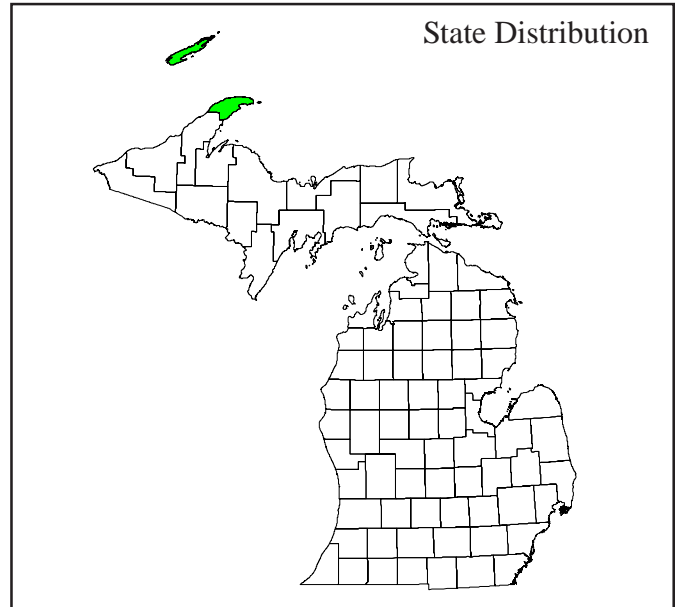
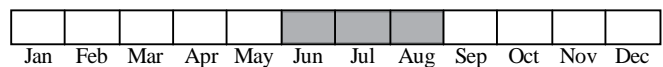




Photo by John V. Freudenstein



Best Survey Period



Status: State threatened

Global and state rank: G5/S1

Other common names: Lime-encrusted saxifrage, white alpine saxifrage

Family: Saxifragaceae (saxifrage family)

Synonyms: *Saxifraga aizoön* Jacq., *Chondrosea aizoön* (Jacq.) Haw.

Range: *Saxifraga paniculata* is a circumboreal species, ranging through central Europe, Scandinavia, Iceland, and Greenland, and in North America occurring south to New England, New York, and the northern Great Lakes region (Gleason and Cronquist 1991, Hultén 1958). It is considered rare in Labrador, Minnesota, New Brunswick, Newfoundland Island, New York, Nova Scotia, and Vermont, and is known only from historical records in Maine (NatureServe 2007).

State distribution: This rare boreal species is found only within Isle Royale National Park, where it is known from 10 localities, three of which are historical records, occurring on or near the main island (Isle Royale) and ranging up to Passage Island, the northernmost point within the archipelago.

Recognition: *S. paniculata* is stoloniferous perennial, forming very dense basal rosettes of **flat, stiff, leathery leaves**. The approximately 1-3 cm long leaves are oblong to obovate and **finely but sharply-toothed**, with distinctive **white, lime-encrusted pores present on each tooth of the leaf margin**. The basal rosettes produce erect flowering stems that may range up to about 3 dm in height, bearing scattered, reduced stem leaves and terminating in a somewhat elongated cluster of several **long-stalked, white flowers that are ca. 1 cm or less in width and have purplish or red dots**. This species is most likely to be confused with the related *S. tricuspidata* (prickly saxifrage), a similar rare arctic-alpine species that also occurs on Isle Royale, and which can be easily distinguished by its much narrower, crowded leaves that terminate in three, stiff spine-tipped teeth and otherwise have smooth margins and lack the lime-encrusted pores characteristic of *S. paniculata*.

Best survey time/phenology: Most observations of this species have occurred from approximately mid-June through late August, with flowering occurring from about mid- to late-June to early August. Owing to the distinctiveness of the species in vegetative condition, this species could easily be sought from June through August, although likely somewhat earlier and later depending on local conditions. Although flowering and fruiting plants



are not necessary for identification, surveys conducted during the flowering period would enhance inventories for this relatively low and somewhat obscure bedrock plant.

FQI Coefficient and Wetland Category: 10, UPL

Habitat: As suggested by one of its common names, this species occurs in alkaline (calcareous) habitats, such as the crevices of basic rocks (Voss 1985), including basalts and volcanic conglomerates. On Isle Royale it occurs in rock crevices and depressions where its associates include *Polypodium virginianum* (polypody), *Campanula rotundifolia* (harebell), *Rubus pubescens* (dwarf raspberry), *Aralia nudicaulis* (wild sarsaparilla), the moss *Tortella tortuosa*, and abundant lichen cover. Soper and Maycock (1963) discovered this species on the east shore of Lake Superior with other boreal, arctic-alpine plants, where it occurred in crevices of boulder talus at a cliff base. Associates there included *Woodsia alpina* (alpine cliff fern), *Sagina nodosa* (pearlwort), *Polygonum viviparum* (alpine bistort), and *Trisetum spicatum*, all of which are known as rare taxa in Michigan.

