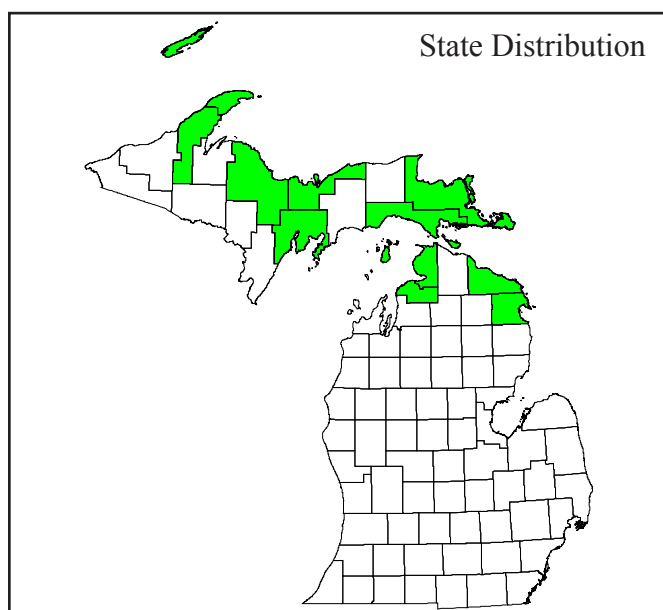




Photo by Susan R. Crispin



Best Survey Period



Status: State special concern

Global and state rank: G5/S3

Other common names: common butterwort, bog-violet, violet butterwort

Family: Lentibulariaceae (bladderwort family)

Range: Butterwort is a circumpolar species ranging around the world in temperate and boreal regions. It is of widespread occurrence from Europe through Siberia. Elsewhere this species occurs in the Arctic from Alaska to Canada and East Greenland, extending southward in North America to northeast Minnesota, northwest Wisconsin, and through the Lake Superior region east to New York and New England. It is considered rare in Alberta, Maine, Minnesota, New Brunswick, New Hampshire, New York, Nova Scotia, Saskatchewan, Vermont, and Wisconsin (NatureServe 2006).

State distribution: Michigan localities for *P. vulgaris* are widely distributed, occurring from Isle Royale through the Upper Peninsula to the tip of the Lower Peninsula. It is known from just over 70 sites, most of which (50+ localities) occur in Keweenaw, Mackinac, and Alger counties, with four or fewer sites known for Delta, Houghton, Marquette, Alpena, Charlevoix, Chippewa, Emmet, and Presque Isle counties.

Recognition: *Pinguicula vulgaris* is a small, herbaceous, insectivorous perennial with **rosettes of 3-6 distinctly yellowish-green leaves**. The blunt, oblong-ovate to elliptic leaves, which narrow to the base, range to ca. 8 cm in length, curling slightly inward along their upper margins. The **upper leaf surface is covered with numerous enzyme-secreting glands** that aid in the breakdown and digestion of small insects, and give the leaves a **sticky-greasy feel when touched**. This slimy, watery surface also serves to attract and capture insect prey. The **spurred purple flowers are solitary on 1.5-12 cm long, leafless peduncles** (stalks) and have a **white spot at the mouth**. In addition to a well developed basal spur, the flowers have a 3-lobed upper lip and 2-lobed lower lip, thus superficially resembling a violet. A single rosette may have produce up to three or more flowering stalks. The fruit is a small capsule with tiny seeds that lack endosperm.

Best survey time/phenology: Butterwort is best sought in spring when in flower, from about early June to early July. However, the distinct bright yellowish-green basal rosettes can be easily recognized throughout the growing season, from approximately late May through September.

FQI Coefficient and Wetland Category: 10, OBL



Habitat: *Pinguicula vulgaris* is a well-known calciphile (favoring alkaline or lime-rich habitats) and as with most insectivorous plants, prefers wet substrates. It is found in moist alkaline rock crevices and outcrops; rocky or gravelly shores, sandy, interdunal shoreline flats; marshy soils near bogs, wet alvars, and the marly, calcareous soils of coastal and northern fens. It also occurs in Lake Superior coastal areas where it inhabits volcanic bedrock lakeshore areas, favoring basalts and conglomerate bedrock types. Most Michigan locations are along Great Lakes shores, particularly on rocky, wet beaches and nearshore wetlands and interdunal areas. *Primula mistassinica* (birds-eye primrose) is a common associate as are numerous other herbs such as *Drosera rotundifolia* (round-leaved sundew), *D. linearis* (linear-leaved sundew), *Sarracenia purpurea* (pitcher-plant), *Utricularia intermedia* (flat-leaved bladderwort), *U. cornuta* (horned bladderwort), *Castilleja coccinea* (Indian paintbrush), *Parnassia glauca* grass-of-Parnassus), *Tofieldia glutinosa* (false asphodel), and *Gentianopsis procera* (small fringed gentian). The rare *Solidago houghtonii* (Houghton's goldenrod) is an expected associate in the Straits region, as might be *Empetrum nigrum* (black crowberry) and other rarities such as the similarly boreal *Erigeron hyssopifolius* (hyssop-leaved fleabane) and *Carex scirpoidea* (bulrush sedge). These associates are similar to those found with butterwort in shoreline limestone pavement or wet alvar sites.

