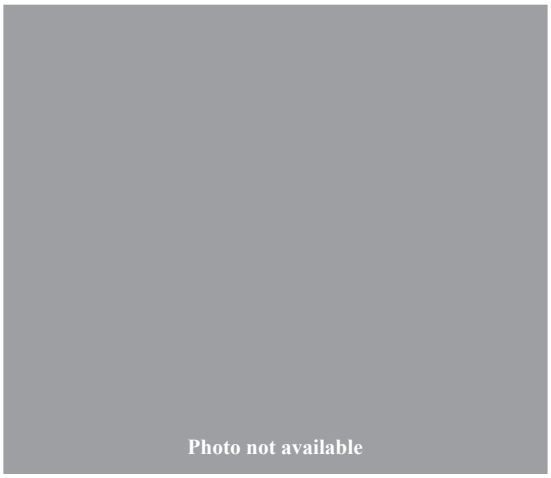
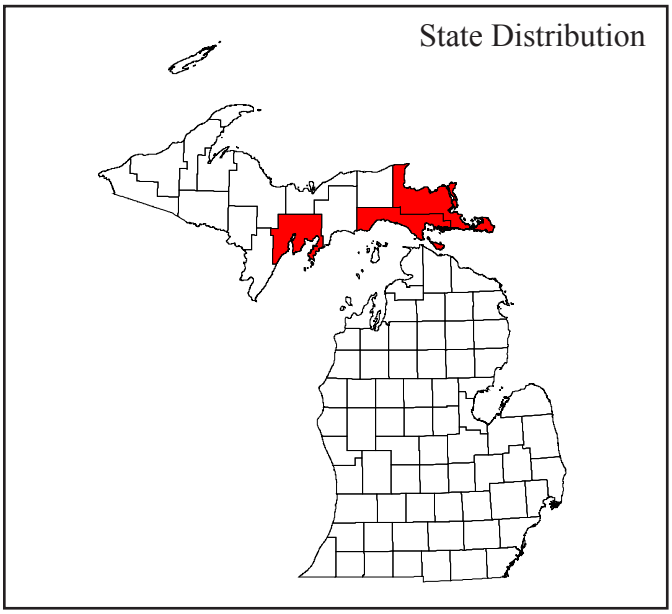
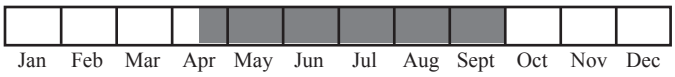
Catinella exile (Leonard) Pleistocene catinella





Best Survey Period



Status: State threatened

Global and state ranks: G1G2/SU

Family: Succineidae

Synonyms: *Succinea exile*

Total range: The Pleistocene catinella's global range includes six U.S. states and one Canadian province. However, it has possibly been extirpated from Illinois and Indiana, it is not ranked in Minnesota and Maine, and it's status is under review in Michigan. The Pleistocene catinella is found in Wisconsin where it is considered imperiled, and Ontario, Cananda where it is considered critically imperiled (NatureServe 2007). It was first known only from Illinoian and Wisconsinan glacial sediments and believed to be extinct until live individuals were found in Iowa in 1986 (Frest 1990).

State distribution: The Pleistocene catinella has been documented at three sites in Michigan, all in the Upper Peninsula. These are located near the Lake Michigan or Lake Huron shoreline in Delta, Mackinac, and Chippewa Counties (Nekola 1998).

Recognition: Pleistocene catinella shells have an elongate spire, usually covered with dirt or mud (Burch and Jung 1988). Adults are approximately 4.9mm in length. This species is similar to the suboval ambersnail (*Catinella vermeta*) but it has a deeper orange-colored shell that is more elongate (at least 1.9 times as tall as wide) and smaller (less than 7mm) (Nekola 1998). A large amount of plasticity is present among species in the Succineidae family. For more information on identifying land snails, see Burch and Jung (1988) pages 155-158 or Burch and Pearce (1990) pages 211-218.

Best survey time: Surveys for Pleistocene catinella are best performed after rain, when the soil and vegetation are moist. During dry periods, a survey site can appear completely devoid of snails, while after a rain the same site can be found to contain numerous individuals. Temperatures should be warm enough that the ground is not frozen and there is no snow. Dry, hot periods during mid-summer should be avoided. The best time of day to survey is often in early morning when conditions are cool and moist. An indicator of suitable conditions for performing Pleistocene catinella surveys is the presence of other species of snails or slugs. Multiple site visits spaced days or weeks apart can help ensure that appropriate conditions are encountered during surveys. Empty shells might still be found when conditions are not suitable for live individuals.

Habitat: Most Pleistocene catinella populations have

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been found in fens and cobble beaches. In Michigan, this species has been found at two cobble beaches and one fen, all within four miles of the Lake Michigan or Lake Huron shoreline. These sites are located within the Niagaran Escarpment and Keweenaw Volcanic Belt in the Upper Peninsula. Fens are peatlands that form in areas of ground water discharge. They have relatively high soil moisture and cooler soil temperatures, which are favorable for land snails. Pleistocene catinella are frequently encountered in leaf litter under sageleaf willow (*Salix candida*) and in moist depressions on open mats (Nekola 1998).

