Assessing the Incidence and Diversity of *Phytophthora* Species occurring in Planned Restoration Areas of the Angeles National Forest

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The Angeles National Forest (ANF), located in the greater Los Angeles metropolitan area encompasses approximately 700,000 acres (238,230 ha), comprising a vital biodiversity hot spot. From 2002 to 2008, the ANF was affected by three major fires, the Copper (2002), Ranch (2007) and Sayre (2008). Together, these fires affected approximately 40,000 acres (16,187 ha) of coastal sage scrub, montane chaparral, grassland, riparian corridor, as well as isolated big cone Douglas-fir (*Pseudotsuga macrocarpa)* stands. Droughts and floods in the following years, plus off-road recreational off-highway vehicle use aggravated erosion and altered chaparral vegetation regeneration. As a mitigation effort, restoration attempts in these areas were initiated to plant native nursery stock.

In 2016 - 2017, prompted by concerns that *Phytophthora* species may have been introduced on restoration plantings, *Phytophthora* surveys were conducted in several restoration locations associated with utility project mitigation on ANF lands. The inadvertent out-planting of infested nursery stock is considered one of the main pathways of entry of exotic *Phytophthora* into natural areas. These preliminary surveys detected numerous *Phytophthora* species associated with out-planted native plants and at the source nurseries. The ANF has a typical Mediterranean climate and averages about 15 – 20 inches (28 to 50 cm) of precipitation per year with long dry periods in late spring into early fall. The ability of *Phytophthora* species to survive and become established under these conditions is not known.

To better understand the *Phytophthora* distribution on arid lands of the ANF, a survey was performed in May 2018 to determine the incidence and distribution of *Phytophthora* pathogens in burned areas of the Copper fire that were prioritized for restoration. Fifty-six soil samples were collected from 14 sites; 13 pre-restoration and one of which had already been planted with container nursery stock. Four *Phytophthora* spp. were detected from 3 sites (*P. cactorum, P. gonapodyides, P. riparia* and an undescribed *P. lacustris x riparia* hybrid). All the detections were located in or near dry creek beds. *Phytophthora* was not detected in the recently planted area. Species belonging to *Pythium* s.l. were recovered from all 14 sites, which suggests that *Pythium* may be resident to ANF lands. Sampling will be repeated seasonally in all three fires areas to determine what additional factors could be correlated with the incidence of *Phytophthora* pathogens. Further research is on-going to explore the ecological factors affecting the survival and distribution of *Phytophthora* species on arid ecosystems and fire-affected areas of the ANF.