoke, transmission lines create serious hazards for aircraft during the day since water and fire retardant must be dropped low to the ground where transmission lines occur. Consequently, the number of potential wildfire containment conflicts are likely to be considerably greater than revealed in the Draft EIR.

Desert Links (Pg. D.15-71)

The Draft EIR is correct in concluding that at the present time the fire risk is very low for scattered population centers within the Imperial Valley and Eastern Anza-Borrego Links. However, the "low fire intensities that burn sparse desert vegetation" still pose a serious fire risk to the desert ecosystem because the species present are not fire tolerant. Once a fire does occur, many of the native species are often eliminated and non-native grasses fill the void (Brooks and Pyke 2001).

While the Draft EIR discusses the threat of non-native weeds and suggests mitigation measures to lessen their impact (B-3a), the measures only focus on controlling weeds around the immediate area of the proposed Project. While such mitigation efforts may be successful, the real threat is the explosive spread of weeds *after* a fire caused by activities related to the proposed Project. Such a fire could rapidly spread across the desert and seriously compromise its ecological health.

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Desert fires fueled by non-native weeds (*Bromus* species, *Brassica* species) are becoming a serious problem throughout the West and have been responsible for the type-conversion of native desert habitats to non-native dominated ecosystems (Lovich and Bainbridge 1999). It is quite possible in the lower elevation deserts that several familiar keystone plant species, such as the Joshua tree and the Saguaro cactus, will have their populations drastically reduced by the end of this century if invasive weeds continue to fuel desert fires. A similar fate could occur to some of the dominant plant species in the Anza-Borrego Desert if non-native weeds are allowed to gain a foothold and changing climatic conditions favor their expansion.

Defensible Space Grants (Pg. D.15-74)

Mitigation F-1e suggests that SDG&E "contribute an annual sum to a fund that shall be distributed as homeowner grants for the creation of defensible space around homes." The Draft EIR lists an estimated number of homes at risk and suggests an annual contribution of $2,000 per home.

The primary cause of home ignition during a wildland fire is by embers landing in vulnerable locations or entering attic spaces through roof vents during Santa Ana wind events. While defensible space is a critical component of the fire risk reduction equation, it often fails to save a home that does not have a fire safe design or is located in a high fire risk area. Embers can travel up to two miles from the fire front. The wood-shake roof of a house in Escondido ignited during the 2007 Witch fire despite the fact that it was two miles from the active fire front (SDUT 2007). Consequently, making contributions to maintain or expand defensible space zones alone would not be as effective as applying such contributions to address the entire fire risk equation. This would include not only defensible space, but also retrofitting unsafe construction designs and funding comprehensive fire management plans for communities. Without including all the variables involved in making a fire-safe community, the default practice often becomes degrading excessive amounts of valuable habitat by improper clearance practices.

For structures in topographical positions that can not be adequately prepared to survive a firestorm, the proposed Project adds a new level of risk to the homeowner that can not be mitigated.

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Alternative Routes

Alternative Route D that is proposed to cut through the Guatay and Boulder Creek Fireshed would be traversing the most pristine and uninhabited portion of the Descanso Ranger District within the Cleveland National Forest. From a fire risk perspective, many areas within these firesheds are especially vulnerable to severe fire weather conditions. When compared to other routes, the mitigation measures suggested to lessen the increased fire risk from the Project in these firesheds would have some of the most significant impacts on the region's chaparral ecosystem. In addition, the presence of transmission lines would compromise both on-the-ground and aerial fire suppression efforts as discussed above.

Any route that would parallel Interstate Highway 8 would so seriously compromise fire suppression efforts that the overhead transmission lines themselves could be considered the most significant factor in wildfire spread. This is due to the fact that a significant number of fires are started along the highway (Fig. 7) and the presence of an overhead transmission line would seriously compromise the ability of firefighters to contain fires before they developed into major incidents. The only option that would reasonably mitigate such risk would be to place the transmission lines underground.

Modified Route D through the Dulzura Fireshed avoids the highway risks of Alternative Route D, however, it will still compromise fire suppression efforts and add unmitigatable impacts to increasing fire risk.

In summary, I strongly concur with the Draft EIR's determination that the presence of the proposed Project will have significant, unmitgatable impacts by increasing fire risk and reducing the effectiveness of fire suppression activities. The 2007 fires have altered the landscape in such a dramatic manner that portions of the current Draft EIR relating to fire risk and biological resources may no longer accurately reflect the impact of the proposed Project. In addition, based on my own research and the research of other fire ecologists, the presence of the proposed project in areas dominated by chaparral (Fig. 7) will significantly increase the chance of type-conversion and associated ecological devastation through the reduction of fire return intervals.