Biology: Terrestrial snails and slugs, along with aquatic snails (Gastropoda) belong to the Phylum Mollusca. They are related to clams and mussels (Bivalivia); squids, octopuses, and nautiluses (Cephalopoda); and five Classes of lesser known mollusks found in marine environments: chitons (Polyplacophora), tusk shells (Scaphopoda), solenogasters (Aplacophora), Monoplacophorans, and Caudofoveatans. As the first molluscan group to expand out of aquatic environments (~150 million years ago, Clarkson 1979), land snails have adapted to a wide variety of terrestrial habitats. There are close to one thousand species in the U.S. and Canada alone.

Although there is very limited information on the specific biology of the Pleistocene catinella, the general biology of land snails applies to this species. One of the most important physiological characteristics of land snails is the need for moisture. Water is expended for locomotion and reproduction, and is lost by evaporation from external tissues (Riddle 1983). Land snail eggs have little resistance to desiccation, and so must be deposited in areas that remain moist. Snail shells are made of calcium carbonate, which is secreted from glands in the mantle along the edge of the shell. The oldest part of the shell is at the apex. The shells coil in one of two directions dextral or sinistral. With the aperture of the shell facing you and the pointed end of the spire pointed up, a dextral shell will have the aperture on the right side while a sinistral shell will have the aperture on the left. Most species of land snails, including the Pleistocene catinella, have dextral shells. Since land snails require a source of calcium for shell production, many species are most abundant on limestone and soils high in calcium carbonate (Burch 1955).

The diet of snails includes a wide range of organic materials including plants, fungi, animal tissue, and soil. Senescent plant material (e.g. aging leaves of deciduous trees, fruit, flowers, shoots) usually comprises the largest component of their diet, being preferred over green or dead plant tissue. Snails have been reported to eat algae, mosses, and lichens, but only rarely grasses. Senescent plant tissue is likely preferred because of its low toxin content. Many types of fungi are eaten by land snails, including some that are highly toxic to mammals. Soil particles are known to be a regular component of their diet, humic acid in particular is important for the nutrition of snails in laboratory culture. Animal remains probably comprise only a small portion of food items. Earthworms, chaetae, mites, remains of insects and other small animals, and mammalian feces have been reported in their diet. Land snail species can occur in a wide range of habitats, and utilize different food types based on what is available. Most snails begin foraging for food around sunset. The sense of smell, which is perceived by their tentacles, directs them toward some types of food items (Speiser 2001).

Reproduction in land snails is characterized by internal fertilization, and often includes elaborate courtship behavior. Land snail reproductive systems are complex and varied. The Pleistocene catinella, along with many other species of pulmonate land snails, are simultaneous hermaphrodites, meaning they have both male and female reproductive organs. The prosobranch land snails are dioecious, that is, individuals are either male or female. Cross-fertilization combined with oviparity (individuals lay eggs) is most common, but self-fertilization with ovoviviparity (eggs develop within the female's body until they hatch) has been documented in many taxa (Gomez 2001).

Conservation/Management: Land snails are particularly vulnerable to habitat degradation due to their localized nature and inability to migrate long distances. They are strongly tied to habitats such as carbonate cliffs, fens, wooded wetlands, and rocky upland woods. Irrevocable losses to land snail diversity may occur unless action is taken to protect these habitats in north-eastern Wisconsin and southern Upper Peninsula of Michigan (Nekola 2003). Roughly 97% of the regions land snail diversity could be conserved by protecting representative examples of these habitats within each of the geographic subregions

(Nekola 2003). Landuse activities that could trample or otherwise alter cool, moist microhabitats should be avoided (e.g. ORV use and timber harvest). Prescribed fire has been shown to substantially reduce the abundance of lnad snails, including the Pleistocene catinella, and cause the local extirpation of land snail species in upland and lowland grassland habitats (Nekola 2002). Nekola (2002) recommends that burn intervals be at least 15 years and that other methods of removing woody and invasive plants be used that preserve organic litter layers at sites with land snails. Hydrologic changes to ecosystems supporting land snail habitat should be avoided. Frest (1990) recommends that the Pleistocene catinella be federally listed as endangered based on habitat specificity and rarity.

Research needs: Surveys for the Pleistocene catinella are needed to more accurately determine its true range and status in Michigan, and to gain better information on its habitat requirements. Additional populations are expected in rich fen sites in the Lower Peninsula of Michigan (Nekola 1998). Studies on the life history of this species are also needed.

Related abstracts: *Euconulus alderi* (a land snail), Eastern Flat-whorl (*Planogyra asteriscus*), Cherrystone Drop (*Hendersonia occulta*), Spike-lipped Crater (*Appalachina sayanus*), Alvar, Limestone Cobble Shore, Limestone Bedrock Glade, Limestone Bedrock Lakeshore, Rich Conifer Swamp, Boreal Forest, Northern Fen

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