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Renewable Energy Projects in Southwestern Deserts – Update on Our Involvement

Scott Abella

Like many in the conservation field, we have a good understanding of the urgent need for alternative energy sources, but also of the negative environmental tradeoffs of placing renewable energy developments on vast tracts of public lands in southwestern deserts as currently envisioned. We also understand political and economic reasons, good or bad, for not doing some obvious things that make sense for renewable energy like placing solar arrays on building tops in cities, within multi-use contexts such as crops, and on *already impacted* land when alternative energy projects (right or wrong) are to be placed on public land.

I was asked to be part of an independent scientific advisory panel to provide conservation recommendations for the California Desert Renewable Energy Conservation Plan, which deals with placing energy projects on public lands. This panel met on April 22-23, in Ontario, CA and includes representatives such as Reed Noss, other university and non-profit organization scientists, and U.S. Geological Survey scientists. The panel will be providing a written report of recommendations coming out at the end of summer. There are two key points I want to note: (1) the recommendations are in the context of the fact that the government is saying these projects are going to happen – other solutions that make sense are irrelevant in this context – and so reducing environmental damage to the extent possible given this situation is our focus; and (2) we as the scientific advisory panel have nothing to do with the implementation of the projects. I've been asked several times if "You can ensure a solar project is not sited here or stop these projects," and my response is well, you'll have to call up President Obama, the U.S. Congress, or Governor Schwarzenegger and talk to them.

As part of this multi-scientist panel, I was responsible for providing recommendations on exotic species management and restoration in the context of renewable energy developments. We have been encouraged to seek input on this report, and recommendations in these areas are provided below.

Exotic Invasive Species Management

We recommend that management of exotic plants be considered as part of the energy development process and as a strategy for partly mitigating direct native habitat destruction due to energy development. It is likely that activities associated with energy development will contribute to the establishment and spread of invasive, exotic plant species. Movement of mechanized equipment can distribute seeds, construction of linear corridors (e.g., transmission lines, roads) can harbor exotics and facilitate their spread, and disturbance promotes exotic species (Lodge et al. 2006). While mitigating for direct habitat destruction by managing other lands does not fully compensate for the destroyed habitat, we suggest that managing exotics on lands adjacent to energy installations (to limit any spread of exotics due to the disturbance) and in conservation areas be considered as part of plans for partly mitigating habitat loss.

Bossard et al. (2000) summarize troublesome exotic plants of the California desert. Some species are more harmful than others. Exotic annual grasses such as red brome (*Bromus rubens*) are currently of great concern to resource managers because these species are highly invasive and linked to wildfires by providing continuous fuel loads. Fires are not thought to have been prevalent historically in the Mojave Desert owing to discontinuous fuel loads, but have increased in extent in recent decades concurrently with expanding populations of exotic plants (Zouhar et

(Continued on page 6).

Renewable energy projects (*continued from page 5*).

al. 2008). These fires devastate native communities dominated by long-lived perennials such as blackbrush (*Coleogyne ramosissima*), which are not considered fire-adapted due to the absence of fire in the evolutionary history of the desert (Abella 2010). We suggest that an analysis of fire potential (based on fuel loads and ignition probabilities) be used as a tool for prioritizing exotic species management treatments, in conjunction with locations of sensitive species or communities with high conservation priority, and corridors where transport of exotic plants might be greatest. We recommend that equal attention be paid to high- and medium-fire potential areas. High-potential areas require treatment because of high risk; medium-potential areas can benefit from treatment to avoid becoming at risk.

Little funding for research has been dedicated to developing treatment strategies for exotic plants in southwestern hot deserts such as the Mojave. However, studies such as Allen et al. (2005) suggest that there is potential for testing different herbicides and other treatments for reducing the prevalence of red brome and other exotic plants. Key factors that should be considered in evaluations of herbicide and other treatment strategies include whether the herbicide acts as a pre- or post-emergent, the timing and duration required for effective treatment, and effects on the non-target native community. Additionally, consideration should be given to post-treatment management, as often establishing a competitive native vegetation type can reduce probabilities of resurgence of the exotic species. Since exotic species management strategies are not well tested in desert areas, these projects could take the form of applied projects that are conducted at an operational scale but within a planned study design that includes untreated controls. This can enable conclusions to be drawn about the effectiveness of candidate treatments and allow development of strategies that may be feasible to implement over the broad scales necessary to make a difference ecologically.

Restoration and Improvement of Habitat

We recommend that other types of habitat management and ecological restoration be considered as partial mitigation for habitat destruction, including revegetating disturbed areas (including wildfires) with native plants within conservation reserves. Revegetation in arid lands is expensive and prone to failure due to unpredictable rainfall, but a recent review of revegetation practices in the Mojave Desert found that there are many examples of successful revegetation projects (Abella and Newton 2009). Seeding and planting of greenhouse-grown or salvaged plants are the most common methods of revegetation. There are advantages and disadvantages to both methods; for example, larger areas can be revegetated through seeding than through planting. Associated treatments, including protecting seeds and plants from being eaten by animals and insects, can make the difference between successful and failed projects. Abella and Newton (2009) compiled a list of the performance of an array of native species in revegetation projects as well as the effectiveness of treatments. In addition, restoration activities such as reestablishing native riparian vegetation and hydrological patterns along springs and water courses could greatly improve habitat value. This is especially appropriate given that some renewable energies require amounts of water that are not insignificant, further stressing scarce water supplies in the desert. Restoration efforts should not focus solely on “cosmetic” areas such as campgrounds or visitor centers, but should include meaningful areas for habitat conservation improvement purposes.

We suggest that consideration be given to incorporating vegetation within renewable energy installations to maintain some habitat. The current paradigm is to simply bulldoze the soil and vegetation to establish energy sites. Assessing alternative strategies that include retaining as much vegetation as possible would be a large improvement over clearing all vegetation. It is possible that that some vegetation can coexist with energy installations to provide

(Continued on page 7).

Renewable energy projects *(continued from page 6)*.

some habitat as well as to sequester carbon. One little-addressed fact is that the benefits of renewable energy for reducing atmospheric CO₂/climate change may not be as large as expected, because by clearing vegetation/soil, year after year carbon storage capacity is lost. An initiative to incorporate vegetation within energy installations should include balancing any conflicts of retaining vegetation with fire hazard, maintenance and performance of the energy structures, and the ability of the vegetation to grow within the energy sites. If vegetation can co-exist within arrays, the best strategy would likely be to leave mature plants (i.e. not bulldoze them in the first place), as opposed to trying to revegetate after the fact. However, it is uncertain what type of native plant species are best adapted to co-exist with energy sites, so species that can thrive with shade cast by solar structures and other aspects of the sites may need to be identified and promoted. In addition, where energy installations are sited by leasing private agricultural land or private or public abandoned agricultural land, it may be possible to grow crops (or restore native desert vegetation) in concert with energy structures. Using agricultural land for energy installations has many advantages (e.g., the land is already relatively level) and is a strategy we recommend.

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