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I declare under penalty of perjury this testimony is, to the best of my knowledge, true and correct.

/s/ Richard W. Halsey_____

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List of Attachments

Attachment 1 - Curriculum Vitae of Richard W. Halsey

Attachment 2 - Figures

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Attachment 1

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Richard W. Halsey is the director of the California Chaparral Institute, a research and educational organization focusing on the ecology of California's chaparral ecosystems, the dynamics of wildland fire in both natural and human communities, and the importance of nature education to allow local communities connecting with their surrounding, natural landscapes. His current research projects include investigating the impact of increased fire frequency on chaparral and other shrubland ecosystems, wildland fire behavior, and the best strategies to help communities improve fire safety.

Mr. Halsey also works with the San Diego Museum of Natural History, publishes *The Chaparralian*, a quarterly newsletter focusing on chaparral and wildfire issues in California, and continues to teach natural history to school and community groups throughout the state. He has given more than 200 presentations about the chaparral ecosystem and wildfire over the past four years. The second edition of his book, *Fire, Chaparral, and Survival in Southern California*, was published in 2008. Mr. Halsey has also been trained as a Type II wildland firefighter with the U.S. Forest Service.

Mr. Halsey has taught biology and natural science for over twenty years in both public and private schools and was honored as the Teacher of the Year for San Diego City Schools in 1991.

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EDUCATION

B.A. Environmental Studies and Anthropology. University of California, Santa Barbara, with honors.

Single Subject Teaching Credentials for Life Science, Physical Science and Social Science. University of California, Berkeley.

M.A. Educational Administration. California State University, San Diego.

PROFESSIONAL EXPERIENCE

2004 – present. Director, California Chaparral Institute.

2005 – present. Wildland firefighter, USFS Type II, Crew 5, Cleveland National Forest.

1998 – present. Free lance writer, natural history.

1993 – 1998. Biology Teacher (Advanced Placement, Field Biology), Scripps Ranch High School, San Diego City Schools, CA.

1984 – 1993. Biology teacher (Advanced Placement, Advanced Science), Serra High School, San Diego City Schools, CA.

1982 – 1984. Physics/Chemistry teacher, National University Jr./Sr. High School, Vista, CA.

SELECTED HONORS

Christa McAuliffe Fellowship, 1993-94.

Teacher of the Year, San Diego City Schools, 1991.
Project 2061 team member, 1989-1991: the American Association for the Advancement of Science.

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PROFESSIONAL ORGANIZATIONS AND AFFLIATIONS

San Diego Regional Fire Safety Forum (Founding Member)

Association of Fire Ecology (Board Member)

International Association of Wildland Fire

California State Firefighters' Association

San Dieguito River Valley Conservancy (Board Member)

California Botanical Society

California Native Plant Society

Society for Conservation Biology

SELECTED PUBLICATIONS

2008. Fire, Chaparral, and Survival in Southern California. Second edition. Sunbelt Publications. San Diego, CA. 192 p.

2004- present. The Chaparralian. Quarterly publication that discusses issues relating to chaparral ecology and wildland fire in California. Publisher/contributor. Selected articles authored by Richard W. Halsey include:

-2007. The myth of fire suppression. No. 25

-2006. The Cedar fire: searching for truth after the flames. No. 21

-2006. Desert fire and invasive weeds. No. 20.

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2004. In search of allelopathy: an eco-historical view of the investigation of chemical inhibition in California coastal sage scrub and chamise chaparral. Journal of the Torrey Botanical Society 131: 343-367.

2004. Habitats of Mission Trails Regional Park. Five permanent, trailside panel displays within the park with both text and photos.

SELECTED PRESENTED PAPERS AND LECTURES

2008. Fuel age and fire spread in Southern California chaparral ecosystems. Presented paper. Association for Fire Ecology Regional Conference. Tucson, AZ. 1/30/08.

2008. Chaparral does not "need" to burn. Correcting fire ecology myths about Mediterranean shrublands. Presented paper. Association for Fire Ecology Regional Conference. Tucson, AZ. 1/30/08.

2007. The Chaparral Fire Environment for Wildland Firefighters. Conducted five workshops for Cleveland National Forest firefighters. 5-6/07.

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2007. Wildfire Education for the Business Sector. Conducted four workshops for community professionals on wildland fire and chaparral ecology. San Diego Natural History Museum. 3-4/07.

