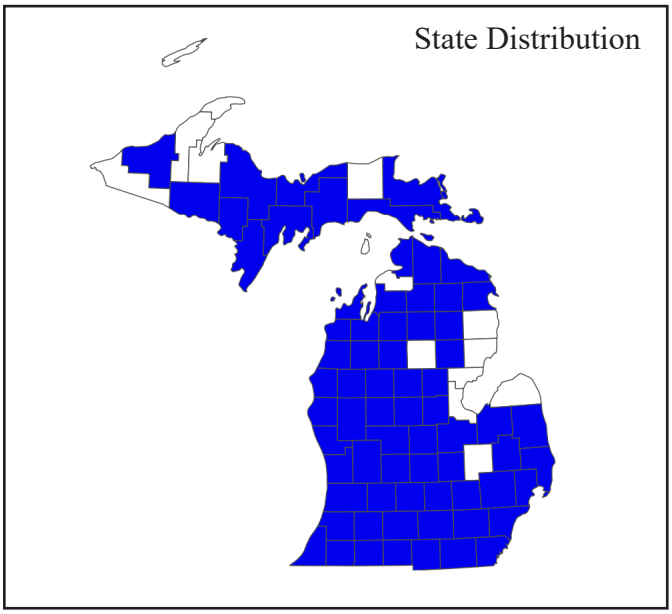
Lasmigona compressa Lea — Creek heelsplitter

Photo by Kurt Stepnitz



Best Survey Period

Status: State Special Concern

Global and State Rank: G5 (Globally Secure) /S3 (State Vulnerable)

Family: Unionidae (Pearly mussels)

Synonyms: *Symphynota compressa* Lea, *Unio alasmodontina* "Barnes" Lea, *Unio compressus*, *Margarita (Unio) compressus*, *Unio pressus* Lea, *Unio compressa* Lea, *Unio compressus* var. *plebius*, *Complanaria alasmodontina*, *Complanaria compressus*, *Margaron (Unio) pressus*, *Complanaria compressa*, *Unio alasmodontinas*, *Alasmodonta pressa*, *Symphynota (Symphynota) compressa*, *Symphynota (Symphynota) compressa* var. *plebius*, *Unio compressa* var. *lindus*, *Lasmigona (Platynaias) compressa* (MolluscaBase 2025, Watters et al. 2009)

Other Common Names: Flat creek shell

Total Range: The global range of creek heelsplitter extends northeast into Quebec, Canada, south into Kentucky, USA, and northwest into Saskatchewan, Canada; occupying the Canadian Interior basin, upper Mississippi, Ohio, St. Lawrence, and Hudson River systems (NatureServe 2025). The creek heelsplitter is currently possibly extirpated from Nebraska, USA (SH), and is critically imperiled in both Kentucky and West Virginia (S1) in the USA. While throughout most of its range it tends to be imperiled or vulnerable, it appears to be stable in both New York, USA (S4) and Ontario, Canada (S5). The southern distribution of this species may be limited by warmer temperatures (mean daily July temperature above 24° C or 75.2° F; Haag 2012).

State Distribution: Records for creek heelsplitter are present throughout the state of Michigan, including the Upper and Lower Peninsula, though it tends to occur in smaller streams with sand and cobble substrates (Watters et al. 2009), rather than large rivers. This species has been found in the Kalamazoo River (Mulcrone and Mehne 2001), Lake St. Clair (Badra and Goforth 2003), and throughout the upper peninsula (Goodrich and van der Schalie 1939). Recent surveys (32 total surveys post 2010) documented live individuals or shells of

creek heelsplitter in the Manistique, Tahquamenon and St. Marys Watersheds in the Upper Peninsula and the St. Joesph, Manistee, Pine, Tittabawasee, Kalamazoo, Thornapple, and Long Lake – Ocqueoc Watersheds in the Lower Peninsula (Badra 2010, Badra 2019, Badra 2020, Cole-Wick and Badra 2022, Cuthrell et al. 2014, Cuthrell et al. 2015, Cuthrell et al. 2019, Klatt et al. 2012). Creek heelsplitter was historically found in the Black River of the St. Clair drainage, some of which were relocated to the Detroit River in 1992 (Trdan and Hoeh 1993). Documentation of the creek heelsplitter has been somewhat limited since 2020: including St. Clair, Ionia, Hillsdale, Kalamazoo, and Osceola Counties (MNFI 2025). Knowledge of the true extent and distribution of this species require systematic surveys throughout the state.

Recognition: The creek heelsplitter is medium sized and compressed, with a thin shell that thickens with age. This species can grow up to 11 cm (4.4 in) long and live for around 13 years. The overall shape is elongate/oval, with a rounded anterior end and bluntly pointed, square posterior end. This species commonly has a small dorsal wing that extends above the hinge line. The beak or umbo is low with five to eight noticeable loops and is located closer to the anterior end. The color of the shell is typically yellow to yellow-green when the mussel is younger, becoming brown or green as the mussel ages. The creek heelsplitter has multiple, broad green rays that can cover most of the shell, particularly the posterior end. The nacre of the creek heelsplitter is white, with occasional salmon or green tinges, especially near the beak cavity. Pseudocardinal teeth are small, low, and elongated while lateral teeth are thin and short.

