Pollinator Protection and Right-of-Way Management Go Hand-in-Hand: Three case studies of local approaches to habitat improvement for pollinators

Paper Summary for the 2013 ISA Conference

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Why Do Pollinators and Their Habitat Matter?

Somewhere between 75% and 95% (Ollerton et al. 2011) of all flowering plants on the earth need help with pollination – they need pollinators. This means that they need some animal to help them move a pollen grain from the male part of the flower (anther) to the female part of another flower (stigma). This action helps create the seeds and fruit that we, and other wildlife, depend on. Pollinators provide pollination services to over 180,000 different plant species and more than 1200 crops. That means that one out of every three bites of food you eat is there because of pollinators (Klein et al. 2007, Buchmann and Nabhan 1996). If we want to talk dollars and cents, pollinators add 217 billion dollars to the global economy (Gallai et al. 2007, Losey and Vaughan 2006), and honey bees alone are responsible for between 1.2 and 5.4 billion dollars in agricultural productivity in the United States (Southwick and Southwick 1999) and 1 billion dollars in Canada. In addition to the food that we eat, pollinators support healthy ecosystems that clean the air, stabilize soils, protect from sever weather, and support other wildlife (Costanza et al. 2007).

Pollinator populations are changing. Many pollinator populations are in decline and this

decline is attributed most severely to a loss in feeding and nesting habitats (NRC 2006, Kremen et al. 2002). Pollution, the misuse of chemicals, disease, and changes in climatic patterns are all contributing to shrinking and shifting pollinator populations. In some cases there aren't enough data to gauge a response, and this is even more worrisome. Where the data do exist the numbers are dwindling. While we do not have enough data to assess the status of all pollinator species (as there are upwards of 3500 species of bees in North America alone!) we do have a few examples that, when combined the essential rolls that pollinators play in ecosystem services, show some disturbing trends. The United States has lost over 50% of its managed honey bee colonies over the past 10 years. There are four species of bumble bees that are candidates of listing in the United States, one of them, *Bombus affinis*, has already been listed in Canada were its population has declined by more than 99%. The lesser long nose bat is a threatened species in the United States, and this pollinator plays a keystone role in the ecosystems of the desert southwest.

Pollinators and Power Lines, *A Natural Partnership*

Reversing the negative trends that we are seeing in pollinator populations depends on increase habitat opportunities. Early successional landscapes, such as those preferred along or adjacent to overhead power lines, have been highlighted as potential pollinator conservation zones that provide environmental benefits and ameliorate some of the negative impacts of wildland conversion (Wojcik and Buchmann 2011). The extent of the power transmission and distribution network (estimated to be more than 400,000 km in Canada and 800,000 km in the United States), combined with the geographic distribution of power lines (parallels to species migration, intersections with agricultural landscapes, and connectivity between wildland and urban areas) present an opportunity for positive environmental management.

Slight modification to existing management practices within utility landscapes could both save resources (financial and physical) and improve environmental quality for pollinators. There is also growing public understanding of the important roles that these species play in human survival and livelihoods, presenting an opportunity for utilities to become land

stewards. Improve public relations and image are additional benefits that can result from this pollinator conservation mechanism.

I am presenting a review of opportunities and the results that can be achieved through collaborative work between local utilities and the Pollinator Partnership (a 501(c) environmental non-profit), or other local environmental organizations, using three case studies. In each case study people, utilities, and wildlife benefit and we achieve a triple bottom line.

Our overall program goals include:

1. Developing habitat sites to increase local populations of ecologically and agriculturally important pollinators;
2. Testing alternative methods of right-of-way management and acquiring data that will inform management for pollinators;
3. Creating a set of transferable landscape management plans that can be used by other utilities to provide mutual benefits to customers and important wildlife such as pollinators; and
4. Creating outreach programs to educate other utilities and the public about our projects.

The first case study focuses on acquiring more data on the exact impacts of targeted Integrated Vegetation Management (IVM) on pollinator communities. The second looks at how utilities can go above and beyond standard practice to benefit pollinators and help support the development of an international conservation program. The final case study centers on the positive community outreach that can be generated through pollinator habitat development, even when it is related to the emotions of tree removal.

