# DRAFT WRITTEN FINDINGS OF

# THE WASHINGTON STATE NOXIOUS WEED CONTROL BOARD

SCIENTIFIC NAME:	Pentaglottis sempervirens
SYNONYMS:	Anchusa sempervirens, Anchusa vulgaris, Buglossa sempervirens, Buglossum sempervirens, Caryolophora sempervirens, Omphalodes sempervirens (Kew Science).
COMMON NAMES:	Green alkanet, evergreen bugloss, evergreen alkanet, bird's-eye
FAMILY:	Forget-me-Not Family, Boraginaceae.
LEGAL STATUS:	Being considered for 2022 Class C listing.
DESCRIPTION AND VARIATION:	

#### OVERALL HABIT:

This perennial, herbaceous, forgetme-not can grow up to 1 m (3 feet) tall, and can spread out just as wide (Candide Gardening).



Infestation in San Juan County.

#### STEMS:

P. sempervirens stems are round, green, and covered in relatively long, thin hairs.



Hair on stem.

## LEAVES:

Basal leaves on *P. sempervirens* are tear drop-shaped, grow from short stems, and are fairly large; up to 40 cm, 16 inches. The leaves on the stems are arranged alternately, grow directly from the stem, and are smaller (Weigend *et al.*, 2016). All of the leaves are bright green, hairy, and very shallowly toothed.



(Above) basal leaf.

(Below) leaf on stem.

#### FLOWERS:

The flowers of *P. sempervirens* have 5 round, sky blue, to light blue-purple, petals that are joined near the center of the flower, around a raised white center. They are 1.3 cm (0.5 inch) wide, and grow in loose bunches, in April through July (Burke Herbarium).

Flowers growing in loose bunches.



## FRUITS/SEEDS:

Per flower, *P. sempervirens* makes 4 roughly egg-shaped, brown nutlets, with knob-like beaks, which are about 3mm in size (Weigend *et al.*, 2016).



Electron scanning image of 1 nutlet, with large bar equal to 1mm (Weigend *et al.*, 2010).

## ROOTS:

*P. sempervirens* can reproduce vegetatively with fragments of thick rhizomes, and also grows a long taproot (Weigend *et al.*, 2016).

#### SIMILAR SPECIES:

There are a few forget-me-nots which look similar to *P. sempervirens*, which grow in Washington, but they are all easily distinguishable. Native, *Adelinia grandis*, Adeline's hound's tongue, only grows along the Columbia Gorge, in Cowlitz, Clark, Skamania, and Klickitat counties. It also only basal leaves, which are arrow shaped, and relatively large, green nutlets. Non-native *Myosotis sylvatica*, wood forget-me-not, grows its flowers in much tighter bunches, which curl in helix shapes. The seeds are shiny, black, nutlets (Burke Herbarium).

#### HABITAT:

*P. sempervirens* grows in shaded, and partly shaded areas, with clay or loamy soil, with a variety of moisture and pH levels (Royal Horticultural Society). Places it frequently grows in Washington are forest edges, roadsides, and partly shaded disturbed areas, on the western side of the Cascades.

## BIOLOGY

## GROWTH AND DEVELOPMENT:

In Washington, *P. sempervirens* begins leafing out in winter and early spring, before flowering in April-July. It is also perennial (Burke Herbarium).

#### **REPRODUCTION:**

*P. sempervirens* reproduces via seed and vegetatively, from root fragments and along those rhizomes (Jukes, 2013).

## GEOGRAPHIC DISTRIBUTION:

## NATIVE DISTRIBUTION

Originally, *P. sempervirens* is native to Western Europe, around the Mediterranean, (Bauer *et al.*, 2016, Müller and Sukopp, 2016, Selvi and Bigazzi, 2001).



Native Introduced

Native and non-native range, via Kew Science.

## NON-NATIVE DISTRIBUTION

*P. sempervirens* is non-native in Central, Northern, and Eastern Europe. It also has a rather robust population in New Zealand (Rolfe, 2005) and south eastern Australia. In North America, there are populations along the West Coast, from California to British Columbia, as well as in the Midwest (Global Biodiversity Information Facility).



Global distributions, via Global Biodiversity Information Facility

#### HISTORY:

In the 1590s, *P. sempervirens* naturalized to central Europe (Jukes, 2013, Müller and Sukopp, 2016, Svenning and Sandel, 2013). In England, it was first described in the wild in 1798 (Jukes 2013), and had a significant population increase between 1930-1960 and 1987-1988 (Rich *et al.*, 1996). The first appearance of P. sempervirens in Brussels was between 1940-1971, and 1991-1994 (Godefroid, 2001).