Fluted shell *(Lasmigona costata*) can resemble creek heelsplitter, but has heavy, rounded ridges on the posterior slope and typically has a less developed dorsal wing. Its pseudocardinal teeth are thicker and heavier than in creek heelsplitter (Watters et al. 2009, Mulcrone and Rathbun 2020).

Best Survey Time: The best time to survey for creek heelsplitter is the first week of June to the end of September. Periods of high water and turbidity after rain should be avoided to help ensure detection rates are high. They may be hard to detect visually, as the creek heelsplitter can be completely buried.

Habitat: Creek heelsplitter occupies smaller sized streams (headwaters) in either slackwaters or in areas with stronger currents and may be completely buried. They are typically found in areas with sand, gravel and /or pebble substrates. They are often found in areas with few other mussel species.

Biology: Creek heelsplitters belong to the Unionidae family of freshwater mussels, which eat phytoplankton, zooplankton, bacteria, fine organic matter, and other particles primarily through filtering, although they can also obtain food from sediments (Vaughn et al. 2008). This species has been reported as hemaphroditic, having both male and female gonadal tissues (Ortmann 1919, Haag 2012). Creek heelsplitter is bradytictic, where spawning occurs in the summer, with eggs developing in August until mid-September, and larvae (glochidia) overwintering in the adult until the following May (Watters et al. 2009).

Glochidia are then released as packets, called conglutinates, that mimic fish eggs, worms, insects, or another prey to lure in fish hosts. The type of conglutinate of the creek heelsplitter is unique to the genus, where eggs are bound together by their membranes (Watters et al. 2009). Glochidia are the parasitic life stage of mussels, needing to attach themselves to the fins or gills of a fish host for survival and development, although they do not harm the fish. Therefore, the co-occurrence of the proper host species is essential for reproduction. By reproducing this way, glochidia are given a stable environment for their development and are spread to new habitats that the otherwise sedentary mussel would not normally migrate to. While some mussels are adapted to a few hosts, creek heelsplitter is more of a generalist, able to use catfish (Ictaluridae, *Ameiurus*), sunfish (Centrarchidae, *Lepomis*), shin-

ers (Leuciscidae, *Notropis*), and multiple other fish species (Watters et al. 2009).

It has been noted that creek heelsplitters can grow quickly during their first 2-3 years, after which their growth slows dramatically (Watters et al. 2009).

Conservation/Management: Like other freshwater mussel species, creek heelsplitter is sensitive to impoundments resulting in altered stream flows, siltation, pollution, and invasive species. Throughout Michigan, creek heelsplitter are currently under threat by the spread of zebra mussels (*Dreissena polymorpha*). This non-native mussel was introduced to the Great Lakes region in the late 1980s and has since spread throughout much of the lower peninsula and parts of the upper peninsula. Zebra mussels must attach to a solid surface to survive, which can include the shells of native mussels. Large numbers of zebra mussels can attach to native mussels and prevent them from feeding, moving, and reproducing, eventually resulting in death (Mackie 1991).

The lower watersheds of Michigan inhabited by the creek heelsplitter are particularly threatened by point and non-point pollution due to urban and agricultural runoff, industrial waste, herbicides, pesticides, and general human impacts. Most freshwater mussels are sensitive to heavy metals (Naimo1995), chlorides, like those found in road salts (Gibson et al. 2018), and ammonia (Newton 2003).

As the creek heelsplitter tends to be found in smaller, headwater streams, it is sensitive to altered hydrologic regimes and stream flows caused by climate change, Michigan is experiencing larger rain events, resulting in higher peak flows, and more severe dry periods, resulting in low flows and potentially stream drying. These extreme conditions drastically alter available habitats for the creek heelsplitter, minimizing habitats available. In addition, particularly with high flows, scouring events may occur more frequently, disrupting the substrate, leading to increased siltation in the water column and potentially resulting in displacement of individuals. Converting natural land cover (i.e., forests, wetlands, and fields) to impervious land cover (i.e., agriculture, pavement) can also contribute to high flows, as these land covers increase runoff into rivers and streams. Maintaining, conserving, and restoring natural land cover, particularly the riparian areas surrounding rivers and streams, is essential for stream health and can help mediate heavy participation and runoff events.

While some populations remain stable, the multiple threats to the creek heelsplitter are leading to declines throughout its range. In addition to preserving natural areas surrounding streams, ensuring that stream reaches within a watershed maintain connectivity is essential for the movement and survival of fish hosts. This includes reducing and removing barriers to movement and migration of fish, such as obsolete dams and poorly placed or small culverts. Increased surveys to better understand the current range are needed to better develop and inform a conservation plan leading to action.

Research Needs: In conjunction with targeted surveys for new occurrences, surveying historical occurrences is essential to understanding how populations have changed over time and identifying drivers of decreased population sizes to develop an effective conservation and management plan. Surveys targeting small headwater streams are needed to better document the status and range of creek heelsplitter in Michigan.

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