Appendix E: TWIST 2024 WHIPPET Process and Methodology

The TWIST team made modifications to the WHIPPET model in the “invasiveness” portion. The road and river dispersal factors were expanded upon, while the distance to population of the same species was modified to take into account specific corridors with high treatment traffic. Figure 4.3 shows the formula used to calculate WHIPPET scores in the Tualatin River Watershed.

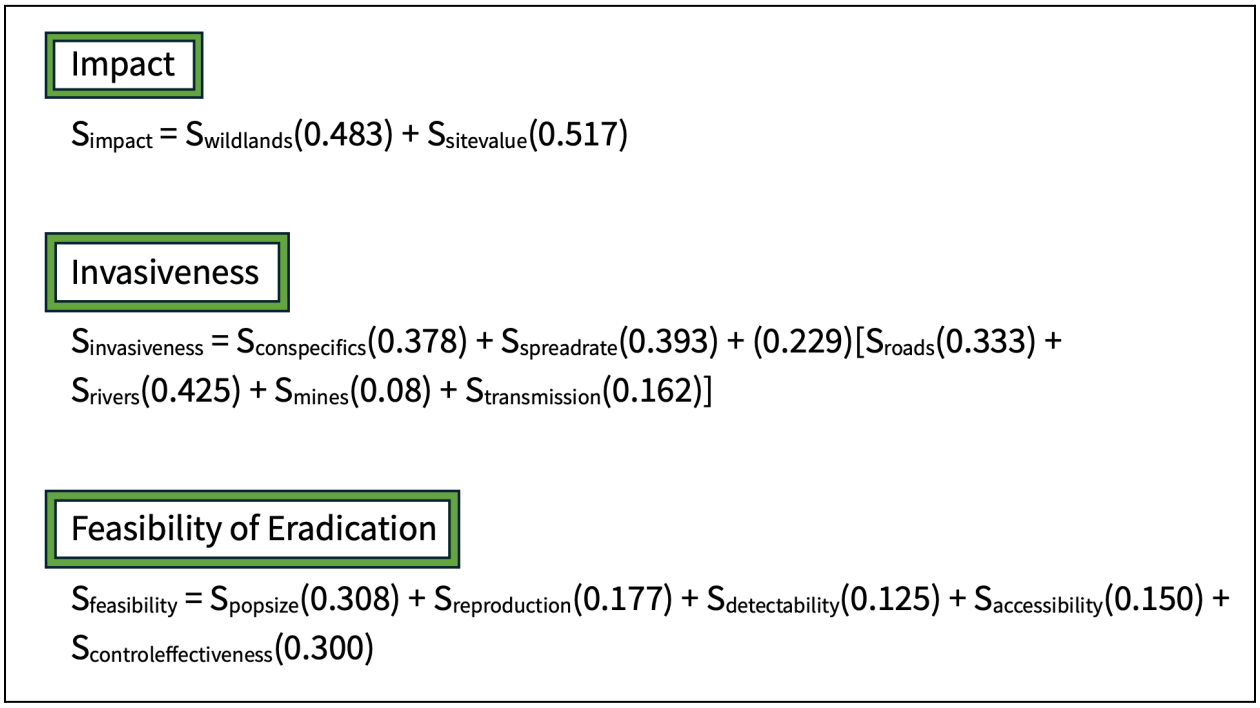

*Figure 4.3: WHIPPET Scoring Algorithm for Watershed Prioritization. *Reference the scoring criteria in Figure 4.1 for additional context.*

Below is a more detailed description of the TWIST WHIPPET modifications that were made:

Distance to populations of the same species: There are a number of stream corridors in the basin that have been a focus for invasive treatment by both Tualatin Soil and Water Conservation District (TSWCD) and other TWIST partners. For many continuous miles, treatment points are located at consistent intervals.

Roads: Using the Metro transportation layer, the “Type” attribute was used to account for traffic volume. Additionally, the trails network was incorporated as a level within the road network, accounting for the trail’s surface type and access.

Rivers: Using the stream “Strahler” attribute from Clean Water Services’ (CWS) stream order data, the TWIST team took into account this value along with a stream’s perennial/intermittent classification as part of the scoring of dispersal. Additionally, some elements of the county storm system, such as open ditches, were included.

WHIPPET Results

A list of priority weed species were selected in order to calculate WHIPPET scores. The priority species were selected from an analysis of the Clean Water Services and Tualatin Soil and Water Conservation District invasive weed species lists. Additionally the 4-County Cooperative Weed Management Area (CWMA) priority list, the Oregon Department of Agriculture State List, and the results from the Technical Advisory Group survey informed the selection of weeds for the WHIPPET calculations.