Case Study 1: IVM with a Focus on Pollinators – American River Parkway

While a brief visual inspection of most rights-of-way suggests them to be ideal pollinator habitats, there is a lack of hard numbers to provide land managers with sufficient cause to shift practices. Naturalist accounts of species occurrences along rights-of-way are nothing new (Soulé 1991; Nabhan 2001), and even rare and endangered pollinators such as the Karner Blue Butterfly are documented within these corridors (Smallidge et al 1996, Lowell and Loundsbury, 2000). The limited scientific studies of the pollinator community along electrical utility corridors include only about 10 published pieces, and the majority focus on the occurrence of species within the corridor or cataloguing habitat characteristics that seem to correspond to pollinator occurrence, only one is experimental in design, but offers only a short assessment period (3 months). To truly shift behaviour patterns land managers will require more conclusive evidence of IVM and other targeted techniques resulting in improved wildlife benefits and a more sustainable management system.

In 2010, the Pollinator Partnership began working with local utility partners (Pacific Gas and Electric-PG&E and the Sacramento Municipal Utility District - SMUD), chemical suppliers (DOW), and the regional conservation authority (Sacramento County Parks) to test the impacts of IVM as a means of pollinator habitat development. This experiment has been gathering data on bee species occurrence (with nest usage and floral visitation counts) for almost three years. Preliminary results indicate that areas subjected to standard mowing are dominated by plant material that does not serve a pollinator benefit. This is seen through lower observed visitation rates and significantly lower nest occupancy data. Nests within IVM plots have occupancy rates of at least 30% more then mowed sites. Treatment areas that are managed with targeted spray and burns have a more characteristically native plant community and a correspondingly higher rate of bee species use. Abundance patterns were similar when IVM and standard mowed sites were compared, but be documented a 30% difference in species richness at IVM sites compared to standard mowed sites, with IVM site having more bee species present. When the occurrence of native pollinator species (non-honey bee) was considered, both the richness and abundance was higher at IVM sites (94% and 198%, respectively). We have one additional year of data collection to complete, after which we will be

developing an outreach plan and Best Management Guidelines using this new data to support the broader adoption of pollinator-supporting IVM on rights-of-way.

Fig 1: An aerial view of the American River Parkway, in Sacramento, CA. Research sites are located throughout the image indicated here.

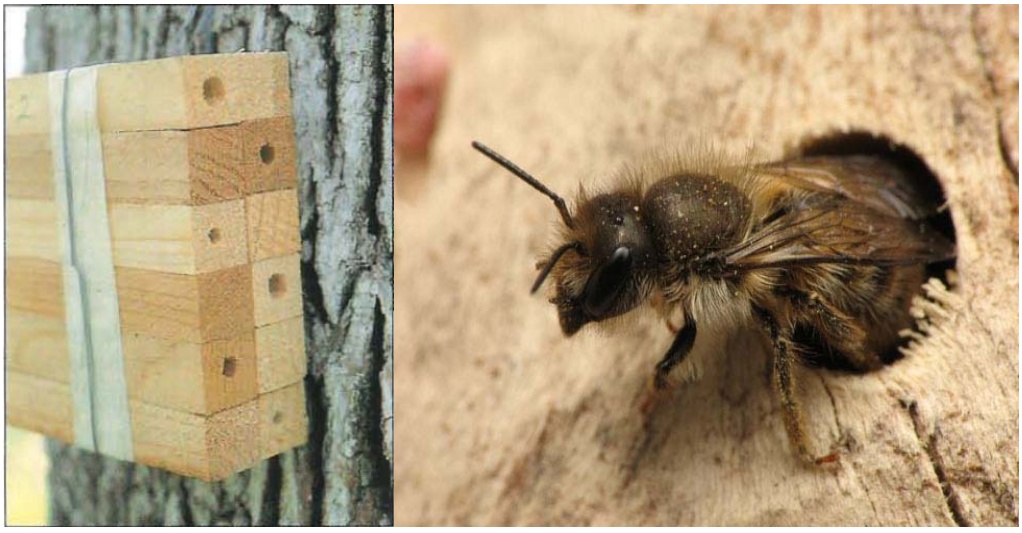

Fig 2: Image of a nesting block used to assess bee habitat usage (L) and a close-up of a Halictid bee emerging from a nest (R).

