



Prioritizing invasive plant eradication in the San Francisco Bay Area

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Abstract

The Bay Area Early Detection Network (BAEDN) coordinates Early Detection & Rapid Response to infestations of invasive plants throughout the nine county San Francisco Bay Area, proactively dealing with new outbreaks before they can grow into large and costly environmental threats. This strategy is applied to regional eradication of invasive species from the Bay Area, the feasibility of which, will be higher the earlier eradication is conducted and the less established and widespread the target species are.

Limited-distribution invasive species in the Bay Area were identified by analyzing occurrence records within the Calflora database. These were then prioritized according to an abbreviated weed risk-assessment model and by expert opinion from throughout the region. This species assessment folded in state-wide eradication targets of the California Department of Food & Agriculture (CDFA) and included information on known invasiveness, impacts, reproductive biology, and feasibility of treatment.

The results of this analysis comprise a priority early detection species list for the San Francisco Bay Area and are being applied to early detection efforts around the region.

We then prioritized populations of high-priority species for eradication using a new tool: Weed Heuristics: the Invasives Population Prioritization for Eradication Tool (WHIPPET) - that prioritizes eradication targets based on relative impact, invasiveness, and feasibility of eradication.

Species Prioritization

The process of listing species combined quantitative analysis of distribution and invasiveness with supplemental expert opinion. California occurrence records for non-native plant species were downloaded from the Calflora and California Consortium of Herbaria databases. All species were then evaluated for their level of documented invasiveness from a broad set of publications and rankings. Non-native species shown to be invasive and have limited Bay Area occurrence records were reviewed as candidate early detection species. Invasive plant experts from across the region then reviewed candidate species to verify distribution and invasiveness. Experts also reviewed species not documented as invasive by our consulted sources, so that invasive species not well studied or understood in the literature were not overlooked. *From over 1400 species considered, 73 taxa remained.* These invasive species of limited San Francisco Bay Area distribution represent a high threat if left unchecked, but also offer a high feasibility of eradication success if acted upon promptly.

