water foxtail
Alopecurus geniculatus L.

Synonyms: *Alopecurus australis* Nees, *A. geniculatus* var. *aquaticus* Schltdl., *A. pallescens* Piper, *A. palludosus* Crantz, *A. palustris* var. *geniculatus* (L.) Syme ex Sowerby, *Tozzettia geniculata* (L.) Bubani
Other common names: bent foxtail, false Timothy grass, floating foxtail, kneed foxtail, marsh foxtail, marsh meadow-foxtail, water meadow-foxtail
Family: Poaceae

Invasiveness Rank: **49** The invasiveness rank is calculated based on a species' ecological impacts, biological attributes, distribution, and response to control measures. The ranks are scaled from 0 to 100, with 0 representing a plant that poses no threat to native ecosystems and 100 representing a plant that poses a major threat to native ecosystems.

Description
Water foxtail is a perennial, tufted grass that grows 20 to 50 cm tall. Plants are able to root at the lower stem nodes. Stems are numerous and erect to decumbent. Leaves are green to gray-green, flat, 2 to 7 mm wide, and 2 to 12 cm long with rough upper surfaces and short-hairy to nearly smooth lower surfaces. Ligules are rounded and 2 to 5 mm long with slightly toothed margins. Leaf sheaths are open. Panicles are pale green or purple-tinged, cylindrical, 2 to 7 cm long, and 3 to 7 mm wide. Spikelets are 3.2 mm long or less (excluding awns) and consist of one fertile floret. Glumes are 2.5 to 3.5 mm long and fringed with long hairs along the keels and nerves. Lemmas are oblong and 2.5 to 3.5 mm long with truncate apexes. Awns are attached to lemmas 0.5 mm above the base. Awns are bent or twisted and 3.5 to 5 mm long, and they extend more than 1.5 mm beyond the glumes. Anthers are 1.2 to 2.2 mm long (Peeters 2004, Clayton et al. 2006, Crins 2007, Malyshev 2007, Klinkenberg 2010).


Alopecurus geniculatus L. Photo by Rasbak.


Panicle of *Alopecurus geniculatus* L. Photo by Rasbak.

Similar species: Several other *Alopecurus* species can be confused with water foxtail. The non-native meadow foxtail (*A. pratensis*) can be distinguished from water foxtail by the absence of creeping lower stems and longer spikelets that are 3 to 6 mm long (Hultén 1968, Klinkenberg 2010). Meadow foxtail also has broader panicles (6 to 10 mm wide) and longer anthers (3 to 3.5 mm long) than water foxtail (Peeters 2004). Two native

Alopecurus species can be found in Alaska: short-awned foxtail (*A. aequalis*) and alpine foxtail (*A. alpinus*). Unlike water foxtail, short-awned foxtail has straight awns that arise from the middle of the lemmas and extend less than 1.5 mm beyond the glumes (Stewart and Hebda 2000). Alpine foxtail can be distinguished from water foxtail by the presence of panicles that are ovoid to short cylindrical, 1 to 2 cm long, and 0.7 to 1 cm wide (Cody 1996, Clayton et al. 2006). Water foxtail is similar to the non-native timothy (*Phleum pratense*). Timothy can be distinguished from water foxtail by the presence of awns on the glumes rather than on the lower portion of the lemma (Hultén 1968, Cody 1996, eFloras 2008).

Ecological Impact

Impact on community composition, structure, and interactions: Water foxtail is often the sole occupant of wet microsites (Peeters 2004) and may reduce populations of other species on nutrient-rich soils (Kalusová et al. 2009). However, it is not highly competitive (Peeters 2004) and probably has only minor impacts on natural community composition. Infestations of water foxtail have occurred at up to 10% ground cover in Alaska (AKEPIC 2011) and therefore may increase the density of forb/graminoid layers in wet areas. Water foxtail forms sterile hybrids with the native short-awned foxtail (Crins 2007). It is used as a forage grass in Russia (Malyshev 2009) and is possibly palatable to wildlife, although it has little nutritive value (Peeters 2004). Water foxtail grown for hay has been associated with several fungi species that contribute to pulmonary diseases in horses (Seguin et al. 2010).

Impact on ecosystem processes: Although no impacts on ecosystem processes have been documented for water foxtail, it has occurred at up to 10% ground cover in Alaska (AKEPIC 2011) and may reduce nutrient availability, as it is moderately to very demanding for soil nutrients (Peeters 2004). A similar species, meadow foxtail, is thought to have little impact on ecosystem processes (Rutledge and McLendon 1996).

Biology and Invasive Potential

Reproductive potential: Water foxtail reproduces sexually by seeds and vegetatively by rooting at stem nodes (Clayton et al. 2006, Klinkenberg 2010). The amount of seeds produced per plant has not been quantified. Seeds remain viable in the soil for at least three years (Roberts 1986), but the maximum period of seed viability is unknown.