Fig 3: Images of a field tour with all project partners prior to major IVM interventions.

Fig 4: One of the IVM treatment sites after initial treatment in Fall 2012.

Fig 5: Close-up view of treated site in Spring 2013. Note the ample low-growing floral resources that provide food for native bees and honey bees.

Case Study 2: Supporting Monarch Migration –Local Waystation Development and Community Outreach.

The 3200 km journey of the monarch butterfly is a unique phenomenon that moves millions of tiny insects across North America each year. Yet, the continued threat of habitat decline is diminishing numbers of monarchs overwintering. Strong parallels are seen when monarch migration corridors are compared to the existing network of utility infrastructure (see figures 6 and 7). Utilities across the country not only have the opportunity to support this wonder of nature, but in doing so they can build community relations, attract and retain new employees with an environmental ethic, and save money.

The eastern Monarch migration starts in March as butterflies from Mexico travel north into Texas and other southern U.S. states, breeding as the move northward. The butterflies produced in these areas move northward in May and June to colonize the northern U.S. states and Canada. Two or three additional generations are produced before

the southward migration begins two months later. Beginning in mid-August and continuing into fall, hundreds of millions of monarchs migrate south to spend the winter in high-elevation oyamel fir forests in central Mexico.

Our local partner in North Carolina, Energy United (EU) is committed to providing safe and reliable electric service to our members while protecting and enhancing wildlife habitat. Located within a key monarch butterfly migration corridor and at a time when a deficit of larval and adult plants threatens the southward movement of these insects, EU had an opportunity to impact change.

We leveraged multiple partnerships to develop a monarch garden and Waystation along a public recreational trail in the new development of Hunter's Pointe, NC. Our monarch garden project with Energy United was a test and prototype for active planting and community involvement as part of a total IVM program within a system. While this approach is not cost-effective for entire transmission corridors, demonstration gardens have significant outreach value to the local community.

A limiting factor in successful monarch habitat developments is the availability of milkweeds, and their survival after planting. We used a project grant from one of our partners, Monarch Joint Venture, to supply local milkweed plugs (over 300 individual plants) to EU. EU employees received the plants and had a community planting day. A deputized milkweed steward took on the role of weekend watering.

Our partnership on this site supported the development of our new technical guide for utilities interested in supporting monarchs on their rights-of-ways, lands, and easements. More information about planting for monarchs, and the forthcoming monarch planting guide for utilities can be found at the P2 website at www.pollinator.org under "useful resources" for mining and utilities.

