Specifically, unique indicator species were found for each of the five types of forest, four study sites, and two mountain ranges. The ecological processes that shape forest biodiversity operate over wide spatial and temporal scales. Sustaining forest biodiversity at these multiple scales requires that forest managers develop a deeper understanding of the underlying biological patterns and environmental gradients affecting forest communities. Forest management strategies guided by knowledge of these biological patterns and gradients can potentially help sustain biodiversity and community composition in intensively managed forests. Our results suggest that leave islands represent an effective silvicultural strategy for maintaining the environmental conditions needed to sustain several low-mobility taxa in intensively managed forests.

**Keywords:** forest leave islands, thinning effects, microclimate, Oregon.

# *Leave Islands as Refugia for Low-mobility Species in Managed Forest Mosaics*

## *Stephanie J. Wessell-Kelly and Deanna H. Olson*

### Poster Abstract

In recent years, forest management in the Pacific Northwest has shifted from one based largely on resource extraction to one based on ecosystem management principles. Forest management based on these principles involves simultaneously balancing and sustaining multiple forest resource values, including silvicultural, social, economic, and ecological objectives. Leave islands, or green-tree retention clusters, have been proposed as an alternative silvicultural strategy designed to sustain the ecological integrity and biological diversity within intensively managed forests. However, pertinent questions regarding the relationship of the physical structure of leave islands to their associated microclimates, flora, and fauna remain largely unanswered. We evaluated the effectiveness of three sizes of leave islands (0.1-, 0.2-, and 0.4-ha) within a thinned forest matrix relative to thinned and unthinned forest in providing refugia for low-mobility, ecologically sensitive species one to five years following forest thinning. Specifically, we examined differences in microhabitat and amphibian, mollusk, arthropod, and vascular plant abundance and diversity with respect to the size of leave islands in managed forests. By determining habitat correlates of species and functional group occurrence, we envision that this study will provide vital information regarding aggregated green-tree retention in managed forest landscapes. Our results indicate that there are treatment effects of forest thinning and leave islands relative to microclimate and some aspects of amphibian and arthropod density, and vascular plant diversity and ground cover. These results suggest that leave islands may represent an effective sustainable forest management strategy by providing short-term refugia for some species in managed forests of the Pacific Northwest, U.S.A.

**Keywords:** microclimate, amphibians, mollusks, arthropods, plants.

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**Photos on facing page—Top left:** headwater stream initiation seep area, Keel Mountain, 2008, photo by Paul Anderson. **Top right:** Small headwater stream with a camera case for scale, Keel Mountain, 2008. USFS photo by Mark Meleason. **Center left:** Edge of variable-width buffer with stream, Keel Mountain, 2008, photo by Paul Anderson. **Center right:** Stream temperature and channel microclimate measurement station, Keel Mountain, 2008, USFS photo by Mark Meleason. **Bottom left:** Streamflow measurement, photo by Brad Catton, USFS. **Bottom right:** Instream wood at Keel Mountain. Photo by Paul Anderson.