

Assessment date 08/04/2021 Prepared by Wanamaker

<i>Agrostis capillaris</i> L. - (common bent; New Zealand bent grass) ALL ZONES		Answer	Score
1.01	Is the species highly domesticated?	n	0
1.02	Has the species become naturalised where grown?		
1.03	Does the species have weedy races?		
2.01	Species suited to Florida's USDA climate zones (0-low; 1-intermediate; 2-high) North Zone: suited to Zones 8, 9 Central Zone: suited to Zones 9, 10 South Zone: suited to Zone 10	3	
2.02	Quality of climate match data (0-low; 1-intermediate; 2-high)	3	
2.03	Broad climate suitability (environmental versatility)	y	1
2.04	Native or naturalized in habitats with periodic inundation North Zone: mean annual precipitation 50-70 inches Central Zone: mean annual precipitation 40-60 inches South Zone: mean annual precipitation 40-60 inches	y	1
2.05	Does the species have a history of repeated introductions outside its natural range?	y	
3.01	Naturalized beyond native range	y	2
3.02	Garden/amenity/disturbance weed	y	2
3.03	Weed of agriculture	y	4
3.04	Environmental weed	y	4
3.05	Congeneric weed	y	2
4.01	Produces spines, thorns or burrs	n	0
4.02	Allelopathic	n	0
4.03	Parasitic	n	0
4.04	Unpalatable to grazing animals	n	-1
4.05	Toxic to animals		
4.06	Host for recognised pests and pathogens	y	1
4.07	Causes allergies or is otherwise toxic to humans	?	
4.08	Creates a fire hazard in natural ecosystems	y	1
4.09	Is a shade tolerant plant at some stage of its life cycle	n	0
4.10	Grows on infertile soils (oligotrophic, limerock, or excessively draining soils). North & Central Zones: infertile soils; South Zone: shallow limerock or Histisols.	y	1
4.11	Climbing or smothering growth habit	n	0
4.12	Forms dense thickets	y	1
5.01	Aquatic	n	0

5.02	Grass	y	1
5.03	Nitrogen fixing woody plant	n	0
5.04	Geophyte	n	0
6.01	Evidence of substantial reproductive failure in native habitat	n	0
6.02	Produces viable seed	y	1
6.03	Hybridizes naturally	y	1
6.04	Self-compatible or apomictic	?	
6.05	Requires specialist pollinators	n	0
6.06	Reproduction by vegetative propagation	y	1
6.07	Minimum generative time (years)	1 or fewer	1
7.01	Propagules likely to be dispersed unintentionally (plants growing in heavily trafficked areas)	y	1
7.02	Propagules dispersed intentionally by people	y	1
7.03	Propagules likely to disperse as a produce contaminant	?	
7.04	Propagules adapted to wind dispersal	?	
7.05	Propagules water dispersed	y	1
7.06	Propagules bird dispersed	?	
7.07	Propagules dispersed by other animals (externally)	y	1
7.08	Propagules dispersed by other animals (internally)	y	1
8.01	Prolific seed production	?	
8.02	Evidence that a persistent propagule bank is formed (>1 yr)	y	1
8.03	Well controlled by herbicides	y	-1
8.04	Tolerates, or benefits from, mutilation or cultivation	y	1
8.05	Effective natural enemies present in U.S.	y	-1
Total Score		29	
Implemented Pacific Second Screening		n/a	
Risk Assessment Results		High Risk	

section	# questions answered	satisfy minimum?
A		11 yes
B		10 yes
C		18 yes
total		yes

