

## Importance of dawn/dusk and nighttime for wildlife in the Puente Hills Preserve (rev 4/22/2015)

Animals have natural biological rhythms and adaptations influencing whether they are active during the day (diurnal), around dawn/dusk (crepuscular) or at night (nocturnal). However, the external environment can be a driving force in altering that natural pattern.

The Puente Hills Preserve is home to a wide range of crepuscular and nocturnal animals including, but not limited to, the following animals:

- Crepuscular: cottontail rabbits, mule deer, mice, rattlesnakes, hummingbirds, songbirds, mosquitoes, moths, some beetles
- Nocturnal: foxes, owls, bats, mule deer, skunks, raccoons, bobcat, coyote, mountain lions, rattlesnakes

### Benefits of being crepuscular

There are numerous benefits of being crepuscular. The temperatures around dusk and dawn can be the most comfortable time of day especially when daytime and nighttime temperatures can be more extreme. In low light conditions, animals can blend in better to their surroundings allowing them to hide while they forage. Being crepuscular also allows many animals to avoid predators by being active when predatory animals, such as mountain lions and bobcats, are typically not. But also many species, such as mule deer, have eyes adapted to see in those light conditions. During this small window of time (currently approximately 1.5 hours before sunrise and after sunset), crepuscular animals must feed, find mates, seek shelter, etc. and many species are only active during the crepuscular and/or nocturnal hours.

### General recreational impacts

Some diurnal animals of the Puente Hills Preserve, such as the California ground squirrel (*Spermophilus beecheyi*) and the Western Scrub-Jay (*Aphelocoma californica*), may become habituated to recreationists during the day because of the regular activity going on around them. However, there are more people on the trails than before (use at Hellman increased 798% between 2005 [Martino et al. 2006] and 2012 [Garbat et al. 2013]), and when recreation levels in the Preserve were much lower, there was presumably less recreation use between sunset and sunrise. Rangers are now spending increasing amounts of time trying to get recreationists out of the Preserve at sunset. This increased level of recreational activity may cause crepuscular and nocturnal wildlife to become alarmed by human use and modify their behaviors, potentially having deleterious effects on their survival (e.g. increased heart rate, decreased foraging) and/or breeding (e.g. nest abandonment). With increased human use, especially after sunset and before sunrise, concerns are that these effects on wildlife may become amplified. The type of activity recreationists are engaging in may also matter since hikers may be more likely to approach wildlife and travel slower than bikers so they have an increased time of disturbance in one area. Papouchis et al. (2001) found that hikers caused the most severe responses in desert bighorn

sheep where sheep fled in 61% of the encounters with hikers as compared to 6% of encounters with bikers. Wildlife may have energetic losses when they are intentionally or unintentionally harassed and flee from their normal activities or preferred habitat expending more energy on fleeing/flight in addition to the potential loss of foraging time. Additionally, noise may disturb wildlife and it is typically quieter in the Preserve during the crepuscular and nocturnal hours. In some studies, noise caused by visitors resulted in increased levels of disturbance to birds (Bowles 1995; Burger & Gochfeld 1998). In general, the presence of dogs were found to cause birds to flush (Burger 1986; Pomerantz et al. 1988;) and unleashed dogs were found to pose a direct threat to birds because they can chase and kill them (Burger 1986), and they may be especially disruptive off-leash due to their resemblance to coyotes and foxes (Sime 1999), thus eliciting a predator avoidance response by wildlife.

### Crepuscular/nocturnal use impacts

With such little time for crepuscular animals to accomplish their daily activities, recreation during this time may interrupt these activities with potential negative effects on wildlife. With more people on the trails now and user-created trails bisecting habitat, pressures on wildlife from recreational activities can cause many diurnal animals to shift their activity times to being more crepuscular or even nocturnal (George and Crooks 2006). Therefore periods of relief for wildlife, such as during the crepuscular and nocturnal hours, become increasingly important. The biggest effect is the cumulative effect of nighttime disturbance on wildlife that has already been displaced or disturbed by human activity during the daytime (see general recreational impacts above). Additionally, if people are in the Preserve at twilight/night, and using lights, those lights can impair wildlife's vision which can disrupt foraging and young rearing, to name a few (Green and Higginbottom 2001).