Biology: This species is a perennial, and propagates itself vegetatively via the production of new basal rosettes that may form immediately at the base of flowering rosettes or the tips of short stolons, thus often forming dense clumps of plants. Rosettes may persist for several years before flowering. Encrusted saxifrage is also a well known calciphile (Soper and Maycock 1963, Wherry 1920). According to Warming (1909) the flowers are markedly protandrous (producing and dispersing pollen before the stigmas become receptive), which promotes outcrossing. However, self-pollination also occurs, a typical feature of arctic plants that helps to ensure the production and dispersal of seed when pollinators are not present or are scarce or inconstant during the short growing season. In alpine environments, *S. paniculata* has been shown to have a high resistance to excessive drought and heat through leaf rosette closure, which prevents irreversible dehydration and sustained photoinhibition (Neuner et al. (1999). Hacker and Neuner (2006) found *S. paniculata* to be more resistant to cold induced photoinhibition in winter than any other evergreen subalpine species they studied, noting that its high photosynthetic efficiency allowed it to respond immediately to take advantage of moderating temperatures and ice melt in late winter.

Conservation/management: Colonies are likely under little threat, especially those occurring on the smaller, inaccessible islands of the park. Foot traffic is probably the only potential problem and should be avoided or minimized by placing trails away from plants and maintaining occasional monitoring.

Comments: Although this species is known in Michigan only from Isle Royale National Park, its occurrence east of Lake Huron in Ontario suggests the likelihood of discovering it on the Upper Peninsula mainland. It should be sought in similar shoreline habitat and possibly also on the exposed, alpine-like ridges inland, as several species once thought to be confined to the Isle Royal archipelago have been discovered in the recent two decades on the Keweenaw Peninsula as well as elsewhere on the mainland.

Research needs: Extensive molecular studies have been conducted to determine relationships within the genus *Saxifraga* (Soltis et al. 1996), a large and diverse group, and to ascertain genetic variation between isolated and non-isolated populations to test for evidence of glacial relict status (Reisch et al. 2003). General life history studies would likely provide the most useful information for conserving and managing Michigan populations, and additional field inventory is also warranted in selected mainland areas to identify new populations.

Related abstracts: Volcanic bedrock lakeshore, pearlwort, prickly saxifrage, alpine bluegrass, downy oatgrass

Selected references:

- Gleason, H. A., and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. Second edition. The New York Botanical Garden. Bronx, New York. lxxv + 910 pp.
- Hultén, E. 1958. The amphi-Atlantic plants and their phytogeographical connections. Kongl. Svenska Vetenskapsakad. Handl. Fjärde Serien 7: 1-340.
- 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).



Neuner, G., V. Braun, O. Buchner, and D. Taschler. 1999. Leaf rosette closure in the alpine rock species *Saxifraga paniculata* Mill.: significance for survival of drought and heat under high irradiation. *Plant, Cell and Environment* 22: 1539-1548.

Reisch, C., P. Poschlod, and R. Wingender. 2003. Genetic variation of *Saxifraga paniculata* Mill. (Saxifragaceae): molecular evidence for glacial relict endemism in central Europe. *Biol. J. Linn. Soc.* 80: 11-21.

Scoggan, H. J. 1978. The Flora of Canada. *Nat. Mus. Nat. Sci. Publ. Botany.* 4 vol., 1711 pp.

Soltis, D.E., R.K. Kuzoff, E. Conti, R. Gornall, and K. Ferguson. *matK* and *rbcL* gene sequence data indicate that *Saxifraga* (Saxifragaceae) is polyphyletic. *Am. J. Bot.* 83: 371-382.

Soper, J. H. and P. F. Maycock. 1963. A community of arctic-alpine plants on the east shore of Lake Superior. *Can. J. Bot.* 41:183-198.

Voss, E. G. 1985. Michigan Flora. Part II. Dicots (Saururaceae-Cornaceae). *Bull. Cranbrook Inst. Sci.* 59 and *Univ. of Michigan Herbarium.* xix + 724 pp.

Warming, E. 1909. Saxifragaceae. 1. Morphology and biology. *Meddelelser om Grønland* 36: 169-236.

Wherry, E. T. 1920. Soil tests of Ericaceae and other reaction-sensitive families in northern Vermont and New Hampshire. *Rhodora* 22: 33-49.

Abstract citation:

Penskar, M.R. 2008. Special Plant Abstract for *Saxifraga paniculata* (encrusted saxifrage). 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