2006. Weather, Fuels, and Suppression During the 2003 Cedar Fire: Which variables made the critical difference? Presented paper. 3rd International Fire Ecology and Management Conference. Association for Fire Ecology. San Diego, CA. 11/06.

2006. Recovering from a Wildfire. Post-fire recovery workshop. Yucca Valley, CA. 7/26/06.

2005. California's Chaparral. California's Green series with Huell Howser. PBS television. 10/05.

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2004. Value of Chaparral. San Diego Fire Recovery Network Landscape Workshop. San Diego Natural History Museum. 9/15/04.

2004. Fuel Age in the Chaparral. Does it Matter? Lecture. San Diego Fire Recovery Network Fire Ecology/Chaparral Workshop. San Diego Natural History Museum. 4/21/04.

2003. Fire Ecology Forum. San Diego City TV 24. 12/13/03.
2003. Fire and Forest Ecology. Full Focus, KPBS. 12/12/03.

2003. San Diego County Habitats. Lecture at the Natural History of San Diego Series, San Diego Natural History Museum, 11/10/03.

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2002. The Chaparral Habitat. Lecture at the Natural History of San Diego Series, San Diego Natural History Museum, 10/30/02.

OTHER RELATED EXPERIENCES

Burned Area Emergency Response (BAER) member, Horse fire, San Diego County, CA. 8/06.

Living with fire in chaparral ecosystems: providing tools for decision makers. Consultant and working group coordinator. USDA, Forest Service. 2005.

San Diego Wildfires Project. Consultant. San Diego State University, Department of Education. 2004.

Earth, Wind, and Wildfire museum exhibit. Consultant for the San Diego Natural History Museum. 2004.

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Attachment 2 to Halsey, Comments relating to the Draft Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the Sunrise Powerlink Project.

Figure 1. Ceanothus chaparral in bloom.

Figure 2. A burned big-berry manzanita (Arctostaphylos glauca) in the San Felipe Fireshed (PFS-2). This species does not resprout. Therefore it depends on seedling recruitment for survival.

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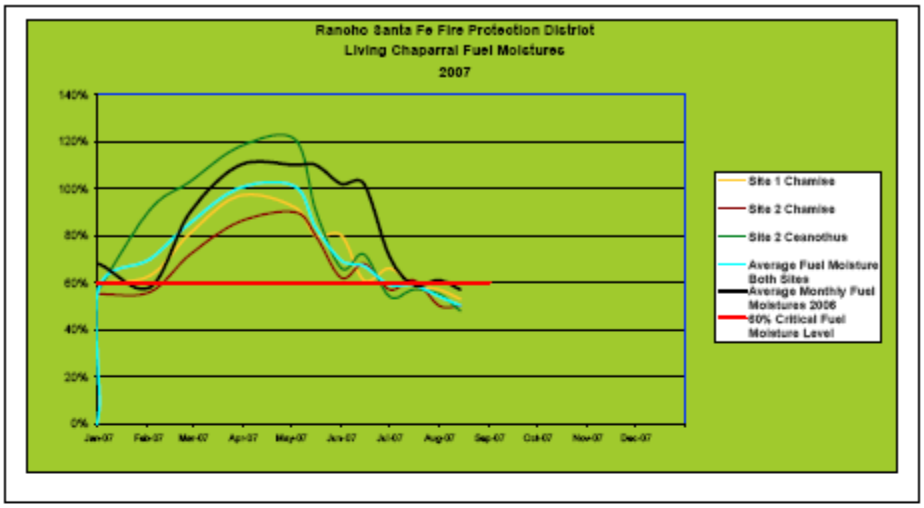

Figure 3. Live fuel moistures during the Witch fire. Moisture levels taken at the western most extension of the Witch fire. Source: Rancho Santa Fe Fire District.

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Figure 4 (above). Four year old, recovering chaparral vegetation that was first burned in the 2003 Cedar fire near Boulder Creek, Cleveland National Forest.

Figure 5 (below). Adjacent area in Fig. 4 that was re-burned in the 2007 McCoy fire.