	Reference	Source data
1.01	We found no evidence to support domestication.	
1.02	Skip to 2.01	
1.03	Skip to 2.01	
2.01	1. Proto4 Mapping Protocol used, see attached. North/Central: High Suitability; South: Low Suitability. 2. USDA Plant Hardiness Zones 3a-11b.	
2.02	Proto4 Mapping Protocol used, see attached.	
2.03	1. Known introduced range includes "Australia, Canada, Greenland, Himalayan Mountains, New Zealand, Saint Helena, South Georgia and South Sandwich Islands, United States including Hawaii" ... "It is tolerant of temperature extremes and can grow at a range of altitudes from coastline up to 2,200 metres in British Columbia." 2-3. Found in a range of Koppen-Geiger Zones including BSk, Csa, Csb, Cfa, Cfb, Cfc, Dsb, Dsc, Dwc, Cfb, Dfc, and ET.	<ol style="list-style-type: none"> http://issg.org/database/species/ecology.asp?si=1365&fr=1&sts=tss&lang=EN GBIF. https://www.gbif.org/species/2706490 Proto4 data
2.04	1. Present in precipitation bands encompassing rainfall from 20-100+ inches.	1. Proto4 data
2.05	1-2. Historically was deliberately grown as a turf grass in Australia.	<ol style="list-style-type: none"> https://keyserver.lucidcentral.org/weeds/data/media/Html/agrostis_capillaris.htm https://weeds.dpi.nsw.gov.au/Weeds/BrowntopBent#profile
3.01	1. "Widely naturalised in the wetter parts of southern Australia (i.e. in eastern New South Wales, the ACT, Victoria, Tasmania, south-eastern South Australia and the coastal districts of south-western Western Australia). Also widely naturalised in other parts of the world." 2. "It has been introduced and has naturalized in the Americas (USA, Canada, Greenland, Brazil, Argentina and Chile), southern Africa, Australia and New Zealand." 3. Widely established in North America	<ol style="list-style-type: none"> https://keyserver.lucidcentral.org/weeds/data/media/Html/agrostis_capillaris.htm CABI 2016 Harvey, M.J. <i>Agrostis capillaris</i>. Flora of North America Editorial Committee, eds. 1993+, Flora of North America North of Mexico [Online]. 22+ vols. New York and Oxford. Vol. 24. http://beta.floranorthamerica.org/Agrostis_capillaris
3.02	1. Considered a major weed of disturbed areas. 2. Grows along roadsides and disturbed areas.	<ol style="list-style-type: none"> https://keyserver.lucidcentral.org/weeds/data/media/Html/agrostis_capillaris.htm Harvey, M.J. <i>Agrostis capillaris</i>. Flora of North America Editorial Committee, eds. 1993+, Flora of North America North of Mexico [Online]. 22+ vols. New York and Oxford. Vol. 24. http://beta.floranorthamerica.org/Agrostis_capillaris
3.03	1. Considered a major weed of pastures. 2. weed of pastures and disturbed areas.	<ol style="list-style-type: none"> https://keyserver.lucidcentral.org/weeds/data/media/Html/agrostis_capillaris.htm https://weeds.dpi.nsw.gov.au/Weeds/BrowntopBent#profile

3.04	1. "Brown-top bent (<i>Agrostis capillaris</i>) is a significant environmental weed in Victoria and an environmental weed in New South Wales, South Australia, Western Australia and Tasmania." 2. "In New South Wales, it competes with native species in bog and fern communities of montane peatlands and swamps, and is common in disturbed areas in the sub-alpine and alpine areas of Kosciuszko National Park. It also has the ability to invade dry coastal vegetation, heathlands, grasslands, woodlands, sclerophyll forests, and riparian vegetation. "	1. https://keyserver.lucidcentral.org/weeds/data/media/Html/agrostis_capillaris.htm 2. https://weeds.dpi.nsw.gov.au/Weeds/BrowntopBent#profile
3.05	1. Randall ranks 3 congeners as potential weeds: <i>Agrostis canina</i> L., high risk. <i>Agrostis gigantea</i> Roth, extreme risk. <i>Agrostis stolonifera</i> L., high risk.	1. Randall, R.P. (2017). A Global Compendium of Weeds. 3rd Edition. Perth, Western Australia. R.P. Randall.
4.01	No evidence of these traits.	
4.02	No evidence	
4.03	No evidence.	
4.04	1. Grazed by sheep, noted as being able to withstand grazing, and is widely imported/planted as a forage.	1. CABI 2016 2. Kuiters, A.T., and Huiskes, H.P.J. (2010) Potential of endozoochorous seed dispersal by sheep in calcareous grasslands: correlations with seed traits. Applied Vegetation Science. 13(2):163-172.
4.05		
4.06	1. <i>Agrostis capillaris</i> is host to genus-specific pests including the fungal pathogens <i>Ascochyta agrostidis</i> , <i>Urocystis agrostidis</i> , and the insect <i>Lopus decolor</i> 2. "A. <i>capillaris</i> is also a known carrier of the Barley yellow-dwarf virus (BYDV), which reduces populations of native grasses in New Zealand (Davis, 2001)."	1. CABI 2016 2. http://issg.org/database/species/ecology.asp?si=1365&fr=1&sts=tss&lang=EN
4.07	No evidence.	
4.08	As the grasses die off, they form a dense litter layer that blocks light and thus suppresses the regeneration and establishment of native species. The litter also provides fuel and creates conditions for detrimental high-intensity fires.	1. Garry Oak Ecosystems Recovery Team. https://goert.ca/wp/wp-content/uploads/IS-factsheet-agrostis-capillaris.pdf
4.09	1. "it generally requires high light levels, can tolerate shade to a certain degree" 2. "It does, however, require high light levels (Rapson & Wilson, 1992b)." Considering the above information and the habitats it is known to occur in (2. "agricultural areas, coastland, range/grasslands, ruderal/disturbed, urban areas, wetlands"), we maintain that A. <i>capillaris</i> is not shade tolerant.	1. Maczey, N. (2016). <i>Agrostis capillaris</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F 2. http://issg.org/database/species/ecology.asp?si=1365&fr=1&sts=tss&lang=EN
4.10	1. Known to invade Dry sclerophyll forests, 2. which are characterized by low soil-nutrient levels. 3. "Within its native range the species is often abundant in nutrient poor pastures"	1. https://keyserver.lucidcentral.org/weeds/data/media/Html/agrostis_capillaris.htm 2. https://www.environment.nsw.gov.au/threatenedSpeciesApp/VegFormation.aspx?formationName=Dry+sclerophyll+forests+(shrubby+sub-formation) 3. Maczey, N. (2016). <i>Agrostis capillaris</i> . In: Invasive Species Compendium. Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F