Role of disturbance in establishment: Water foxtail can establish in vegetated, wet areas (Stewart and Hebda 2000, Cody et al. 2003, Klinkenberg 2010). However, in Alaska, most infestations occur in areas disturbed by fill importation (AKEPIC 2011).

Potential for long-distance dispersal: Each seed has a mass of approximately 0.8 mg (USDA 2011) and can likely be transported short distances by wind.

Potential to be spread by human activity: Most infestations of water foxtail in Alaska are associated with fill importation and are located near areas of high human traffic (AKEPIC 2011, UAM 2011), suggesting that this species can be spread by human activities. This species has been identified as a contaminant in ryegrass straw imported from Washington and Oregon (Conn et al. 2010).

Germination requirements: Cold stratification is not required for germination (USDA 2011).

Growth requirements: Water foxtail grows in wet to very wet soils and is moderately to highly nutrient demanding. It often grows in wet clay or peat. This species is not drought tolerant (Peeters 2004).

Congeneric weeds: Meadow foxtail (*Alopecurus pratensis*) is known to occur as a non-native species in Alaska with an invasiveness rank of 52 (AKEPIC 2011). Slender foxtail (*A. myosuroides*) is considered a noxious weed in Washington (Invaders 2011, USDA 2011).

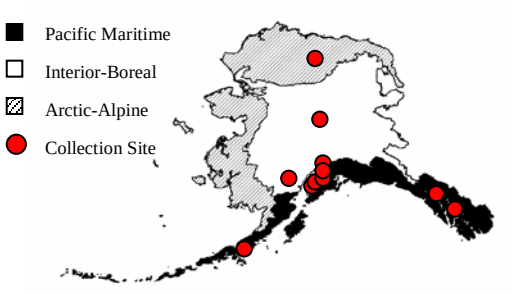
Legal Listings

- ☒ Has not been declared noxious
- ☐ Listed noxious in Alaska
- ☐ Listed noxious by other states
- ☐ Federal noxious weed
- ☐ Listed noxious in Canada or other countries

Distribution and Abundance

Water foxtail is grown as a forage grass in Russia (Malyshev 2009). In Scandinavia, this species frequently occurs as a weed in reduced tillage systems (Tørresen et al. 2006). It has been associated with imported straw in Alaska (Conn et al. 2010). Water foxtail has invaded open wet meadows, stream banks, shores, and shallow water in North America (Ling 2011) and wet ground near streams and lakes in New Zealand (Johnson 1982). This species grows in wet areas near lakes in several locations in Alaska (UAM 2011).

Native and current distribution: Water foxtail is native to Eurasia and parts of western North America (Crins 2007). It has been introduced to Australia, New Zealand, South America, and parts of North America (Johnson 1982, Clayton et al. 2006, Crins 2007). This species grows in 34 states of the U.S. and much of Canada (USDA 2010). It is known to grow in arctic regions of western Russia (Malyshev 2007) and occurs as far north as 71°N in Norway (Vascular Plant Herbarium Oslo 2011). Water foxtail has been documented from all three ecogeographic regions of Alaska (Hultén 1968, AKEPIC 2011, UAM 2011).



Distribution of water foxtail in Alaska

Management

As a grass, vegetative regeneration in water foxtail is expected to occur from ground-level meristems. Consequently, this species is tolerant of cutting, grazing, and trampling (Peeters 2004). Frequent cutting and mowing can reduce plant yield and prevent seeding of meadow foxtail (OSU Rangeland Ecology and Management 2005). These methods will likely contain water foxtail as well. Digging and hand pulling methods have not been investigated but may be effective because the plants lack rhizomes (Klinkenberg 2010). The effectiveness of herbicides in controlling water foxtail is unknown.

References:

AKEPIC database. Alaska Exotic Plant Information Clearinghouse Database. 2011. Available: http://akweeds.uaa.alaska.edu/

Clayton, W., K. Harman, and H. Williamson. 2006. GrassBase - The Online World Grass Flora. [5 February 2011] http://www.kew.org/data/grasses-db.html

Cody, W., C. Kennedy, B. Bennet, and J. Staniforth. 2003. New Records of Vascular Plants in the Yukon Territory V. Canadian Field-Naturalist. 117(2). 278-301 p.

Conn, J., C. Stockdale, N. Werdin-Pfisterer, and J. Morgan. 2010. Characterizing Pathways of Invasive Plant Spread to Alaska: II. Propagules from Imported Hay and Straw. Invasive Plant Science and Management. 3(3). 276-285 p.

