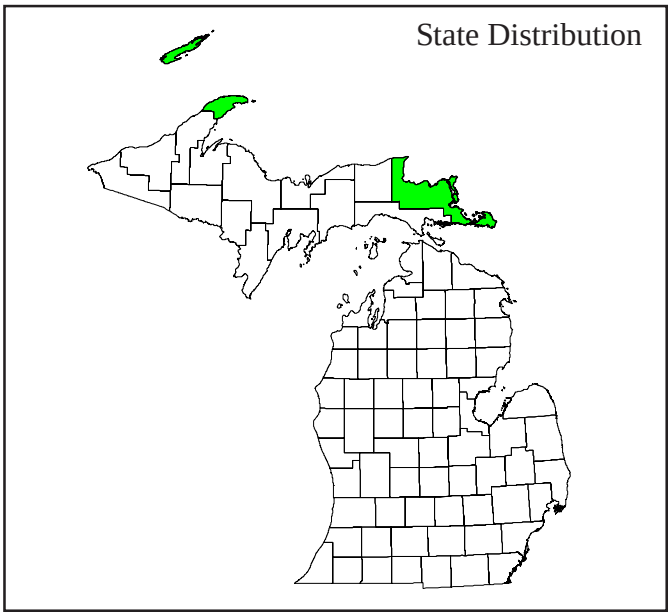
Poa alpina L. alpine bluegrass

Photo by Susan R. Crispin



Best Survey Period

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Status: State threatened

Global and state rank: G5/S1S2

Other common names: bluegrass

Family: Poaceae (grass family), also known as the Gramineae

Taxonomy: Alpine bluegrass has been divided into two subspecies, *Poa alpina* L. subsp. *alpina*, which is found through the range of the species, and *P. alpina* subsp. *vivipara* (L.) Arcang., which is known in Greenland, possibly Alaska, and commonly in Europe (Flora of North America 2007).

Range: This circumboreal grass occurs south in eastern North America to Quebec, the Bruce Peninsula of Ontario, and Michigan's Keweenaw Peninsula. In western North America it ranges south to Oregon and Colorado. It is considered rare in Newfoundland and Saskatchewan, and is known only from historical records in Nova Scotia (NatureServe 2007).

State distribution: Alpine bluegrass is known from 21 localities in the Upper Peninsula, with the vast majority of sites (16) occurring in Isle Royale National Park including the main island and several smaller islands within the archipelago, ranging up to Passage Island. The Passage Island occurrence was observed as consisting of hundreds of plants, while elsewhere within the park the populations were found to be much smaller and very local, comprised of about 20 to 100 plants. Two mainland records for the Keweenaw Peninsula localities are known only from pre-1900 collections, whereas two occurrences discovered on Manitou Island – located just east of the tip of the Keweenaw Peninsula – were documented in 1996 and 2005, respectively. Markedly disjunct from the western Lake Superior sites is a single occurrence in Chippewa County, comprised of about 50 plants discovered on the southern shoreline of Drummond Island in 1984.

Recognition: *Poa alpina* grows in **scattered, dense clumps** with stems that range from about 1-4 dm tall, bearing primarily basal leaves that are 2-4 mm wide and usually one to two much reduced, upright stem leaves that are strongly boat-shaped at the tip. The stem is terminated by a **pyramidal inflorescence which is ca. 3-6 cm tall, at least half as wide** and sometimes pinkish in color. In the spikelet, the lower part of the **distinctly 3-nerved lemma has long, fine hairs between the finely hairy keel and margins**, and the base lacks a cobwebby tuft of hairs. **The broadly ovate glumes are more than half as wide as long**. The majority of Michigan's *Poa* species can be distinguished by the presence of a distinct tuft of cobwebby hairs at the base of the lemma. Of the other four *Poa* species lacking a

Michigan Natural Features Inventory
P.O. Box 30444 - Lansing, MI 48909-7944
Phone: 517-373-1552

cobwebby tuft at the lemma base, *P. annua* and *P. autumnalis* have five distinct lemma nerves, while *P. compressa* and *P. canbyi* have narrow inflorescences and lack long hairs between the keel and margin of the lemma.

Best survey time/phenology: Most of the observations and collections of this species have occurred from early July through August, and flowering plants have been observed as early as mid-June. The optimal survey period for this species is thus estimated to be from mid-June through early September.