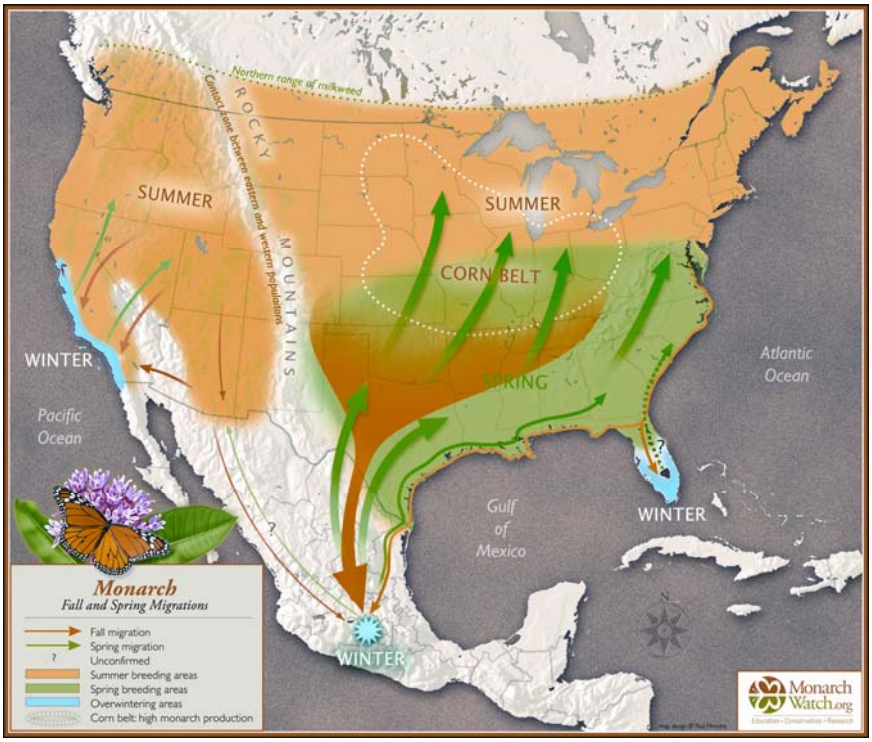

Fig 6: Map of the common Monarch migratory routes throughout North America (Courtesy of Monarch Watch and Monarch Joint Venture)

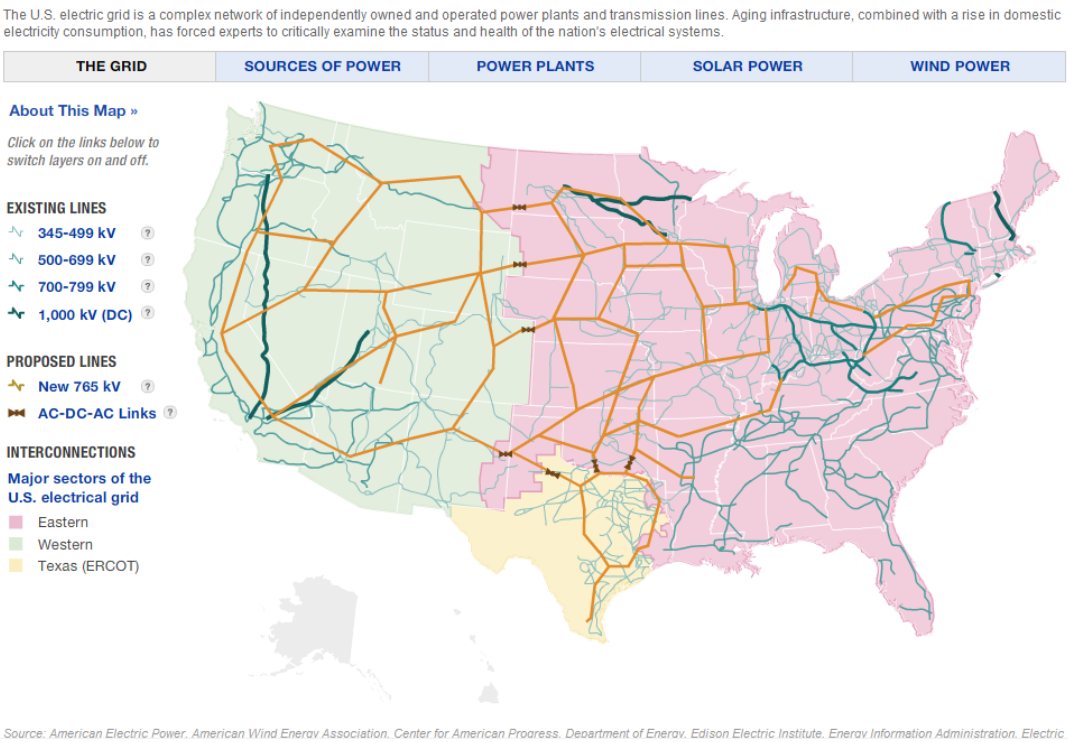

Fig 7: Map of major utility corridors in the United Sates, note parallels between migration routes and potential linear corridors along managed ROWs (Courtesy AEP).