In bedrock shoreline communities in the more northern portion of its Michigan range, butterwort occurs on alkaline basalts, volcanic conglomerates, and occasionally wet sandstones, where associates include such species as *Campanula rotundifolia* (harebell), *Deschampsia cespitosa* (hair grass), *Festuca saximontana* (fescue), *Artemisia campestris* (wormwood), *Carex viridula* (sedge), and *Solidago simplex* (Gillman's goldenrod).

Biology: *Pinguicula vulgaris* is an insectivorous, perennial herb that secretes mucilaginous fluids and digestive enzymes through two types of leaf glands. Small insects first adhere to the mucilaginous fluids secreted by the stalked 'sticky' glands. Their struggling movements, which stimulate increased production of the mucilaginous fluids, then cause the secretion of enzyme-containing fluids from the 'sessile' glands. It is the latter secretion that is primarily responsible for insect digestion and nutrient absorption by the plant.

Upon stimulation, the leaves also roll inward from their margins; this is thought to minimize the loss of prey and also aid in enzymatic degradation by increasing the leaf surface area in contact with the prey. This in-rolling may also reduce the loss of enzymes and nutrients through seepage or by preventing exposure to rainfall.

Flowering plants can be found in late May through June and into early July, followed by the formation of a capsule containing several seeds, typically from early July through August. During winter, butterwort persists as a winter resting bud known as a hibernaculum that begins to form in the center of the rosette by late summer. This bud is entirely without roots and therefore may be dispersed by water movement, wind, or possibly animal activity. The small scale-leaves of the hibernaculum contain starches that nurture the enclosed seedling during spring emergence when new leaves and roots are forming.

Biologists have long been interested in carnivorous plants, particularly with regard to the topics of resource allocation, reproduction, plant demography (the structure and dynamics of populations), and the evolution of carnivory as an adaptation to low nutrient availability. Owing to the extensive nature of this literature, which cannot be adequately summarized here, the reader is referred to the following references for further information on these topics: Méndez and Karlsson (2005), Méndez and Karlsson (2004), Eckstein and Karlsson (2001), Worley and Harder (1999), Thorén and Karlsson (1998), Thorén et al. (1996), Lesica and Steele (1996), Worley and Harder (1996), Svensson et al. (1993), Kull and Zobel (1991), Karlsson et al. (1990), Karlsson 1988), Karlsson and Carlsson (1984), and Aldenius et al. (1983).

Conservation/management: Several large butterwort populations are protected on public lands, including several sites within Isle Royale National Park, and also via a number of private nature preserves, including large exemplary areas managed by the Michigan Nature Conservancy in the Straits region. Habitat loss through shoreline development and recreation is the most critical threat to butterwort populations, and as for many coastal areas, the prevalence and widespread use of off-road-vehicles (ORVs) remains a constant and ever present threat to sites. Conservation strategies should focus on the identification and preservation of shoreline ecosystems that encompass known and potential



habitat. Equally important is the education of private landowners as well as federal, state, and local land managers to provide guidance on how to identify and steward important coastal systems and their associated rare species.

Comments: The word *Pinguicula* is derived from the Latin word *pinguis*, meaning 'fat', and refers to the leaves being 'greasy' or 'buttery' to the touch. It is reported that the leaves were once used by farmers to coagulate milk.

Research needs: The principal need at present, given the extensive research that has been conducted to date, is perhaps the identification of viable colonies and conducting monitoring to determine population dynamics, trends, changes in status, and the presence of natural and artificial threats.

Related abstracts: Coastal fen, northern fen, interdunal wetland, sand and gravel shore, limestone bedrock lakeshore, limestone cobble shore, volcanic bedrock lakeshore, cherrystone drop, Eastern massasauga, Hine's emerald, incurvate emerald, crested vertigo, six-whorl vertigo, tapered vertigo, alpine bluegrass, calypso, English sundew, Franklin's Phacelia, Hill's thistle, Houghton's goldenrod, prairie Indian plantain, ram's head orchid, Richardson's sedge, rock whitlow-grass, and numerous additional animal and plant species.

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Abstract citation:

- Penskar, M.R. and J.A. Hansen. 2009. Special Plant Abstract for *Pinguicula vulgaris* (butterwort). Michigan Natural Features Inventory, Lansing, MI. 4 pp.

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MSU Extension is an affirmative-action, equal-opportunity organization.

Funding for abstract provided by the Michigan Department of Transportation.