4.11	Taxon a grass. Despite spreading vegetatively via stolon, we found no evidence that <i>A. capillaris</i> will climb or otherwise smother surrounding vegetation.	
4.12	1. "The vigorous growth of this exotic perennial grass enables it to compete strongly with, or in some places even displace, native species." 2. "forms dense swards of quite fine leaves"	1. https://keyserver.lucidcentral.org/weeds/data/media/Html/agrostis_capillaris.htm 2. Maczey, N. (2016). <i>Agrostis capillaris</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F
5.01	1. particularly troublesome in wetlands and riparian areas, and is regarded as a high threat weed species in remnant floodplain riparian woodlands in some parts of the state. 2. "Optimal growth occurs on freely drained or fairly dry soils, but <i>A. capillaris</i> can also be abundant on poorly drained and damp soils when inhabiting wetlands"	1. https://keyserver.lucidcentral.org/weeds/data/media/Html/agrostis_capillaris.htm 2. Maczey, N. (2016). <i>Agrostis capillaris</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F
5.02	1-2. Family: Poaceae	1. https://www.gbif.org/species/2706490 2. https://keyserver.lucidcentral.org/weeds/data/media/Html/agrostis_capillaris.htm
5.03	Taxon is a grass	
5.04	1. <i>Agrostis capillaris</i> produces rhizomes, and occasionally stolons. 2. Life form listed as a hemicryptophyte, defined as "hav[ing] herbaceous stems that often die-back during unfavourable seasons, and surviving buds placed on (or just below) soil level. This group includes many biennial and perennial herbs, including those in which buds grow from a basal rosette."	1. Maczey, N. (2016). <i>Agrostis capillaris</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F 2. Royal Botanic Gardens Kew. (2021) Seed Information Database (SID). Version 7.1. Available from: http://data.kew.org/sid/
6.01	No evidence.	
6.02	1. wind pollinated and propagates by seeds. 2-3. Germination rates of stored seed are around 80-90%.	1. Maczey, N. (2016). <i>Agrostis capillaris</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F 2. Royal Botanic Gardens Kew. (2021) Seed Information Database (SID). Version 7.1. Available from: http://data.kew.org/sid/ 3. https://www.gardenorganic.org.uk/sites/www.gardenorganic.org.uk/files/organic-weeds/agrostis-capillaris.pdf
6.03	1-3. Common bent forms hybrids with creeping bentgrass, <i>A. stolonifera</i> and black bent, <i>A. gigantea</i> (<i>A. capillaris</i> x <i>A. gigantea</i> = <i>A. x bjoerkmanii</i> Widén; <i>Agrostis capillaris</i> x <i>stolonifera</i> = <i>A. x murbeckii</i> Fouill.)	1. Maczey, N. (2016). <i>Agrostis capillaris</i> . In: <i>Invasive Species Compendium</i> . Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F 2. Smith A, 1972. The pattern of distribution of <i>Agrostis</i> and <i>Festuca</i> plants of various genotypes in a sward. <i>New Phytologist</i> , 71(5):937-945. 3. http://issg.org/database/species/ecology.asp?si=1365&fr=1&sts=tss&lang=EN