Case Study 3: Public Relations and a Remedy to Tree Removal – Saratoga Joe's Trail

Joe's Trail is a 1.4 mile walking, hiking, and biking recreational trail in Saratoga, CA that parallels and intersects with a 230Kv transmission line (PGE Currents 2011a). Joe Sanfilippo, a prominent local resident and successful property owner, for whom the trail is named, spent countless mornings walking this trail with his dog Macchi (Rodriguez, Mercury News 2011). Upon his untimely passing in 1993, his widow Dee sponsored the development of this trail, which has since become a significant piece of community recreational space.

The trail, and all of its history, are a resource for the community. It was not unexpected that routine maintenance of redwood and pine trees currently growing dangerous close to the power lines would case a stir. More than 25 large and stately redwood and pine trees, prized in California for their symbolism and beauty, were within inches of being in violation of North American Electircal Reliabity Corporation NERC standards (NERC 2003).

The impacts of a tree-wire interaction can be significant as was seen in the 2003 Northeastern black-out in the United States and Canada where nearly 30 million people lost power – the culprit was a tree growing too close to overhear lines and an eventual blow out when extreme heat caused the wires to sag into the tree. Strict guidelines and policies are now in place within industry to prevent such an incident.

IVM programs along rights-of-way result in landscapes that promote butterflies, hummingbirds, and bees – species that thrive in open meadows. The removal of trees that are potential outage hazards can appear as the removal of habitat, however, on these managed landscapes it is a transition from a late stage, usually lower diversity, habitat to an early stage, more floral landscape with increased plant and animal species diversity. Trimmed trees and downed logs also provide potential nesting sites for native bees. This is where the Pollinator Partnership stepped in to help PG&E develop and promote a positive solution to NERC compliance (PGE Currents 2011b).

A site assessment was conducted in the summer of 2011, examining the available microhabitats and potential for support of various parts of the pollinator community. The Pollinator Partnership worked with the hired landscape architect to develop a planting scheme that would work to attack local species of butterflies as well as migratory monarch nearer to public access areas. A meadow habitat, complete with log remnants from a selection of the downed trees, was installed along the far edges of the site to provide habitat for native bees (PGE Currents 2011b). Informative signage that links to www.pollinator.org and www.pge.com provides information about the various pollinator gardens and their links to local ecosystems.

Opening day for the new Joe's Trail was well-received by the local community. Dee, Joe's widow, was present at the ribbon cutting ceremony to reopening the new space for community use (City of Saratoga 2011). The trail is now back in use and has an added habitat and outreach role that supports pollinators.