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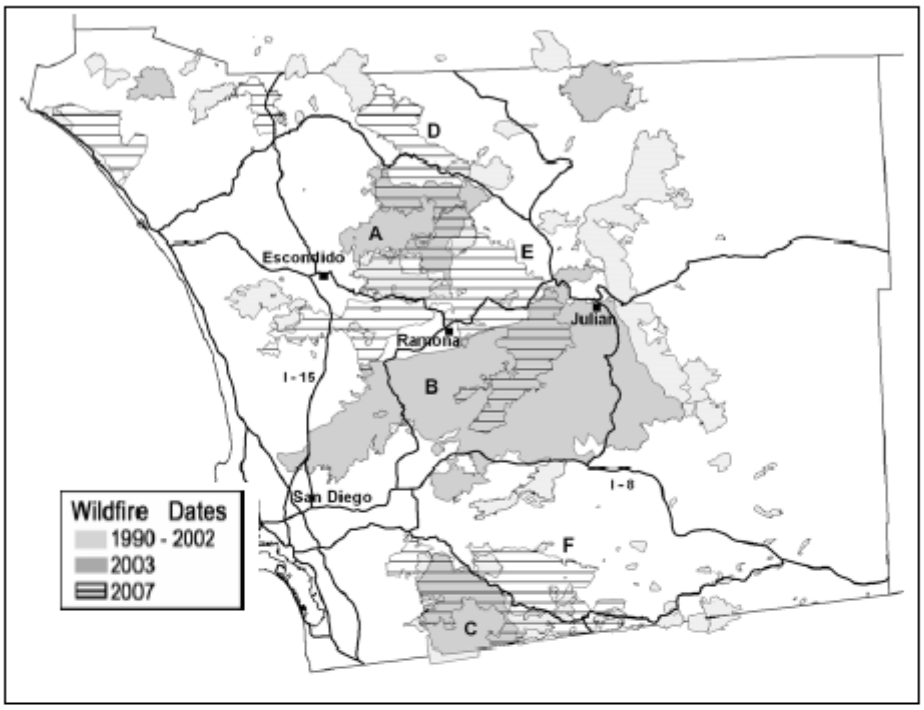

Figure 6. 2003 and 2007 San Diego County Fire Overlap Map. 2003 Paradise fire (A), Cedar fire (B), Otay fire (C). 2007 fire labeled to the right of their perimeters: Poomacha fire (D), Witch Creek fire (E), and Harris fire (F). Major roads indicated by dark lines. From Fire, Chaparral, and Survival in Southern California, Halsey (2008).

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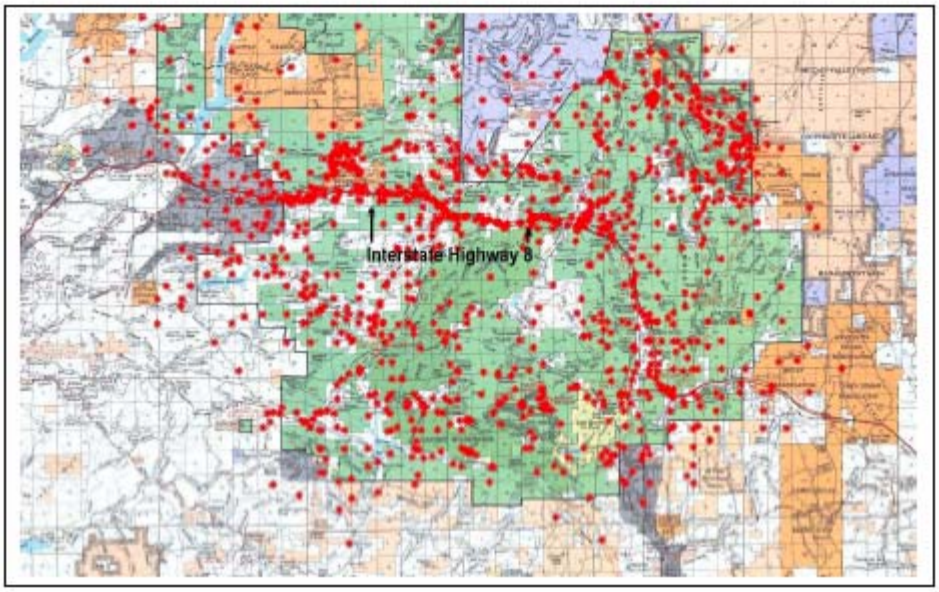

Figure 7. Fire starts (red dots) in the Descanso Ranger District, Cleveland National Forest. Note concentration of starts along Interstate Highway 8. Source: USFS.

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BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA

In the Matter of the Application of San Diego Gas & Electric Company (U 902-E) for a Certificate of Public Convenience and Necessity for the Sunrise Powerlink Transmission Project	Application 06-08-010 (Filed August 4, 2006)

PHASE II DIRECT TESTIMONY OF TRAVIS LONGCORE ON BEHALF OF THE CENTER FOR BIOLOGICAL DIVERSITY AND THE SIERRA CLUB

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