6.04	1. "predominantly outcrossing," 2. self-compatibility is usually low for this group.	<p>1. Maczey, N. (2016). <i>Agrostis capillaris</i>. In: Invasive Species Compendium. Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F</p> <p>2. Smith A, 1972. The pattern of distribution of <i>Agrostis</i> and <i>Festuca</i> plants of various genotypes in a sward. <i>New Phytologist</i>, 71(5):937-945.</p>
6.05	Wind Pollinated	<p>1. Maczey, N. (2016). <i>Agrostis capillaris</i>. In: Invasive Species Compendium. Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F</p> <p>2. Timmins SM, MacKenzie IW, 1995. Weeds in New Zealand Protected Natural Areas Database. Department of Conservation Technical Series, 8. Wellington, New Zealand: Department of Conservation, 291 pp. http://www.doc.govt.nz/Documents/science-and-technical/docts08.pdf</p>
6.06	1, 2. Reproduces vegetatively by rhizomes and stolons	<p>1. Maczey, N. (2016). <i>Agrostis capillaris</i>. In: Invasive Species Compendium. Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F</p> <p>2. Timmins SM, MacKenzie IW, 1995. Weeds in New Zealand Protected Natural Areas Database. Department of Conservation Technical Series, 8. Wellington, New Zealand: Department of Conservation, 291 pp. http://www.doc.govt.nz/Documents/science-and-technical/docts08.pdf</p>
6.07	1. Reproduction via sexual means takes an estimated 1-2 years. Reproduction via asexual reproduction listed as taking days.	<p>1. Timmins SM, MacKenzie IW, 1995. Weeds in New Zealand Protected Natural Areas Database. Department of Conservation Technical Series, 8. Wellington, New Zealand: Department of Conservation, 291 pp. http://www.doc.govt.nz/Documents/science-and-technical/docts08.pdf</p>
7.01	1. <i>Agrostis capillaris</i> is grown in areas of high human traffic: golf courses, lawns, roadsides, etc.	<p>1. http://issg.org/database/species/ecology.asp?si=1365&fr=1&st=s&tss&lang=EN</p> <p>2. Harvey, M.J. <i>Agrostis capillaris</i>. Flora of North America Editorial Committee, eds. 1993+, Flora of North America North of Mexico [Online]. 22+ vols. New York and Oxford. Vol. 24. http://beta.floranorthamerica.org/Agrostis_capillaris</p>
7.02	1. "A. capillaris has been intentionally introduced as a pasture grass and as a turf grass for lawns, in particular for golf courses" 2. Seed is sold commercially for building fine-textured lawns.	<p>1. Maczey, N. (2016). <i>Agrostis capillaris</i>. In: Invasive Species Compendium. Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F</p> <p>2. Harvey, M.J. <i>Agrostis capillaris</i>. Flora of North America Editorial Committee, eds. 1993+, Flora of North America North of Mexico [Online]. 22+ vols. New York and Oxford. Vol. 24. http://beta.floranorthamerica.org/Agrostis_capillaris</p>
7.03	No evidence	