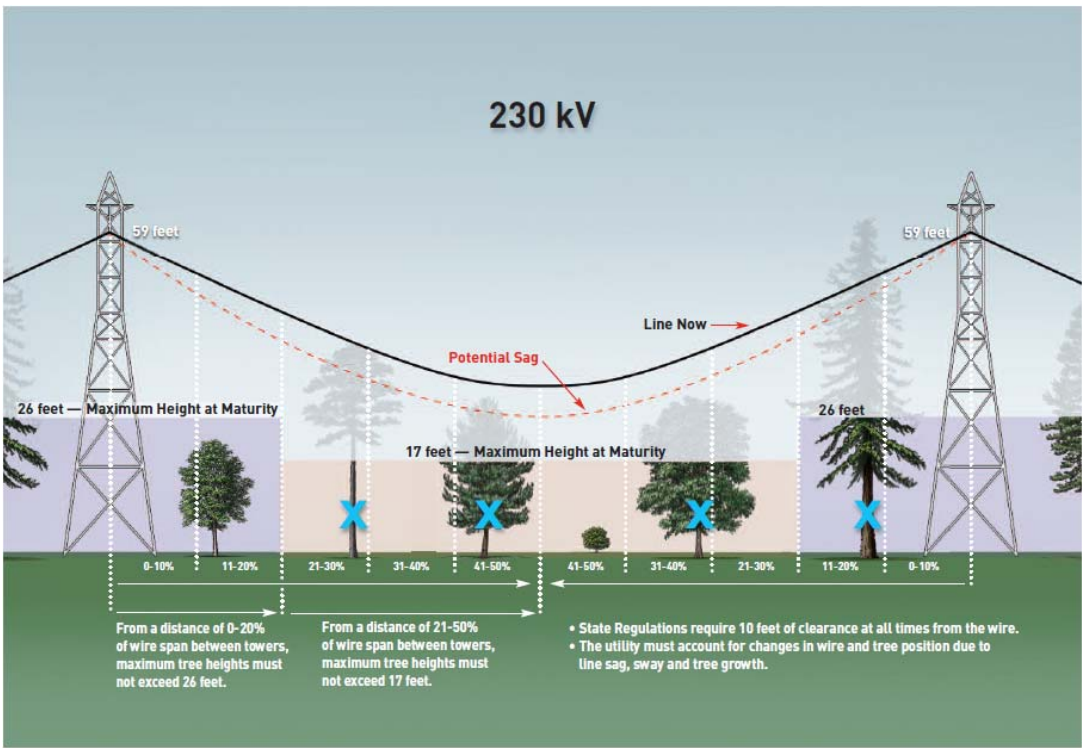

Fig 8: A diagram used by PG&E during public outreach explaining the potential hazards of taller trees along Joe's Trail (Courtesy PG&E).

Figure 9: A conceptual drawing of Joe's Trail from the city of Saratoga's website (Courtesy City of Saratoga and PG&E).

Figure 10: Replanting after hazard tree removal at Joe's Trail (Courtesy PG&E).

Fig 11: Delora Sanfilippo (with scissors) and Mayor Howard Miller (far right) joined others in dedicating the trail on Thursday (Courtesy City of Saratoga).

Conclusions

Vegetation underneath overhead transmission corridors provide habitat for pollinating species – this is clear for our work and an extensive review of the research on the subject (Wojcik and Buchmann 2012). This habitat becomes especially important when it is the only available space for certain species – which has been proven to be the case for many key pollinators and other wildlife (Smallidge et al 1996, Lowell and Loundsbury, 2000). Power line corridors are potential linear refuges. How we manage them makes a difference. Impediments to broad scale adoption of pollinator-supporting IVM include historical precedents whereby agencies routinely use scheduled mowing or herbicidal treatments; the perception that IVM is not a correct fit, or cost-effective for their system; and a lack of understanding or proof of to the benefits that can come from this program. With these case studies Pollinator Partnership is working to fill data gaps in order to support greater adoption of IVM, test localized projects for their large-scale applicability, and work with utilities and the public to raise awareness for the role that utility corridors can play in pollinator conservation.

When utility landscapes are managed appropriately or restored using native vegetation there is a strong positive effect on native pollinator diversity and local abundance. This translates into a sustained local floral system, improved local ecosystem services, and safe power transmission.

About Us

The Pollinator Partnership (P2) in an environmental non-profit with a mission to protect and promote pollinators and pollination services. We support pollinators, the plants they pollinate, the ecosystems that this structures, and the food that this produces. We achieve our goals through partnerships, collaborations, and stakeholder interactions; the most successful projects are the ones where a benefit to pollinators also means a benefit to the local community, industry, or economy. We work to foster the triple bottom line that is supported by the most fundamental ecosystem service of all. Visit us at www.pollinator.org to find out more about our project, consulting to support pollinator and other wildlife habitat management on your right-of-way, and other partnership opportunities.

About the Author

Vicki Wojcik is an optimistic ecologist that believes human populations and the natural world can coexist. Her graduate research focused on understanding the factors that influence the occurrence of bees in urban areas. This focus on pollinators in human-dominated landscapes has continued into her professional career. As part of the P2 science team Dr. Wojcik develops and manages studies that investigate how pollinators interact with managed agriculture, industrial lands, urban landscapes, and conservation systems. Dr. Wojcik also works with the P2 consulting team to restore and rehabilitate private and corporate lands for pollinators. She received her B.Sc. Honours from the University of Guelph in 2004 and her Ph.D. in Environmental Science, Policy, & Management from UC Berkeley in 2009. When she isn't professionally planning and managing landscapes for pollinators you can find Vicki in her home garden in San Francisco helping the local urban bee population.

