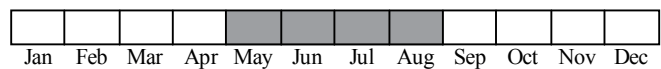


Best Survey Period



**Legal status:** State threatened

**Global and state rank:** G4/S2

**Family:** Ranunculaceae (buttercup family)

**Total range:** Goldenseal occurs throughout the eastern half of North America, occurring from Vermont to Minnesota and ranging south to Nebraska, Kansas, Arkansas, Georgia, and Alabama. It is considered rare over several portions of its range, including Connecticut, Delaware, Iowa, Massachusetts, Maryland, Minnesota, Mississippi, Vermont, North Carolina, New York, Virginia, Alabama, Indiana, Tennessee, Wisconsin, and Ontario.

**State distribution:** Goldenseal is currently known from 53 sites in 21 counties, where it is concentrated in the southern three tiers. Nine counties are represented by only a single locality. The species has been discovered or confirmed extant since 1980 at twenty-five localities; eight sites are based on records from 1930 or earlier, many in areas now with widespread development, and where the status of these historical records is largely unknown. Nine occurrences are reported to support more than 100 shoots and only two of those occurrences comprise populations with more than 1000 shoots.

**Recognition:** Goldenseal has an unbranched, hairy stem reaching 20-50 cm in height. Each stem produces one or two leaves near the top. These leaves are **palmately divided (maple-like) into five to nine sharply-pointed lobes with toothed margins**. Young leaves are small (3-10 cm wide), **shiny**, and **wrinkled**. When fully flushed, the leaves become dull green, the veins appear deeply impressed on the upper leaf surface, and they expand up to about 25 cm wide. A solitary flower about 15 mm in width terminates the stem. Below the flower is a very reduced bract-like leaf similar in shape to the other leaves. The flower of goldenseal has no petals, although there are **three pale, greenish-white sepals** at the base. These sepals are very ephemeral and **drop as soon as the flower opens**, revealing a **dense spray of conspicuous showy stamens with white, expanded filaments**. The berry-like fruit (8-18 mm) is green when immature, ripening to a **bright red color** and somewhat resembling a large raspberry in appearance. Goldenseal has a thick, knotty rhizome (4-7 cm long, 0.5-2cm wide) that is brown on the surface, with a bright yellow pigment inside, from which the common name is presumably derived.

**Best survey time/phenology:** Goldenseal is most easily identified when in flower or in fruit, but sterile plants can also be reliably determined by those experienced with this clone-forming, rich woodland



species. The distinctive flowers are visible from approximately late April through early May. The fruits, first appearing green and then ripening to form a bright red aggregate of achenes, are visible from mid to late-season, about June to early August and perhaps later in some localities.

**Habitat:** Goldenseal typically inhabits shady, rich, mesic southern forests, usually under a canopy of beech-sugar maple or red oak-sugar maple. It frequently occurs in moist microhabitats near vernal pools, along forested streams, and also in southern floodplain forests, often in moist sandy loam, clay loam, or even organic (muck) soils. Overstory species include *Acer saccharum* (sugar maple), *Fagus grandifolia* (American beech), *Quercus rubra* (red oak), *Betula alleghaniensis* (yellow birch), *Acer saccharinum* (silver maple), *Tilia americana* (American basswood), *Juglans nigra* (black walnut), *Juglans cinerea* (butternut), *Celtis occidentalis* (hackberry), and *Fraxinus pennsylvanica* and *F. nigra* (red and black ash). Common mesic woodland herbs that are associated with goldenseal include *Arisaema triphyllum* (jack-in-the-pulpit), *Asarum canadense* (wild ginger), *Carex hirtifolia* (sedge), *Carex plantaginea* (plantain-leaved sedge), *Claytonia virginica* (spring beauty), *Erythronium americanum* (trout-lily), *Caulophyllum thalictroides* (blue cohosh), *Geranium maculatum* (wild geranium), *Uvularia perfoliata* (wild-oats), *Trillium grandiflorum* (common trillium), and *Hepatica acutiloba* (hepatica), among many other forbs typical of the ground layer in mesic forests.

**Biology:** Goldenseal is a perennial which, in Michigan, flowers in early May and produces fruits through September (Albert and Penskar 1984). Colonies of up to several hundred shoots can occur, with the smallest or late-flowering ones on the edges and the taller plants more central, suggesting that colonies expand by vegetative propagation. Colonies may be long-lived, slowly increasing in size through the years (Charette 1964).

**Conservation/management:** The knotty root (actually a rhizome) of this species is considered to have great medicinal value, and a large part of the great reduction in goldenseal populations can be attributed to exploitation by commercial harvesters (Swink and Wilhelm 1994). Protection from over-harvesting is a

necessary first step to insure this species' survival. Habitat protection is also essential. At least three Michigan populations are in nature preserves under protective ownership of The Nature Conservancy, Michigan Nature Association, and Michigan Audubon Society. Two others are within University designated natural areas, one in a county park natural area, three in city parks, two in metropolitan parks, one in a state park, and one within a university woodlot. Other populations are on various tracts of private land. In addition to exploitation, this plant is vulnerable to removal of the forest canopy and probably to drainage or extended flooding of its habitat. The species is reportedly difficult to cultivate (Mitchell and Dean 1982).

**Comments:** Although goldenseal populations have been severely diminished and fragmented through over-harvesting and habitat destruction, it is also a species that can be easily overlooked when obscured by the typical lush vegetation of its forest habitat. Since more than one-half of the populations known to be extant have been discovered in the last several years, it is likely that others have yet to be discovered. Observations of a large population within a Nature Conservancy preserve (Albert and Penskar 1984) indicate that the fruit is highly palatable to animals, who appear to readily seek out this species as soon as the fleshy achenes are ripened.

**Research needs:** Investigation of the biology and ecology of goldenseal would assist in the management and protection of this species. Status inventories are also needed to provide better data on known populations, as well as to determine the condition of any existing historically documented localities.

**Related abstracts:** Ginseng, large toothwort, showy orchis, cerulean warbler, northern goshawk, red-shouldered hawk

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