

Research at the James: **The California Acorn Survey**

Walt Koenig; Cornell University and Jean Knops; University of Nebraska



In 1980, Drs. Walt Koenig and Jean Knops currently from Cornell University and the University of Nebraska, began a long-term study of annual acorn (mast) production of California oaks (*Quercus* spp.). The overarching focus of the study is to better understand factors affecting variability in acorn production (masting behavior) at multiple levels, including the evolutionary mechanisms driving masting behavior as well as the ecological consequences of this population level phenomenon. Currently, the study encompasses over 1,000 trees at over 20 sites, including 24 trees at the James Reserve



To estimate acorn production, Koenig and Knops count as many acorns as they can at different parts of the tree for 15 seconds, and then add the values of each estimate to quantify relative acorn production per tree. This rapid assessment enables the researchers to estimate relative acorn production by this large of a number of trees over the huge geographic area of their study. Despite their clever methodology, the sheer number of trees and sites represents a logistical challenge for the small research team. The project requires a tremendous amount of travel and field work across California. However, the rewards are great for studies that are conducted for longer timescales and larger spatial scales. Yearly efforts are beginning to provide unique insights to biological and ecological processes.



To date, the project has demonstrated large-scale spatial synchrony of acorn production by two species of California oaks (*Q. lobata* and *Q. douglasii*). This synchrony was found within and between these species over distances of nearly 750 km (Koenig and Knops 2013). This provides evidence for the importance of weather as a driver of masting behavior. Currently

one of Walt and Jean's main interests is to determine the proximate mechanism driving masting behavior, particularly how pollen limitation may affect acorn production in these wind-pollinated species. With continued annual sampling of the mast production by California oaks, including those at the James Reserve, Walt and Jean will no doubt shed light on this and other important ecological aspects of this interesting and important genus of trees.

Koenig, W.D. and J.M.H. Knops. 2013. Large-scale spatial synchrony and cross-synchrony in acorn production by two California oaks. Ecology 94:83-93.