FQI Coefficient and Wetland Category: 10, FACU

Habitat: On Isle Royale's shores, *Poa alpina* grows in basaltic rock crevices and along other wave-splashed, rocky shores where its associates include such species as *Campanula rotundifolia* (harebell), *Potentilla tridentata* (three-toothed cinquefoil), *Trisetum spicatum* (downy oatgrass), *Euthamia graminifolia* (grass-leaved goldenrod), *Sagina nodosa* (pearlwort), *Polygonum viviparum* (alpine bistort), *Castilleja septentrionalis* (pale Indian paintbrush), and *Achillea millefolium* (yarrow). On Passage Island it inhabits a disturbance opening and is concentrated along a footpath, growing in dense sod with *Antennaria neglecta* (pussytoes), *Plantago major* (common plantain), *Fragaria virginiana* (wild strawberry), and other native and adventive species. Although it thrives along rocky shores, alpine bluegrass may also occur along paths and elsewhere in interior areas under aspen and other overstory trees and or under shrubs such as *Shepherdia canadensis* (buffaloberry) and *Physocarpus opulifolius* (ninebark) or in open bearberry (*Arctostaphylos uva-ursi*) – juniper (*Juniperus* spp.) heaths. Along the shoreline of Drummond Island, this species occurs on limestone in moist seepage areas with *Trisetum spicatum* and *Carex scirpoidea* (bulrush sedge). Elsewhere in its range it inhabits mostly calcareous subalpine and arctic habitats including alpine meadows, and also often occurs in disturbed ground (Flora of North America 2007).

Biology: Alpine bluegrass is a tufted, low-growing perennial species. *P. alpina* subsp. *vivipara*, which is most common throughout northern and central Europe, is well known for its ability to reproduce asexually through the development of bulbiferous spikelets, producing spikelets that are either completely bulbiferous or those that are partly bulbiferous and partly flowering (Flora of North America 2007). Producing vegetative bulbs or plantlets in place of seeds is a reproductive approach demonstrated by certain arctic/alpine grass species, and can be considered a conservation strategy for retaining genetic traits developed by stress tolerators in low nutrient habitats (Pierce et al. 2003). Pierce as well as Baxter and Farrar (1999) and Baxter et al. (1997) found through detailed experiments that *Poa alpina* var. *vivipara* (and possibly var. *alpina*) actually lost photosynthetic capacity through long-term growth under elevated CO_2 conditions. Their findings indicate that global climate change may adversely affect alpine bluegrass, although the research thus far appears to have focused primarily on one subspecies.

Conservation/management: The majority of the Michigan stations for this species are contained within Isle Royale National Park, where there are few threats, although protection of these sites from excessive foot traffic and human alteration of adjacent inland communities is advised. Searches of the Keweenaw Peninsula shoreline should be continued to relocate historical mainland localities. Inventories are also warranted elsewhere throughout the Upper Peninsula to identify additional new populations in calcareous bedrock shoreline areas, as this somewhat obscure grass species may be overlooked.

Comments: *Poa* ×*gaspensis* Fernald is a rare hybrid between *P. alpina* and *P. pratensis* subsp. *alpigena* (Lindm.) Hiitonen, known only from the coastal mountains of the Gaspé Peninsula in Quebec, Canada (Flora of North American 2007). *Poa alpina* ecotypes and their origin as glacial relics were examined in an extensive paper by Turesson (1927).

Research needs: In addition to inventories, the conservation and management of this species would benefit from basic life history studies, including research on population structure and genetic diversity.

Related abstracts: Volcanic bedrock lakeshore, small-flowered wood rush, alpine bistort, pearlwort, encrusted saxifrage, prickly saxifrage, rayless mountain ragwort, squashberry

Selected references:

Baxter, R. and J.F. Farrar. 1999. Export of carbon from leaf blades of *Poa alpina* L. at elevated CO_2 and two nutrient regimes. J. Exp. Botany 50: 1215-1221.

Baxter, R., T.W. Ashenden, and J.F. Farrar. 1997. Effect of elevated CO_2 and nutrient status on growth, dry matter partitioning and nutrient content of *Poa alpina* var. *vivipara* L. J. Exp. Botany 48: 1477-1486.

Flora of North America Editorial Committee. 2007. Flora of North America, North of Mexico. Volume 24: *Magnoliophyta: Commelinidae (in part): Poaceae, part 1*. Oxford Univ. Press. New York, NY. 908 pp.

Heide, O.M. 1989. Environmental control of flowering and viviparous proliferation in seminiferous and viviparous arctic populations of two *Poa* species. Arctic and Alpine Research 21: 305-315.

NatureServe. 2007. NatureServe Explorer: an online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: October 15, 2007).

Pierce, S., C.M. Stirling, and R. Baxter. 2003. Pseudoviviparous reproduction of *Poa alpina* var. *vivipara* L. (Poaceae) during long-term exposure to elevated atmospheric CO_2. Annals of Botany 91: 613-622.

Turesson, G. 1927. Contributions to the genecology of glacial relics. Hereditar 9: 81-101.

Schlag, R.N. and B. Erschbamer. Germination and establishment of seedlings on a glacier foreland in the Central Alps, Austria. Arctic, Antarctic, and Alpine Research 32: 270277.

Solhaug, K.A. 1991. Long day stimulation of dry matter production in *Poa alpina* along a latitudinal gradient in Norway. Holarct. Ecol. 14: 161-168.

Abstract citation:

Penskar, M.R. 2008. Special Plant Abstract for *Poa alpina* (alpine bluegrass). Michigan Natural Features Inventory. Lansing, MI. 3 pp.

This project was funded, in part, by:

The Michigan Coastal Management Program,
Michigan Department of Environmental Quality

and the

National Oceanic and Atmospheric Administration
U.S. Department of Commerce