Freshwater Mussels of Montana

David Stagliano, MT Natural Heritage Program

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Report Your Mussel Sightings

If you see dead mussel shells or live mussels, note:

1) Where you are: stream name and major road crossing. GPS coordinates are best.
2) Are the shells abundant, fresh or old. Fresh mussels will have flexible hinge ligaments still attached, maybe internal muscle parts and may smell bad.
3) Take a photo of live specimens for verification purposes (if you have a camera) and release them or send the shells in (wrapped in paper towels in a Ziploc bag) for a voucher record. Please report them!

Montana Fish, Wildlife & Parks

Contact Information:

Montana Natural Heritage Program

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David Stagliano- Aquatic Ecologist
Montana Natural Heritage Program
1515 E. 6th Avenue
PO Box 201800

email: dstagliano@mt.gov
website: www.mtnhp.org
phone: 406-444-7329
Helena, MT 59620-1800

Freshwater Mussels: Montana's Hidden Biological Treasure

Mussels are a seldom seen and under-appreciated biological component of many Montana trout streams and prairie rivers. The state's only trout stream mussel, the western pearlshell, has been quietly disappearing from some watersheds for decades. Few people know Montana has native freshwater mussels; even fish biologists and fishing guides who spend thousands of hours on streams and rivers may not realize they are floating over or "stepping on" these cryptic organisms. Most mussels resemble rocks on the river bottom.

A good mussel haul: Missouri River, 2004

Mussel searching: White Cliffs Missouri River

Freshwater mussels, sometimes called “clams,” are a group of mollusks within the class Bivalvia (literally meaning 2 valves or shells joined by a hinged ligament). Freshwater mussels require a larval host-fish parasitic stage, while true clams have a free-living larval stage. These are really amazing invertebrates! Some species have developed elaborate ‘lures’ to get the host fish to bite them and become infected with glochidia (mussel larvae). North America contains the most diverse mussel fauna (~300 species) of any continent. Unfortunately, 38 ofat these species are presumed to be extinct, and another 77 are considered critically endangered or threatened in their range (Williams et al. 1993). Montana has 3 native and 3 introduced species; two are very recent introductions. Because the larvae can be attached to the host fish for up to 3 months, mussels may be carried to new areas within the watershed many miles from their parents, or even to different states. This was the case with our introduced, mussels brought in on stocked fish species.

Who says mussels can’t move?
The Introduced Black Sandshell & Creek Heelsplitter Mussels are causally linked to fish stocking events in Fort Peck Reservoir when the Missouri River was dammed in 1940. Now the Black Sandshell is abundant ~120 miles upstream at Fort Benton, MT.

Mussel Survey Techniques

Qualitative

Shoreline searches, aquascope (glass-bottomed bucket) timed-transects and snorkeling are all common qualitative mussel survey techniques. Visual benthic surveys are conducted along a series of defined transects across the width of the stream (Goforth et al. 2001) or 50m transects are searched upstream along high priority habitats in a reach of stream while time is being recorded (Young et al. 2001). Aquascopes are used for underwater viewing within 1m of defined transects while wading, or in depths >1m, snorkeling can be utilized. Mussels (and dead shells) observed during the timed-transect period are placed in mesh bags, identified to species, measured, enumerated and released in the field. Shells can be kept for voucher records. **Data calculated**: Number of mussels per person-hour of search time, # / 50m.

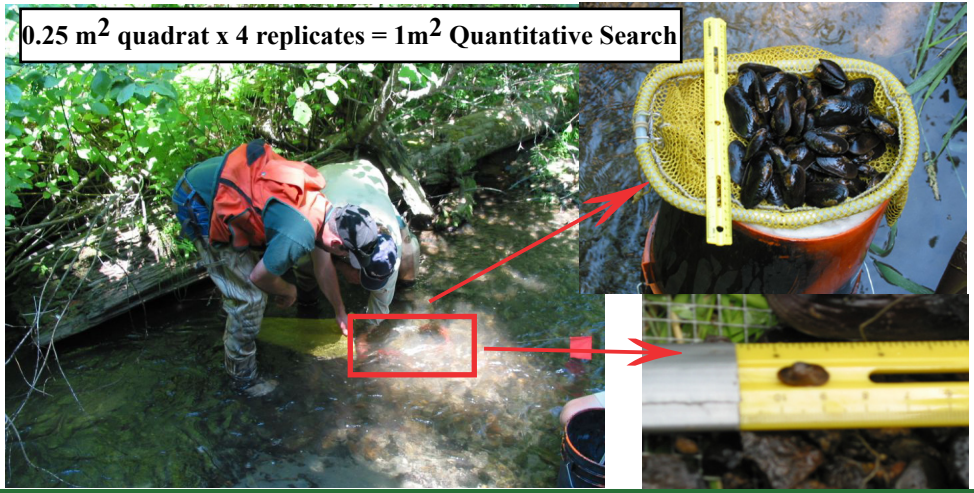
Example 1: 1 person reports 10 live mussels in a ½ hour search of 100m = 20 mussels/person-hour or 5 mussels per 50m reach)

Example 2: 2 people report 10 live mussels in a ½ hour search of 200m = 10 mussels/person-hour or 2.5 mussels per 50m reach).