List of TWIST priority weed species:

- Balfour's balsam (*Impatiens balfourii)*
- Brazilian elodea *(Egeria densa)*
- Drooping sedge *(Carex pendula)*
- False brome *(Brachypodium sylvaticum)*
- Garlic mustard *(Alliaria petiolata)*
- Giant butterbur *(Petasites japonicus)*
- Giant hogweed *(Heracleum mantegazzianum)*
- Giant reed *(Arundo donax)*
- Goatsrue *(Galega officinalis)*
- Italian thistle *(Carduus pycnocephalus)*
- Knotweed *(Reynoutria species)*
- Meadow hawkweed *(Hieracium caespitosum)*
- Milk thistle *(Silybum marianum)*
- Oblong spurge *(Euphorbia oblongata)*
- Orange hawkweed (*Hieracium aurantiacum*)
- Parrotfeather *(Myriophyllum aquaticum)*
- Pokeweed *(Phytolacca decandra)*
- Policemans helmet *(Impatiens glandulifera)*
- Puncturevine *(Tribulus terrestris)*
- Purple loosestrife *(Lythrum salicaria)*
- Spurge laurel *(Daphne laureola)*
- Water primrose (*Ludwigia* species)

The list of priority species is a hybrid of both EDRR species and common weeds. They are species that partners have identified across the Tualatin Watershed that should be prioritized with allocated funds on a case-by-case basis. Their patch size and location will impact what management strategies are utilized. While species like garlic mustard are more widespread throughout all of Washington County, specific patch sizes within the HUC-12 sub-watersheds will impact their WHIPPET score and therefore the applied management strategy.

The distribution of WHIPPET population scores can be seen below in Figure 4.4. This shows where the highest count of WHIPPET scores occurs across the population count. The y-axis count refers to individual records of all of the priority weed species and the x-axis refers to the corresponding WHIPPET scores. The population distribution is helpful in identifying the frequency of the priority weed species WHIPPET scores. Refer to Appendix D for the table of average final scores and species count.

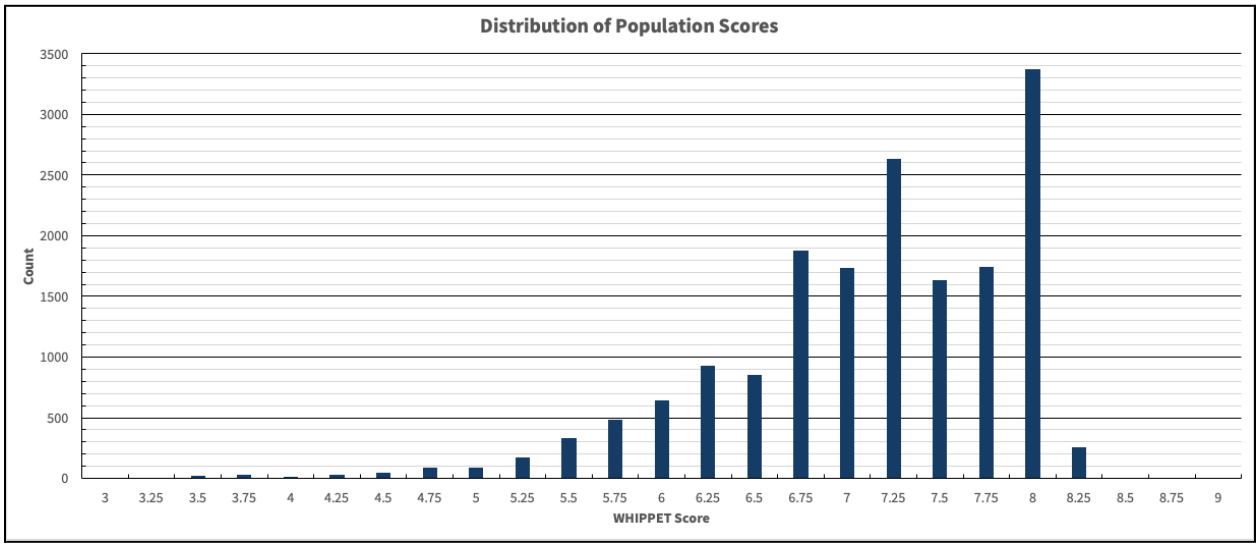

Figure 4.4: Distribution of WHIPPET Population Scores.

