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Transmitted Via Email:

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Subject: Habitat Connectivity Overlay Zone

We applaud the County for the development of the Habitat Connectivity Overlay Zone (HCOZ) and the associated ordinances. The HCOZ is based on two of the South Coast Missing Linkages, the Santa Monica-Sierra Madre Connection (Penrod et al. 2006) and the Sierra Madre-Castaic Connection (Penrod et al. 2005), which are part of a broader regional conservation strategy. The South Coast Missing Linkages effort was a highly collaborative effort among federal, state and local agencies and non-governmental organizations to identify and conserve landscape-level habitat linkages to protect essential biological and ecological processes in the South Coast Ecoregion. Partners included but were not limited to: South Coast Wildlands, The Wildlands Conservancy, The Resources Agency California Legacy Project, California State Parks, California State Parks Foundation, United States Forest Service, National Park Service, Santa Monica Mountains Conservancy, The Nature Conservancy, Rivers and Mountains Conservancy, Conservation Biology Institute, San Diego State University Field Stations Program, Southern California Wetlands Recovery Project, Environment Now, Mountain Lion Foundation, and the Zoological Society of San Diego's Center for Reproduction of Endangered Species (now called Conservation and Research for Endangered Species). Cross-border alliances were also formed with Pronatura, Universidad Autonoma de Baja California, and Conabio to further the South Coast Missing Linkages initiative in northern Baja. These regionally important habitat linkages are essential to accommodate wildlife movement and sustain large-scale ecosystem processes, especially in light of climate change.

County of Ventura
Planning Commission Hearing
PL16-0127

Exhibit 16 – Letter dated October 17,
2018 from Kristeen Penrod

Our Mission is to protect and restore systems of c

systems upon which they depend.

As the lead author of the Missing Linkages reports, I believe that the minor amendments that the County has made to the Linkage Designs for the HCOZ are entirely consistent with the intent of the original model. The amendments include incorporating existing protected areas into the design, filling in the “holes” in the Linkage Design, and adding the Ventura River corridor. The following several paragraphs provide the rationale and justification for these amendments and include various references to the South Coast Missing Linkages reports (Penrod et al. 2005 and 2006).

The Linkage Designs were always intended to build upon existing conservation investments in the region. As such, amending the HCOZ to include existing protected areas into the Linkage Designs is completely in line with the original intent of the model. The Santa Monica-Sierra Madre Linkage was designed to connect two expansive core areas that are largely conserved within the Sierra Madre Range of the Los Padres National Forest and the Santa Monica Mountains National Recreation area, while the Sierra Madre-Castaic Linkage was designed to connect core habitats in the Sierra Madre Range of Los Padre National Forest with core habitats in the Castaic Ranges of the Angeles National Forest. The HCOZ passes through several existing protected areas, which were always considered an essential part of the original Linkage Designs. For example, when habitat was added to the Least-Cost Unions to ensure sufficient live-in and move-through habitat for the focal species for which we did not conduct landscape permeability analyses, we always added habitat to lands already set aside for conservation purposes (See Figure 15 in Penrod et al. 2005 and Figure 13 in Penrod et al. 2006). Thus, adding existing protected lands to the HCOZ is entirely consistent with the overarching goals of the South Coast Missing Linkages effort. Currently, the HCOZ includes protected areas that were conserved at the time the Linkage Design reports were completed (Penrod et al. 2005 and 2006). We believe that recent acquisitions and easements that intersect the HCOZ, such as the Santa Susana Field Laboratory Conservation Easement, should also be added to the HCOZ.

Filling in the “holes” in the Linkage Designs for the HCOZ will help to address edge effects, which is also consistent with the original intent of the model. Edge effects are adverse ecological changes that enter open space from nearby developed areas, such as weed invasion, artificial night lighting, predation by house pets, increases in human-associated or opportunistic species like house mice (*Mus musculus*), elevated soil moisture from irrigation, pesticides and pollutants, noise, and domesticated animals that attract native predators. Edge effects have been best-studied at the edge between forests and adjacent agricultural landscapes, where negative effects extend 300 m (980 ft) or more into the forest (Debinski and Holt 2000, Murcia 1995) depending on forest type, years since the edge was created, and other factors (Norton 2002). Data on edge effects for southern California habitats include reduction in leaf litter and declines in populations of some species of birds and mammals up to 250 m (800 ft) in coastal scrub (Kristan et al. 2003), collapse of native plant and animals communities due to the invasion of argentine ants up to 200 m (650 ft) from irrigated areas (Suarez et al. 1998), and predation by house cats which reduce small vertebrate populations 100 m (300 ft) from the edge (Crooks and Soule 1999). Domestic cats may affect wildlife up to 300 m (980 ft) from the edge based on home range sizes reported by Hall et al. (2000). The proximity of human activities near natural areas can also result in indirect impacts and habitat alteration from trail proliferation, higher fire frequencies, etc., and these changes in turn may impact native species (Buechner and Sauvajot 1996). These impacts can be partially mitigated by maintaining high quality habitat in conservation areas, particularly adjacent to human-developed areas (Sauvajot et al. 1998). Edge effects can reach well beyond the development footprint, impacting wildlife movement in several ways:

