PRIORITIZING THE CONSERVATION NEEDS OF U.S. TREE SPECIES: EVALUATING VULNERABILITY TO FOREST PESTS

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Insect and disease infestations pose the most serious threat to several North American forest tree species. Scientists and managers from throughout the United States Forest Service have cooperated to develop a conservation priority-setting framework for forest tree species at risk from insects and disease and other threats. The Project CAPTURE (Conservation Assessment and Prioritization of Forest Trees Under Risk of Extirpation) framework is data-driven and guided by expert opinion, allowing the quantitative grouping of species into vulnerability classes that may require different management and conservation strategies. We applied this framework to categorize and prioritize 419 native North American tree species for conservation, monitoring, and management, based on trait data and insect and disease threat data for each host tree species. The categorization is based on vulnerability factors relating to each tree species' (1) insect and disease threat severity, (2) sensitivity to insect and disease infestation, and (3) capacity to adapt to insect and disease infestation. We used K-means clustering to group species into 11 classes based on these three vulnerability dimensions. The three most vulnerable classes encompassed 15 species which require the most immediate conservation intervention. Two additional classes face less severe insect and disease threats and may be good candidates for resistance breeding efforts. Other groups had traits associated with high sensitivity and/or low adaptive capacity to potential future insect and disease threats, suggesting that these species need close monitoring. This assessment tool should be valuable for decision-makers determining which species and populations to target for monitoring efforts and for pro-active gene conservation and management activities. Several Southern tree species were among those identified as those needing immediate conservation intervention, including Florida torreya (*Torreya taxifolia*), Allegheny chinquapin (*Castanea pumila*), pumpkin ash (*Fraxinus profunda*), Carolina ash (*F. caroliniana*), redbay (*Persea borbonia*), Carolina hemlock (*Tsuga caroliniana*), eastern hemlock (*T. canadensis*), and butternut (*Juglans cinerea*). Additionally, the Project CAPTURE framework was used to help identify a short list of imperiled tree species as potential targets for Forest.Health, **a focused, high intensity intervention U.S.-Canadian effort that could apply biotechnology applications such as** genome sequencing and bioinformatics, population genotyping for breeding, and transformation of native genotypes with resistance genes**.**