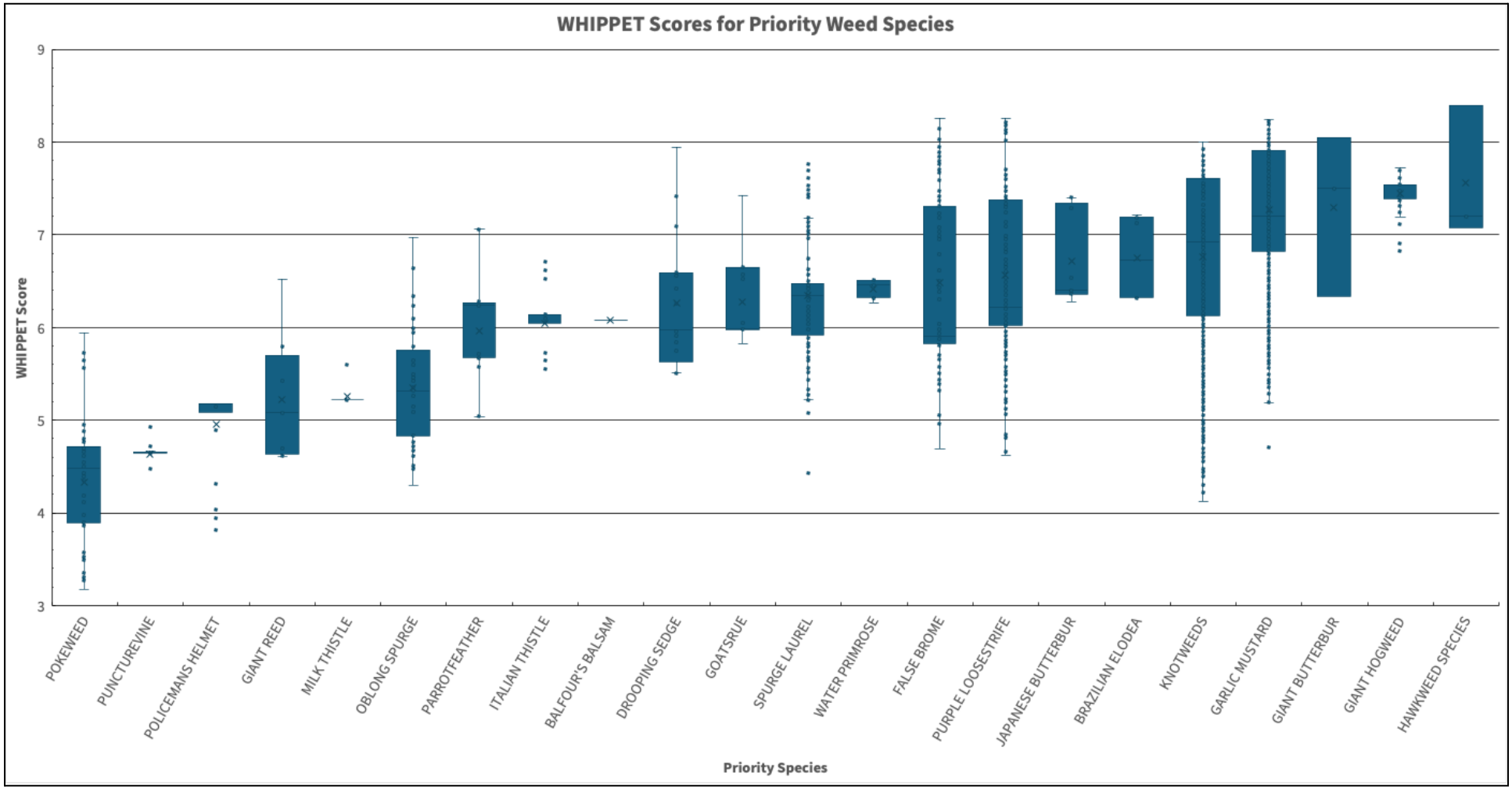

Figure 4.5: Box and Whisker Plot showing the TWIST Priority Weeds WHIPPET Scores.

The results of this WHIPPET analysis, summarized in Figure 4.5, will serve to guide the prioritization of species targeted for treatments and ongoing weed management. High WHIPPET scores generally show where time and effort should be allocated in order to effectively target high priority populations. The overarching criteria scores (impact, invasiveness, and feasibility) allow species to be ranked against each other so as to narrow down the biggest threats across the Tualatin watershed. The actual priority score, while informative, is less relevant than its rank relative to other targeted weed species populations.

Clustering within populations of the same species often occurs because the species-level criteria contribute significant weight to the overall priority score (WHIPPET User Guide, 2014). Precise WHIPPET modeling requires widespread data from partner contributors. As this Plan continues to develop, new partner data will be incorporated to increase the accuracy of WHIPPET results. Reference the Plan Per Year section below to find out how to stay involved in yearly updates and send new or existing data.

