



Research Brief for Resource Managers

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How can managers consider bumble bees during post-fire management?

Loffland, H.L., J.S. Polasik, M.W. Tingley, E.A. Elsey, C. Loffland, G. Lebuhn, and R.B. Siegel. 2017. *Bumble Bee Use of Post-Fire Chaparral in the Central Sierra Nevada*. *The Journal of Wildlife Management* **81**(6): 1084-1097. DOI: 10.1002/jwmg.21280

Post-fire restoration often targets montane chaparral for removal to support forest reforestation and reduce future fire risk. While removal of chaparral is often successful for increased growth of trees, it is unknown how this impacts pollinators. Bumble bees are important pollinators of native plant species, however these species are in decline throughout Western North America. The objective of this study was to increase information related to the value of post-fire upland vegetation for bumble bees. This information can support managers in making nuanced decisions to benefit bumble bees during post-fire management.

Loffland et al. investigated bumble bee and plant diversity and abundance in two 2004 mixed severity forest fires. The fire study sites were located in the Freds and Power fires on the Eldorado National Forest in the Central Sierra Nevada. Four-hundred ninety-five plots were sampled during 965 surveys in 2015 and 987 surveys in 2016. Four-hundred thirteen of the plots were located in upland habitat while 82 were located in riparian habitat. Upland plots were a mix of chaparral shrubs and associated herbaceous plants.

Management Implications

- Consider foraging preferences of pollinators when developing projects.
- During reforestation of burned areas, forest openings dominated by herbaceous vegetation and chaparral should be retained for bumble bee habitat, especially openings dominated by bearclover and phacelia species.
- Retain mosaics (within 100-1000m) of post-fire herbaceous and shrub species to maximize bumble bee resources across time and space.

Six-hundred seventy-six bumble bees of 12 species were identified in 2015 and 1,818 bumble bees of 11 species were identified in 2016. Nine species were found in both riparian and upland plots. Riparian plots had two unique species and upland plots had one unique species. Riparian plots had greater abundance and diversity of bumble bees compared to upland plots, but also had higher variance. Small isolated patches of riparian vegetation were less intensively used compared to larger patches.

Species richness increased with increasing herbaceous cover and decreased with increasing tree cover. Greenleaf manzanita was the only shrub species with a clear influence on bumble bee populations as a whole, as the cover of this species increased, bumble bee richness decreased.

Bearclover cover had an unclear influence on bumble bees as a whole, however as cover of this

species increased, the most common bumble bee species in the study also increased. This shrub species was used significantly more than would be expected based on availability. It was the most frequently used shrub species for foraging and the second most frequently used plant species overall, after phacelia species. The four most frequently used plant species all bloomed at different times in the year, highlighting the importance of plant diversity for pollinator diversity.

While riparian habitat were more intensively used than post fire chaparral communities, chaparral communities were still important for bumble bee abundance and diversity. Additionally, chaparral shrub species may provide other benefits to bumble bees regardless of whether bees forage on them (e.g. shade), bumble bee preferences may change across the Sierra, and these communities may be important for other species of pollinators. Therefore these chaparral shrub species should be considered for pollinators during project planning.

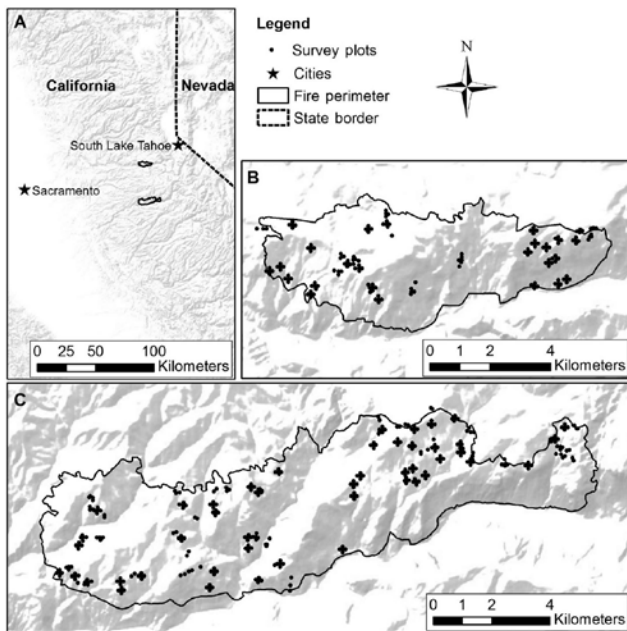


Fig. 1 Location plots in Fred's (B) and Power Fire (C) in the Central Sierra Nevada, California (A).