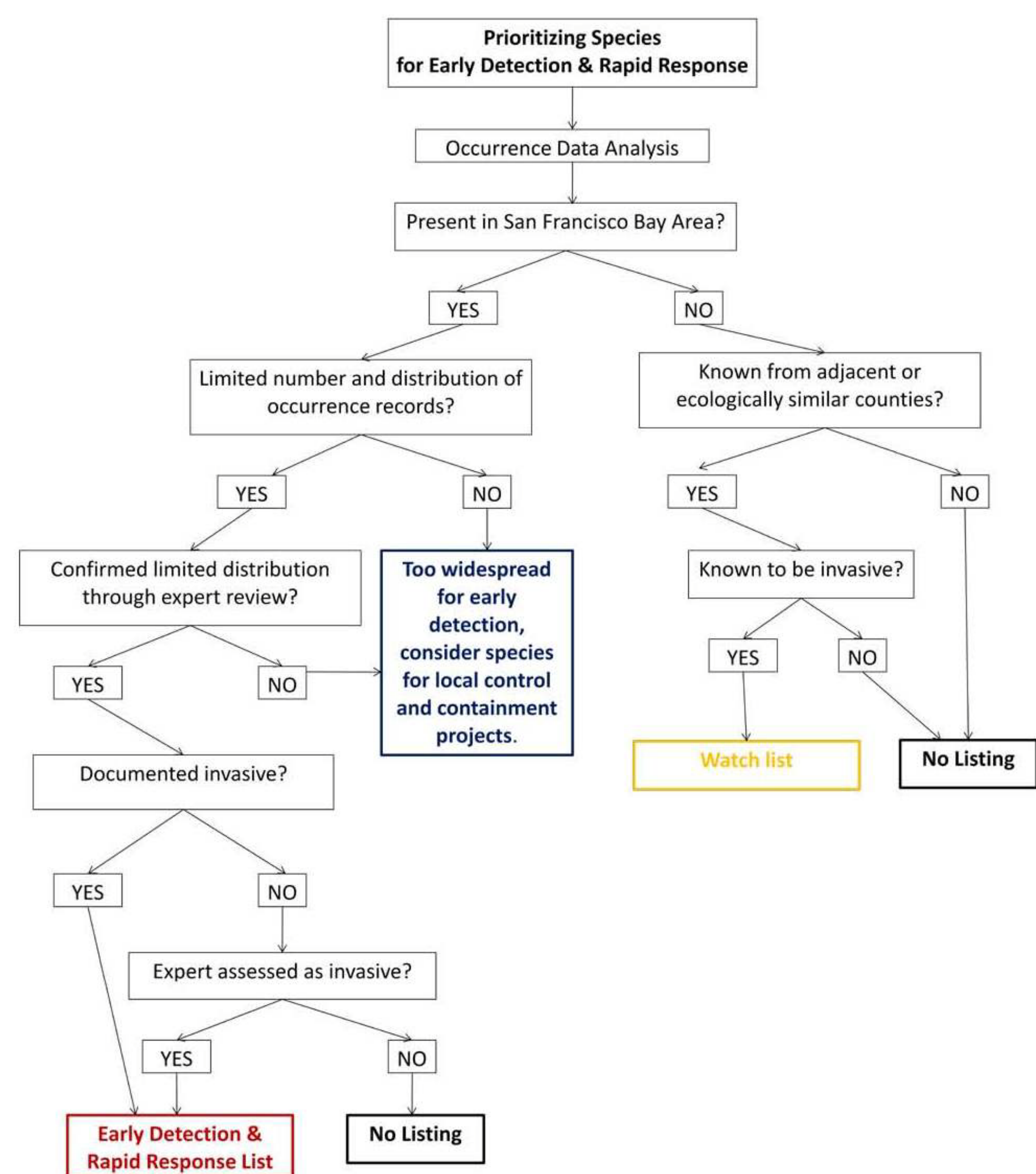
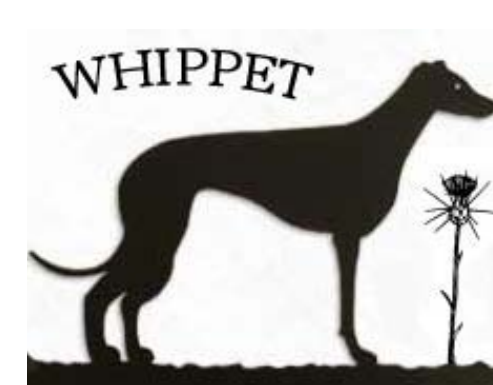


Figure 1: Early detection species prioritization decision tree.



Population Prioritization

Populations of target species were prioritized for eradication using *Weed Heuristics: the Invasives Population Prioritization for Eradication Tool* (WHIPPET), which scores each population based on a combination of proximity to high value assets and vectors of spread, and species-specific criteria. Population-level criteria allow the overall priority scores for conspecific populations to vary spatially corresponding to levels of impact, invasiveness, and feasibility of control. Additional factors such as willingness of landowners to cooperate on management or eradication efforts, or local socio-political concerns centered on particular control aspects (i.e. herbicide use) can be considered once populations are ranked. Targeting eradication for high-scoring populations thus directs effort to populations with the greatest potential to cause negative impacts, spread rapidly, and with the highest feasibility of eradication.

Scoring Populations

Proximity to high value assets and vectors of spread was measured for each occurrence using Geographic Information Systems software. Closer proximity garnered higher scores.

Experts ranked species on:

- impacts to wildlands
- rangelands, and humans
- spread rate;
- reproductive ability
- detectability
- control effectiveness.

High species scores were assigned for:

- high impacts
- high spread rate
- low reproductive ability
- high detectability
- high effectiveness of control

Population and species-specific criteria scores were then multiplied by their relative model weight, and then summed to the overall score (see diagram below).

