

WHIPPET: A novel tool for prioritizing invasive plant populations for regional eradication

Gina M. Skurka Darin^{a, 1}, Steve Schoenig^{b, 2}, Jacob N. Barney^a, F. Dane Panetta^c, Joseph M. DiTomaso^{a, *}

^a Department of Plant Sciences, Mail Stop 4, One Shields Ave., University of California, Davis, CA 95616, USA

^b Integrated Pest Management Branch, California Department of Food and Agriculture, 1220 N Street, Sacramento, CA 95814, USA

^c Alan Fletcher Research Station, Biosecurity Queensland, Department of Employment, Economic Development and Innovation, P.O. Box 36, Sherwood, Queensland 4075, Australia

Abstract

Large geographic areas can have numerous incipient invasive plant populations that necessitate eradication. However, resources are often deficient to address every infestation. Within the United States, weed lists (either state-level or smaller unit) generally guide the prioritization of eradication of each listed species uniformly across the focus region. This strategy has several limitations that can compromise overall effectiveness, which include spending limited resources on 1) low impact populations, 2) difficult to access populations, or 3) missing high impact populations of low priority species. Therefore, we developed a novel science-based, transparent, analytical ranking tool to prioritize weed populations, instead of species, for eradication and tested it on a group of noxious weeds in California. For outreach purposes, we named the tool WHIPPET (Weed Heuristics: Invasive Population Prioritization for Eradication Tool). Using the Analytic Hierarchy Process that included expert opinion, we developed three major criteria, four sub-criteria, and four sub-sub-criteria, taking into account both species and population characteristics. Subject matter experts weighted and scored these criteria to assess the relative impact, potential spread, and feasibility of eradication (major criteria) for 100 total populations of 19 species. Species-wide population scores indicated that conspecific populations do not necessarily group together in the final ranked output. Thus, priority lists based solely on species-level characteristics are less effective compared to a blended prioritization based on both species attributes and individual population and site parameters. WHIPPET should facilitate a more efficacious decision-making process allocating limited resources to target invasive plant infestations with the greatest predicted impacts to the region under consideration.

* Corresponding author. Tel.: þ1 530 754 8715; fax: þ1 530 752 4604.

E-mail address: jmditomaso@ucdavis.edu (J.M. DiTomaso).

1 Current address: California Department of Water Resources, 3500 Industrial Blvd, West Sacramento, CA 95691, USA.

2 Current address: California Department of Fish and Game, 1807 13th Street, Suite 202, Sacramento, CA 95811, USA.