References

1. Buchmann S, Nabhan GP (1996) The Forgotten Pollinators. Island Press, New York.
2. City of Saratoga (2011) Joe's Trail Safety & Reclamation Area http://www.saratoga.ca.us/cityhall/pw/projects/joe/safety_reclamation.asp(Accessed June 10, 2013)
3. Costanza R, d'Arge R, de Groot R, Faber S, Grasso M, Hannon B, Limburg K, Naeem S, O'Neill RV, Paruelo J, Raskin RG, Sutton P, and van den Belt M. 1997. The value of the world's ecosystem services and natural capital. Nature 387:254-260.
4. Gallai N, Salles JM, Settele J, Vaissiere BE (2009) Economic valuation of the vulnerability of world agriculture confronted with pollinator decline. Ecological Economics 68:810–821
5. Klein AM., Vaissiere B, Cane JH, Steffan-Dewenter I, Cunningham SA, Kremen C (2007) Importance of crop pollinators in changing landscapes for world crops. Proceedings of the Royal Society B: Biological Sciences 274: 303–313;
6. Klein AM., Vaissiere B, Cane JH, Steffan-Dewenter I, Cunningham SA, Kremen C (2007) Importance of crop pollinators in changing landscapes for world crops. Proceedings of the Royal Society B: Biological Sciences 274: 303–313.
7. Kremen C, Williams NM, Thorp RW (2002) Crop pollination from native bees at risk from agricultural intensification. Proc. Natl Acad. Sci. USA. 99: 16812–16816.
8. Losey JE, Vaughan M (2006) The economic value of ecological services provided by Insects. Bioscience 56: 311–323.
9. Lowell F, and Lounsbury S (2000) Karner Blue Butterfly habitat restoration on pipeline right-of-way in Wisconsin. 7th International Symposium on Environmental Concerns in Rights-of-Way Management.
10. National Research Council of the National Academies (2006) Status of Pollinators in North America. National Academy Press, Washington, DC.
11. NERC – North American Electircal Reliabity Corporation. 2009. Reliability Standards for the Bulk Electric Systems of North America. [Online] http://www.nerc.com/files/Reliability_Standards_Complete_Set.pdf
12. Ollerton J, Winfree R, and Tarrant S (2011) How many flowering plants are pollinated by animals? Oikos 120:321-326.
13. PG&E Currents (2011a) Saratoga Community Gathers As Joe's Trail Offically Opens. http://www.pgecurrents.com/2011/11/18/saratoga-community-gathers-as-joe%E2%80%99s-trail-officially-opens/ (Accessed June 10, 2013)
14. PG&E Currents (2011b) Saratoga City and PGE Work Together To Renovate A Really Wonderful Trail http://www.pgecurrents.com/2011/07/26/saratoga-city-pge-work-together-to-renovate-a-really-wonderful-trail/(Accessed June 10, 2013)
15. Rodriguez, J. (2011) A trail for Joe in Saratoga. Mercury News. http://www.mercurynews.com/saratoga/ci_17238674 (Accessed June 10, 2013)
16. Smallidge PJ, Leopold DJ, and Allen CM (1996) Community Characteristics and Vegetation Management of Karner Blue Butterfly (Lycaeidesmelissa samuelis) Habitats on Rights-of-Way in East- Central New York, USA. British Ecological Society 33: 1405-1419
17. Southwick EE, Southwick L (1999) Estimating the Economic Value of Honey Bees (Hymenoptera: Apidae) as Agricultural Pollinators in the United States. Journal of Economic Entomology 85:(3):13
18. Wojcik, V.A. and S. Buchmann. 2012. A review of pollinator conservation and management on infrastructure supporting rights-of-way Journal of Pollination Ecology- Cholula Special Issue: Journal of Pollination Ecology 7(3):16-26.