Crins, W. 2007. *Alopecurus geniculatus* L. In: Flora of North America Editorial Committee, eds. 1993+. Flora of North America North of Mexico. 12+ vols. New York and Oxford. Vol. 24, p. 784.

eFloras. 2008. Published on the Internet http://www.efloras.org [accessed 18 February 2011]. Missouri Botanical Garden, St. Louis, MO & Harvard University Herbaria, Cambridge, MA.

Hultén, E. 1968. Flora of Alaska and Neighboring Territories. Stanford University Press, Stanford, CA. 1008 pp.

Invaders Database System. 2011. University of Montana. Missoula, MT. http://invader.dbs.umt.edu/

Johnson, P. 1982. Naturalised Plants in south-west South Island, New Zealand. New Zealand Journal of Botany. 20(2). 131-142 p.

Kalusová, V., M. Le Duc, J. Gilbert, C. Lawson, D. Gowing, and R. Marrs. 2009. Determining the important environmental variables controlling plant species community composition in mesotrophic grasslands in Great Britain. Applied Vegetation Science. 12(4). 459-471 p.

Klinkenberg, B. (Editor) 2010. *Alopecurus geniculatus* L. In: E-Flora BC: Electronic Atlas of the Plants of British Columbia**.** Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia. Vancouver, BC. [6 February 2011] Available: http://www.geog.ubc.ca/biodiversity/eflora/index.shtml

Ling, C. 2011. *Alopecurus geniculatus*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. [5 February 2011] http://nas.er.usgs.gov/queries/factsheet.aspx?SpeciesID=2681

Malyshev, L. 2007. Relatives, Range of distribution of Bent Foxtail, Marsh Foxtail (*Alopecurus geniculatus*). AgroAtlas. Interactive agricultural ecological atlas of Russia and neighboring countries: Economic plants and their diseases, pests, and weeds. [5 February 2011] http://www.agroatlas.ru/en/content/related/Alopecurus_geniculatus/map/

Malyshev, L. 2009. Relatives, *Alopecurus geniculatus* L. – Bent Foxtail, Marsh Foxtail. AgroAtlas. Interactive agricultural ecological atlas of Russia and neighboring countries: Economic plants and their diseases, pests, and weeds. [5 February 2011] http://www.agroatlas.ru/en/content/related/Alopecurus_geniculatus/

OSU Rangeland Ecology and Management. 2005. Meadow foxtail, *Alopecurus pratensis* L. Department of Rangeland Ecology and Management, College of Agricultural Sciences, Oregon State University. Corvallis, OR. [20 October 2010] http://oregonstate.edu/dept/range/sites/default/files/Meadow_20Foxtail.pdf

Peeters, A. 2004. Wild and Sown Grasses, Profiles of a temperate species selection: ecology, biodiversity, and use. Food and Agriculture Organization of the United Nations. Blackwell Publishing. Rome, Italy. 314 p.

Roberts, H. 1986. Persistence of seeds of some grass

species in cultivated soil. Grass and Forage Science. 41(3). 273-276 p.
Rutledge, C., and T. McLendon. 1996. An assessment of exotic plant species in Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. Fort Collins, CO. [20 October 2010] http://www.npwrc.usgs.gov/resource/plants/explant/index.htm
Seguin, V., S. Lemauviel-Lavenenant, D. Garon, V. Bouchart, Y. Gallard, B. Blanchet, S. Diquelou, E. Personeni, P. Gauduchon, and A. Ourry. 2010. An evaluation of the hygienic quality in single-species hays and commercial forages used in equine nutrition. Grass and Forage Science. 65(3). 304-317 p.
Stewart, H., and R. Hebda. 2000. Grasses of the Columbia Basin of British Columbia. WP45. Forest Science Program, British Columbia Ministry of Forests and Natural History Section, Royal BC Museum. 228 p.
Tørresen, K., J. Salonen, H. Fogelfors, S. Håkansson, and B. Melander. 2006. Weed problems in various tillage systems in the Nordic countries. In: NJF Seminar 378, Tillage systems for the benefit of agriculture and the environment. Nordic Association of Agricultural Scientists. Nordic Agricultural Academy. Odense, Denmark. 54-60 p.
UAM. 2011. University of Alaska Museum, University of Alaska Fairbanks. Available: http://arctos.database.museum/home.cfm
USDA. 2011. The PLANTS Database. National Plant Data Center, Natural Resources Conservation Service, United States Department of Agriculture. Baton Rouge, LA. http://plants.usda.gov
Vascular Plant Herbarium, Oslo. 2011. Accessed through GBIF (Global Biodiversity Information Facility) data portal (http://data.gbif.org/datasets/resource/1078, 2011-02-05). Natural History Museum, University of Oslo. Oslo, Norway.