### Studies on/near the Preserve

Most recently Whittier College senior, Bo Gould, has been analyzing USGS wildlife camera data (unpublished) for bobcat, coyote, gray fox, mule deer, raccoon, and striped skunk from 12/30/2012 to 6/30/2013 and analyzed what percent of the wildlife detections occurred in the daytime versus the nighttime. These data indicate that these species may be shifting their activity times at Turnbull Canyon and Hellman Park into the nighttime compared to the core habitat where they are active in both the daytime and nighttime. The cameras at Hellman Park, Turnbull Canyon and the core habitat were active for 147 days, 170 days and 181 days, respectively which can account for some of the higher number of detections at Turnbull Canyon and the core habitat.

<b>Wildlife Detections</b>	<b>No. Daytime Detections</b>	<b>No. Nighttime Detections</b>	<b>Percent of Detections in Daytime</b>	<b>Percent of Detections in Nighttime</b>
Hellman Park	0	78	0.0%	100.0%
Turnbull Canyon	8	143	5.3%	94.7%
Core Habitat	139	197	41.4%	58.6%

Several other studies have been conducted on or near the Puente Hills Preserve investigating the effects of recreation on wildlife. A 2002 report by Haas and Turschak stated that coyote and mule deer shifted their activity times to more nocturnal hours after opening the Colima tunnel within the Puente Hills Preserve to human recreation; a pattern which continued during a follow-up study conducted by Lucas (2010) but now also included a nocturnal shift in bobcat activity. This may have negative effects like decreased feeding efficiency, increased predation, and increased energy demands.

In a study conducted on the Nature Reserve of Orange County (within 40 miles of the Puente Hills Preserve), George and Crooks (2006) found that in areas with high human activity, bobcats and coyotes were less active in the daytime and exhibited a lower range of activities. Bobcats were found less frequently along trails with high recreation use (hikers and bikers) and were more nocturnal, versus diurnal, in areas with high recreational use (again hikers and bikers) and when dogs were present. Although coyote activity was also lower in sites with higher recreation use and coyotes were also temporally displaced by dogs, they were not as sensitive to human disturbance as bobcats. In short, the study by George and Crooks illustrates that recreation use can alter wildlife behavior. These are important findings since our Preserve has both hikers and bikers, allows dogs in more areas than not, and bobcats and coyotes are present on the Preserve and as top predators are good indicators of ecosystem health.

### Conclusion

With the continual added pressure due to increased human activity during the day, it becomes more important to provide relief to wildlife during crepuscular and nocturnal times. In addition, other challenges to the Preserve are limited Ranger resources to control human activities and close all trailheads at sunset as well as porous access points when the Preserve is closed.

### Bibliography

Bowles A. E. 1995. Response of wildlife to noise. Pages 109-156. in R.L. Knight and D.N. Cole, editors. *Wildlife and recreationists: coexistence through management and research*. Washington, D.C., Island Press.

Burger, J. 1986. The effect of human activity on shorebirds in two coastal bays in northeastern United States. *Biological Conservation* 13:123-130.

Burger, J., and M. Gochfeld. 1998. Effects of ecotourists on bird behaviour at Loxahatchee National Wildlife Refuge, Florida. *Environmental Conservation* 25:13-21.

Garbat, A., A. Gullo, and L. Longacre. 2013. Trail visitor user survey. A Pilot Study of Visitation at Hellman Park and Turnbull Canyon.

- George, S.L. and K.R. Crooks. 2006. Recreation and large mammal activity in an urban nature reserve. *Biological Conservation* 133:107-117.
- Green, R. and K. Higginbottom. 2001. The negative effects of wildlife tourism on wildlife. *Wildlife Tourism Research Report Series: No.5*.
- Haas, C. and G. Turschak. 2002. Responses of large and medium-bodied mammals to recreation activities: the Colima Road underpass. Final Report. 23 pages.
- Lucas, S. 2010. Changes in Large and Medium-bodied Mammal Activity Following Eight Years of Recreation and Other Activities: The Colima Road Underpass and Vicinity. Final Report. 29 pages.
- Martino, D., T. Longcore, and J. Wolch. 2006. Park Visitor User Survey for the Puente Hills Landfill Native Habitat Preservation Authority. 68 pages.
- Papouchis, C.M., F.J. Singer and W. B. Sloan. 2001. Responses of Desert Bighorn Sheep to increased human recreation. *Journal of Wildlife Management* 65(3):573-582.
- Pomerantz, G. A., D. J. Decker, G. R. Goff, and K. G. Purdy. 1988. Assessing impact of recreation on wildlife: a classification scheme. *Wildlife Society Bulletin* 16:58-62.
- Sime, C. A. 1999. Domestic Dogs in Wildlife Habitats. Pages 8.1-8.17 *in* G. Joslin and H. Youmans, coordinators. *Effects of recreation on Rocky Mountain wildlife: A Review for Montana*. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society. 307pp.