Figure 4.6 illustrates the mean WHIPPET scores and score counts across the entire Tualatin Watershed. Looking at these results on a HUC-12 scale allows for a comparison of priority weed species populations locations and a rank of their invasiveness and feasibility for eradication. The overall priority score for a species population provides insight into why that population might be a high priority for eradication, and why a specific HUC-12 should receive funding and resources. The basis of the WHIPPET model recognizes that species scores will vary across the landscape of the Tualatin. By comparing the species on a basin-wide scale, it is possible to identify weed populations with a higher impact even with low priority species, or lower priority populations with higher priority species (CRISP, Dezso et al., 2015).

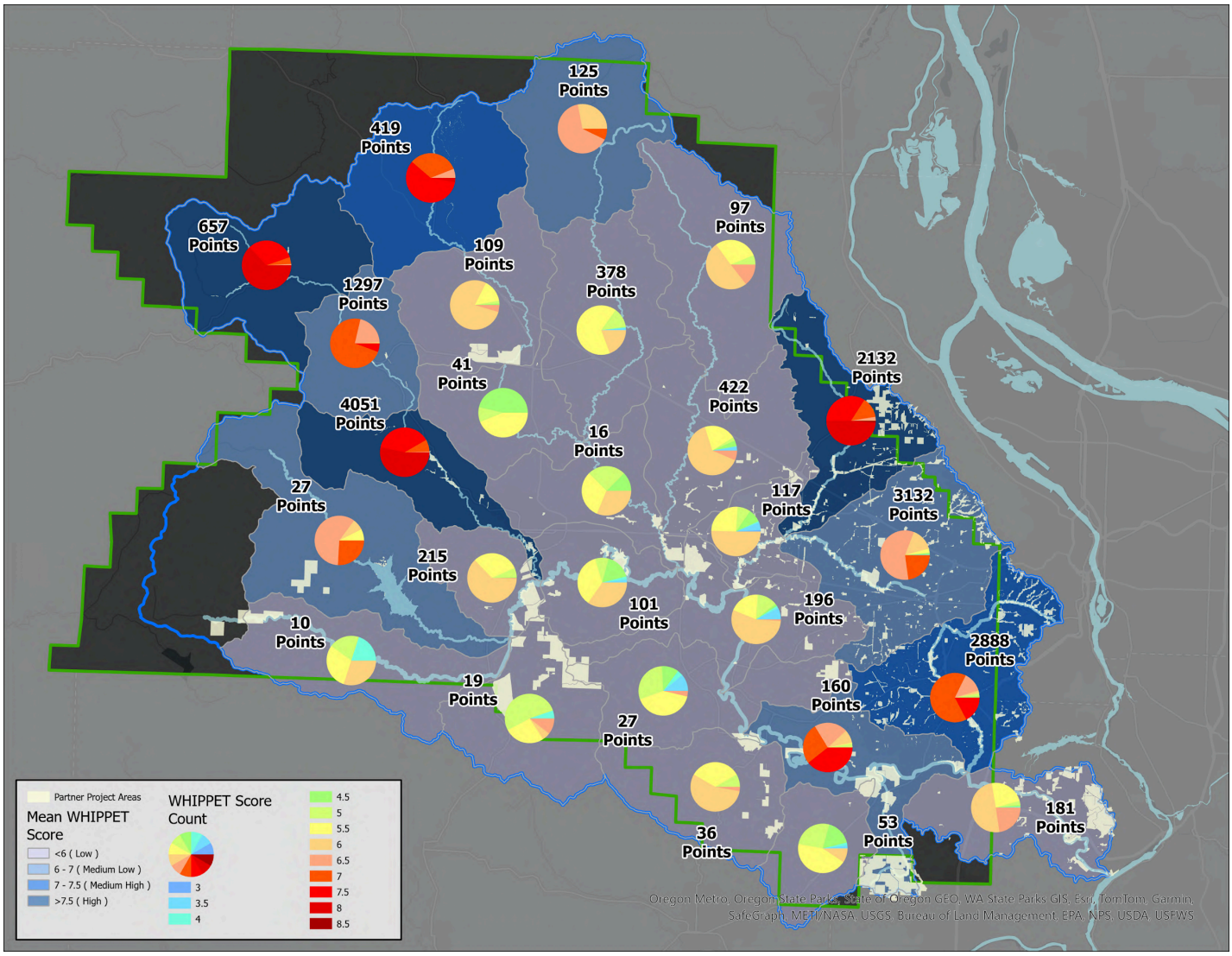

Figure 4.6: Mean WHIPPET Score and WHIPPET Score Count across the Tualatin Watershed.