7.04	<p>1, 2. Wind dispersal listed, but these compiled reports seem to rely on a single reference, Timmins & MacKenzie, 1995 (3) which provides no additional information. The description of <i>A. capillaris</i> listed in Floras (4, 5) and elsewhere neglects to mention any physical adaptation of the seed to wind dispersal. For this reason, we answer "unknown".</p>	<p>1. Maczey, N. (2016). <i>Agrostis capillaris</i>. In: Invasive Species Compendium. Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F</p> <p>2. http://issg.org/database/species/ecology.asp?si=1365&fr=1&sts=tss&lang=EN</p> <p>3. Timmins, S. M., & Mackenzie, I. W. (1995). Weeds in New Zealand Protected Natural Areas Database. Wellington, N.Z: Dept. of Conservation.</p> <p>4. Harvey, M.J. <i>Agrostis capillaris</i>. Flora of North America Editorial Committee, eds. 1993+, Flora of North America North of Mexico [Online]. 22+ vols. New York and Oxford. Vol. 24. http://beta.floranorthamerica.org/Agrostis_capillaris</p> <p>5. Flora of China Editorial Committee, 2016. Flora of China. St. Louis, Missouri and Cambridge, Massachusetts, USA: Missouri Botanical Garden and Harvard University Herbaria. http://www.efloras.org/florataxon.aspx?flora_id=2&taxon_id=242301747</p>
7.05	<p>1-2. Water dispersal listed</p>	<p>1. Maczey, N. (2016). <i>Agrostis capillaris</i>. In: Invasive Species Compendium. Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F</p> <p>2. http://issg.org/database/species/ecology.asp?si=1365&fr=1&sts=tss&lang=EN</p>
7.06	<p>No evidence</p>	
7.07	<p>1. Animal dispersed. 2. Seed described as "bristled" (likely referring to awns which are occasionally thought not always present) and is noted as getting caught in the fur of dummy cattle and sheep in this field experiment. 3. Dispersed by ants</p>	<p>1. http://issg.org/database/species/ecology.asp?si=1365&fr=1&sts=tss&lang=EN</p> <p>2. Mouissie, A.M., Lengkeek, W., and Van Diggelen, R. (2005) Estimating adhesive seed-dispersal distances: field experiments and correlated random walk. <i>Functional Ecology</i> 19 pp.478-486. doi: 10.1111/j.1365-2435.2005.00992.x</p> <p>3. Delatte, E., and Chabrierie, O.(2008) Performances des plantes herbacées forestières dans la dispersion de leurs graines par la fourmi <i>Myrmica ruginodis</i>. <i>Comptes Rendus Biologies</i>, 331(4):309-320. ISSN 1631-0691. https://doi.org/10.1016/j.crv.2008.02.002.</p>
7.08	<p>1. <i>Agrostis capillaris</i> is a common grazing and fodder species. Seeds can readily be found in sheep's manure, which remain viable through gut passage and readily sprout.</p>	<p>1. Kuiters, A.T., and Huiskes, H.P.J. (2010) Potential of endozoochorous seed dispersal by sheep in calcareous grasslands: correlations with seed traits. <i>Applied Vegetation Science</i>. 13(2):163-172.</p>
8.01	<p>1. "<i>Agrotis capillaris</i> propagates by way of highly abundant seeds" No empirical or quantitative data was found.</p>	<p>1. http://issg.org/database/species/ecology.asp?si=1365&fr=1&sts=tss&lang=EN</p>
8.02	<p>1. Seeds can persist for up to 40 years, 2. noted as having a "persistent" seed bank. 3. One study found seeds retain viability for at least 4 years, but were not viable after 20 years.</p>	<p>1. http://issg.org/database/species/ecology.asp?si=1365&fr=1&sts=tss&lang=EN</p> <p>2. Eriksson, O. 1992. Evolution of seed dispersal and recruitment in clonal plants. <i>Oikos</i> 63: 439-448.</p> <p>3. https://www.gardenorganic.org.uk/sites/www.gardenorganic.org.uk/files/organic-weeds/agrostis-capillaris.pdf</p>

8.03	<p>1. "The gramicides cycloxydim and fluazifop-p-butyl have been used in the effective management of <i>A. capillaris</i> (Clay, 2006). <i>A. capillaris</i> is also susceptible to the herbicide dalapon (Evans, 1964). A study found that the application of the herbicide BAS 9052 OH on <i>A. capillaris</i> produced a 100% mean control rate (Hosaka, 1984). Glyphosate applied to soil before emergence of <i>A. capillaris</i> has been found to be effective in reducing growth (Salazar, 1982). Hexazinone has also been used in successful treatment and control of various weed and grass species including <i>A. capillaris</i> (White, 1990)."</p> <p>2. Herbicide recommendations include Glyphosate and Propyzamide</p>	<p>1. http://issg.org/database/species/ecology.asp?si=1365&fr=1&sts=tss&lang=EN</p> <p>2. https://weeds.dpi.nsw.gov.au/Weeds/BrowntopBent#profile</p>
8.04	<p>1. "As well as grazing, <i>A. capillaris</i> tolerates cutting and mowing and also benefits from frequent burning"</p> <p>2. "Grazing can even increase abundance"... " In a study done in Oregon, <i>A. capillaris</i> was 10 times as abundant in areas after prescribed burn versus that of an unburned area (Wilson, 1999)"</p>	<p>1. Maczey, N. (2016). <i>Agrostis capillaris</i>. In: <i>Invasive Species Compendium</i>. Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F</p> <p>2. http://issg.org/database/species/ecology.asp?si=1365&fr=1&sts=tss&lang=EN</p>
8.05	<p>In the northwestern USA, European crane fly larvae are the only insects reported to cause significant damage on common bent in most years (Cook, 2015). In this context the term European crane fly most likely refers to either <i>Tipula paludosa</i> Meigen or <i>T. oleracea</i> L., with all turf grasses in the USA reported to be susceptible to the larvae of these two species (Peck et al., 2006).</p>	<p>Maczey, N. (2016). <i>Agrostis capillaris</i>. In: <i>Invasive Species Compendium</i>. Wallingford, UK: CAB International. https://www.cabi.org/isc/datasheet/3830#38AC721C-3221-4FA1-9921-B2C59E1ECC7F</p>