- Urbanization triggers further development of the road network, which increases the mortality and repellent effect of the road system (Van der Zee et. al 1992).
- Most terrestrial mammals that move at night will avoid areas with artificial night lighting (Rich and Longcore 2006). Artificial night lighting can impair the ability of nocturnal animals

to navigate through areas (Beier 2006) and has been implicated in decline of reptile populations (Perry and Fisher 2006).

- Noise may also disturb or repel some animals and present a barrier to movement (Minton 1968, Liddle 1997, Singer 1978). Some reptiles (which “hear” ground-transmitted vibrations through their jaw (Hetherington 2005) are repelled even from low-speed 2-lane roads, resulting in reduced species richness (Findlay and Houlihan 1997), reducing road kill but increasing fragmentation of habitat.
- Pet cats can significantly depress populations of small vertebrates near housing (Churcher and Lawton 1987, Crooks 1999, Hall et al. 2000) killing millions of wild animals each year (Courchamp and Sugihara 1999, May and Norton 1996).
- Subsidized “suburban native predators” such as raccoons, foxes, and crows that exploit garbage and other human artifacts can reach unnaturally high densities, outcompeting and preying on other native species (Crooks and Soule 1999).
- Development may also cause an increase in the removal of nuisance animals, including wild predators for killing pets or hobby animals (Woodroffe and Frank 2005) and native herbivores that feed on ornamental plants (Knickerbocker and Waithaka 2005).
- There is also an increased risk of mortality to native plants and animals via pesticides and rodenticides, which kill not only their target species (e.g., domestic rats), but also secondary victims (e.g., raccoons and coyotes that feed on poisoned rats) and tertiary victims (mountain lions that feed on raccoons and coyotes; Riley et. al 2006).
- Formerly ephemeral streams may become perennial, making them more hospitable to non-native plants and animals that displace natives and reduce species richness (Forman et al. 2003). For example, irrigation of landscapes surrounding homes encourages the spread of Argentine ant populations into natural areas, where they cause a halo of local extinctions of native ant populations extending 200 m (656 ft) into native vegetation (Suarez et al. 1998, Bolger et al. 2000). Similar affects have been documented for amphibians (Demaynadier and Hunter 1998).
- Spread of some exotic (non-native) plants, namely those that thrive on roadsides and other disturbed ground, or that are deliberately introduced by humans.
- Disruption of natural fire regime by (a) increasing the number of wildfire ignitions, especially those outside the natural burning season (Viegas et. al 2003), (b) increasing the need to suppress what might otherwise be beneficial fires that maintain natural ecosystem structure, and (c) requiring firebreaks and vegetation manipulation, sometimes at considerable distance from human-occupied sites (Oregon Department of Forestry 2006).

As for the lower Ventura River corridor, it was not initially included in the Linkage Designs because it was outside of the analysis extent for both linkage planning areas (Penrod et al. 2005 and 2006). Nevertheless, the lower Ventura River corridor merits inclusion in the HCOZ. The Santa Clara River, Sespe, Santa Paul and Piru creeks were added to the Santa Monica-Sierra Madre Connection (Penrod et al. 2006) primarily to support the needs of southern steelhead trout, though a number of other terrestrial and aquatic species also benefit from these additions. Had the analysis extent been larger, there is no doubt that the lower Ventura River would have been included in the Linkage Design, especially because it provides designated critical habitat for southern steelhead trout (NMFS 2005). Rivers and streams are known movement corridors for countless species (Holland 1985, Dickson et al.

2004, Leidy et al. 2005). In addition, The Ventura River Corridor was identified as a critical linkage at the statewide Missing Linkages conference in 2000 (Penrod et al. 2001).

Having the HCOZ ordinance in place is vital to conserving these regionally important areas and it is consistent with numerous other local, regional and statewide plans, programs and policies. Please let me know if you have any questions or need any additional information.

Respectfully Submitted,



Kristeen Penrod, Director

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