215 Bay Area populations were ranked in this manner.

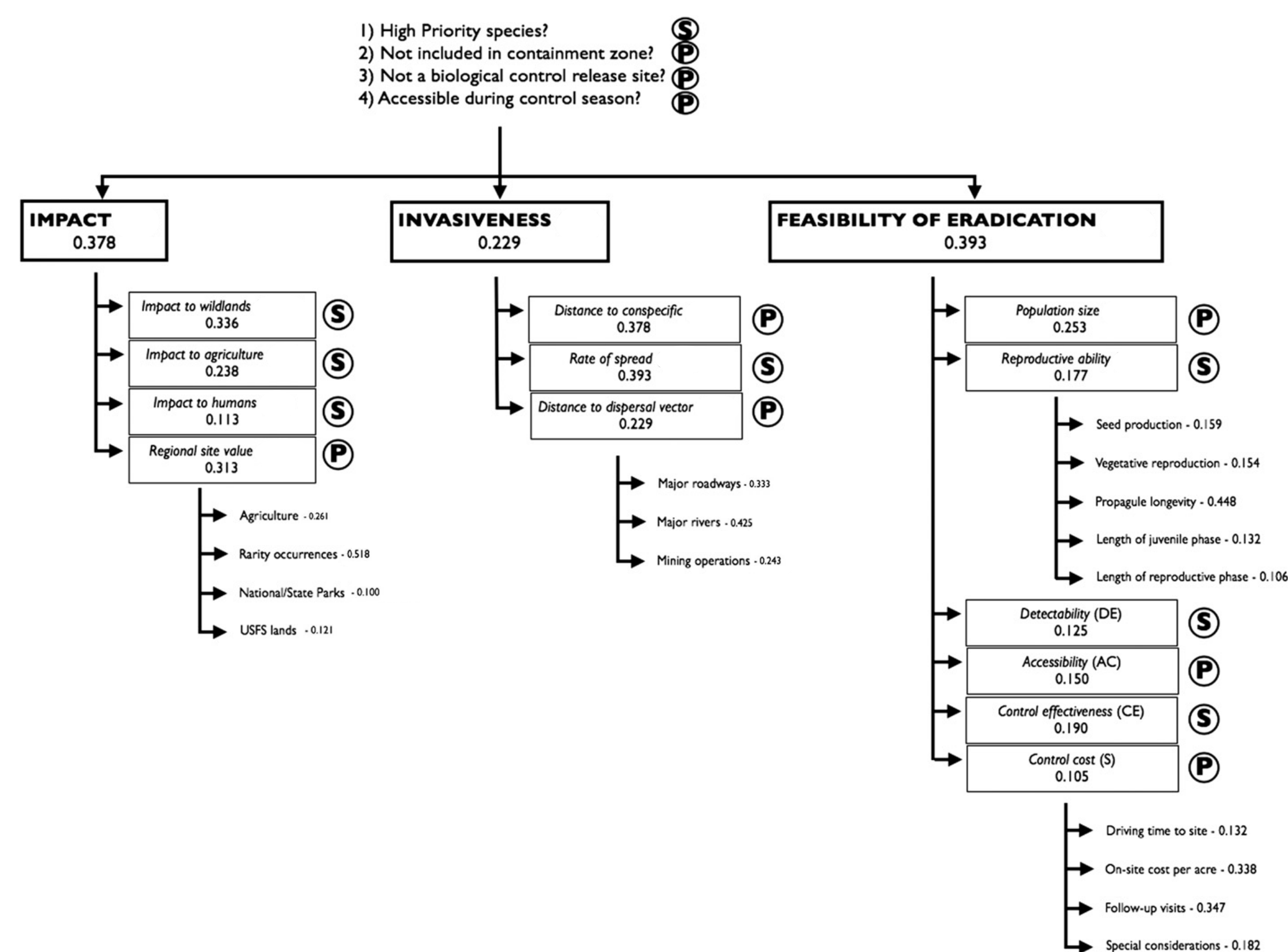


Figure 2: WHIPPET criteria and their relative weights. Species level criteria indicated by (S). Population level criteria indicated by (P).

Next Steps

- Determine status (eradicated, under treatment, or unmanaged) of prioritized populations.
- Fill existing occurrence data gaps.
- Encourage early detection and reporting to the Calflora database.
- Coordinate with partners to ensure eradication treatment and monitoring of extant populations.
- Evaluate pilot season results and modify species list and response protocols accordingly.



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