The earliest record in Washington State is in San Juan County, in 1992. The earliest record in Oregon is in 1971 (Consortium of Pacific Northwest Herbaria).

## WASHINGTON:

*P. sempervirens* has been observed in almost all counties of Western Washington, but the highest amount of occurrences are in Thurston, Pierce, and Kitsap Counties (Burke Herbarium, iNaturalist).



Records in Washington, via the Burke Herbarium.

### NEARBY TO WASHINGTON:



Records of West Coast occurrence via iNaturalist.

## ECONOMIC AND ECOLOGICAL IMPORTANCE:

#### DETRIMENTAL:

Many gardeners around the Western Hemisphere consider *P. sempervirens* to be "not ideal" for gardens due to how rapidly it spreads via seed and root fragments (Buzz About Bees). It is very weedy and has a deep, brittle tap root, which is very hard to remove completely (Jane Perrone).

## OREGON:

The Consortium of Pacific Northwest Herbaria and iNaturalist have records of *P. sempervirens* throughout northwestern Oregon, from Coos Bay to Portland.

## IDAHO:

There are no records of *P. sempervirens* in Idaho (Idaho Fish & Game).

## **BRITISH COLUMBIA:**

The Consortium of Pacific Northwest Herbaria and iNaturalist have records of *P. sempervirens* around the Vancouver, Canada area.

## CALIFORNIA

There are many records of *P. sempervirens* around the Bay Area of California (iNaturalist), though Calflora has no records of it in the state.

## LISTINGS:

*P. sempervirens* is listed on Oregon's invasive species list (Center for Invasive Species and Ecosystem Health), and as an exotic in British Columbia, California, and Maine (Nature Serve). Washington State has it on our monitor list, as of 2014.

#### **BENEFICIAL:**

Pollinators use *P. sempervirens* very frequently, especially bumblebees (Foster *et al.*, 2017). Humans have used it as a source of red dye for centuries (Kakhia). For food preservation, it may have antiseptic, antibiotic, and antimicrobial properties (Guidoni, 2018).

### CONTROL:

#### **MECHANICAL:**

In a survey of gardeners in the United Kingdom, pulling, digging, and removing seed heads was effective in controlling *P. sempervirens*. Gardeners were able to compost the removed vegetation, after soaking it in water to rot for at least a week (Dehnen-Schmutz, *et al.*, 2018).

#### CHEMICAL:

In the same survey of U.K. gardeners, chemicals were effective at controlling *P. sempervirens*, though no chemicals were listed in the research (Dehnen-Schmutz, *et al.*, 2018).

## RATIONALE FOR LISTING:

In addition to its quick spread, growth, and difficulty to completely remove (Buzz About Bees, Jane Perrone), *P. sempervirens* is also likely very adapted to surviving through climate change. Over just a century, it has naturalized in northern Europe, far away from the warm, Mediterranean climate where it evolved. This shows that it has a wide temperature range and can survive in cold, temperate, and warm habitats (Svenning, *et al.*, 2013). This could pose a problem in the Pacific Northwest in current and future climates.



Infestation near JBLM and I-5.

#### **REFERENCES:**

- Bauer, P., Collender, M., Jakob, M., Bonnelame, L. K., Petschek, P., Siegrist, D., & Eds, C. T. (2016). Opportunities and Risks Using Exotic Species in Planting Design – How Should We Present Non-Native Plants Within Teaching? *Bridging the Gap Proceedings of the ECLAS Conference*, 481–484.
- Burke Herbarium. (2021, June 10). Pentaglottis sempervirens. Burke Herbarium Image Collection and Identification Key. <u>http://biology.burke.washington.edu/herbarium/imagecollection/taxon.php?Taxon=Pentaglotti</u> s%20sempervirens
- 3. Buzz About Bees. (2021, June 16). Bees Love Green Alkanet!. The Wonderful World of Bees. https://www.buzzaboutbees.net/Bees-Love-Green-Alkanet.html
- 4. Calflora. (2021, June 11). Pentaglottis sempervirens. https://www.calflora.org/app/taxon?crn=8507
- Candide Gardening. (2021, June 10). Green Alkanet. Plant Knowledge. <u>https://candidegardening.com/US/plants/fc9589d3ef15d6a222fea3958be4140f</u>
- 6. Center for Invasive Species and Ecosystem Health. (2021, June 16). Evergreen Bugloss. Invasive.org. <u>https://www.invasive.org/browse/subinfo.cfm?sub=32320</u>
- 7. Consortium of Pacific Northwest Herbaria. (2021, June 11). Pentaglottis sempervirens search. <u>https://www.pnwherbaria.org/data/results.php?ExcludeCultivated=Y&GroupBy=ungrouped&SortBy=ScientificName&SearchAllHerbaria=Y&QueryCount=1&Genus1=Pentaglottis&Species1=sempervirens&Zoom=4&Lat=55&Lng=-135&PolygonCount=0&GroupBy=State&SortBy=Year&SortOrder=DESC</u>
- Dehnen-Schmutz, K., & Conroy, J. (2018). Working with gardeners to identify potential invasive ornamental garden plants: testing a citizen science approach. *Biological Invasions*, 20(11), 3069– 3077. <u>https://doi.org/10.1007/s10530-018-1759-3</u>
- Foster, G., Bennett, J., & Sparks, T. (2017). An assessment of bumblebee (Bombus spp) land use and floral preference in UK gardens and allotments cultivated for food. *Urban Ecosystems*, 20(2), 425–434. <u>https://doi.org/10.1007/s11252-016-0604-7</u>
- 10. Global Biodiversity Information Facility (2021, June 9). Pentaglottis sempervirens. Species maps. https://www.gbif.org/species/2926130
- 11. Godefroid, S. (2001). Temporal analysis of the Brussels flora as indicator for changing environmental quality. *Landscape and Urban Planning*, 52(4), 203–224. <u>https://doi.org/10.1016/S0169-2046(00)00117-1</u>
- 12. Guidoni, G. (2018). Natural preservation. Canadian Packaging, 71(11), 12–17.
- 13. Idaho Fish & Game. (2021, June 11). Evergreen-bugloss. Idaho Species. https://idfg.idaho.gov/species/taxa/50934
- 14. iNaturalist. (2021, June 11). Green Alkanet. Observations. https://inaturalist.ca/taxa/166466-Pentaglottis-sempervirens
- 15. Jane Perrone. (2021, June 16). Green Alkanet: That Mystery Plant, Revealed. Blog. https://www.janeperrone.com/blog/greenalkanet
- 16. Jukes, A. R. (2013). *The establishment of non-native plant species in relation to climate and land use in Britain* (Issue December). <u>http://etheses.whiterose.ac.uk/6257/</u>
- 17. Kakhia, T. I. (n.d.). *Dyes, colors & pigments*.

- 18. Kew Science. (2021, June 10). Pentaglottis sempervirens. Plants of the World Online. http://powo.science.kew.org/taxon/urn:lsid:ipni.org:names:60457907-2
- Nature Serve. (2021, June 9). Pentaglottis sempervirens, Evergreen Bugloss. NatureServe Explorer. <u>https://explorer.natureserve.org/Taxon/ELEMENT\_GLOBAL.2.145412/Pentaglottis\_semperviren</u>
- 20. Müller, N., & Sukopp, H. (2016). Influence of different landscape design styles on plant invasions in Central Europe. *Landscape and Ecological Engineering*, *12*(1), 151–169.
- Rolfe, J. (2005). New exotic plant records, and range extensions for naturalised plants in the northern North Island, New Zealand. *Auckland Botanical Society Journal.*, 60(130–147), 130– 147.
- 22. Royal Horticultural Society. (2021, June 11). Pentaglottis sempervirens. Plants. https://www.rhs.org.uk/Plants/12486/Pentaglottis-sempervirens/Details
- Selvi, F., & Bigazzi, M. (2001). Leaf surface and anatomy in Boraginaceae tribe Boragineae with respect to ecology and taxonomy. *Flora*, 196(4), 269–285. <u>https://doi.org/10.1016/S0367-2530(17)30056-7</u>
- Svenning, J. C., & Sandel, B. (2013). Disequilibrium vegetation dynamics under future climate change. American Journal of Botany, 100(7), 1266–1286. <u>https://doi.org/10.3732/ajb.1200469</u>
- Weigend, M., Gottschling, M., Selvi, F., & Hilger, H. H. (2010). Fossil and extant western hemisphere boragineae, and the polyphyly of "trigonotideae" riedl (boraginaceae: Boraginoideae). Systematic Botany, 35(2), 409–419. <u>https://doi.org/10.1600/036364410791638423</u>
- 26. Weigend, M., Selvi, F., Thomas, D. C., & Hilger, H. H. (2016). Boraginaceae. In *Flowering Plants. Eudicots* (Vol. 128, Issue 1789). <u>https://doi.org/10.1007/978-3-319-28534-4</u>