Quantitative

Once mussel beds are found, a quantitative method for estimating densities is excavating a series of 0.25 m^2 quadrats. Often young mussels (<30 mm) will not be visible on the surface. Only by digging out the substrate and sifting through a sieve or mesh net will you locate these and demonstrate successful reproduction and recruitment. Additionally, buried mussels can double the density estimates in deep gravel, dense beds.

Data calculated: Number mussels m^2, B-Factor = # buried / # visible in the Quadrats.

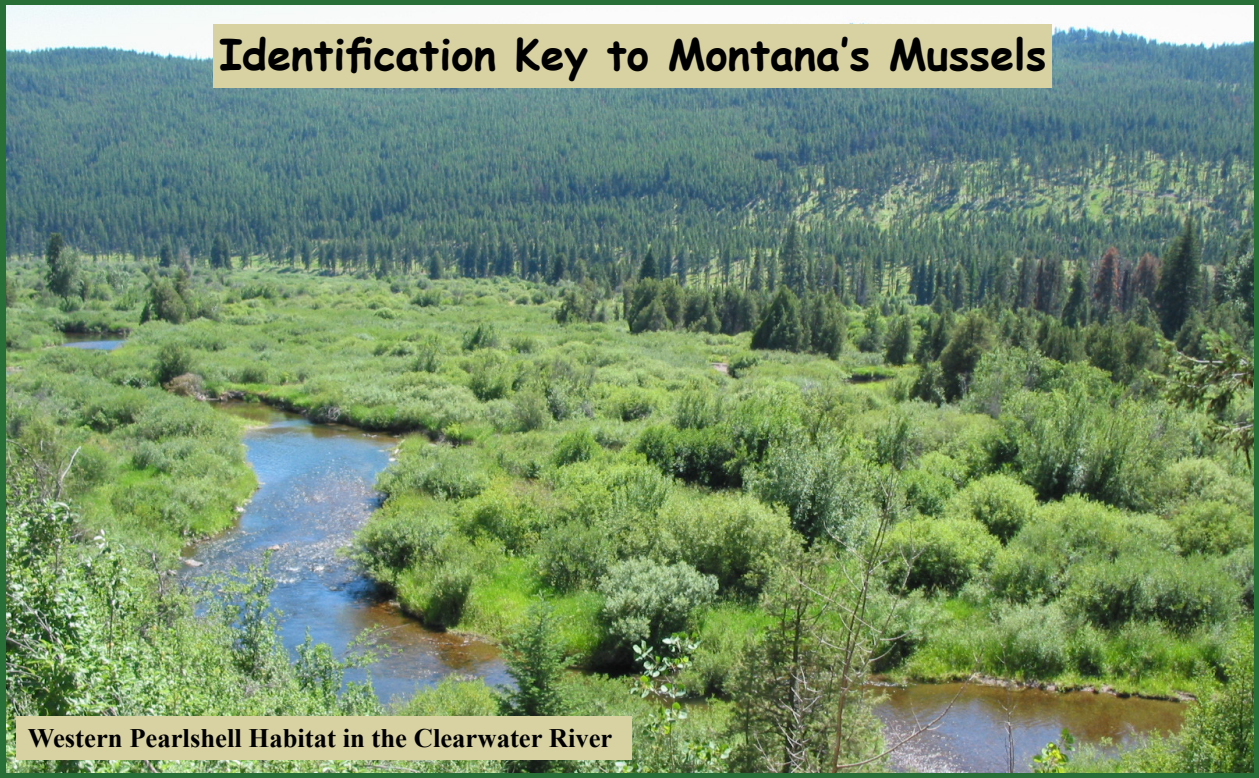


Example 1: Quadrat 1: 5 mussels visible/ 3 buried = 8 / 0.25 m^2
Quadrat 2: 9 mussels visible/ 4 buried = 13 / 0.25 m^2
Quadrat 3: 1 mussels visible/ 5 buried = 6 / 0.25 m^2
Quadrat 4: 5 mussels visible/ 0 buried = 5 / 0.25 m^2
Total = 32 / m^2 Average = 8 / 0.25 m^2

The B-factor (in this example= 12/20 or 0.60) can be applied to numbers of visible individuals recorded in upstream mussel beds to produce more realistic density estimates, thereby saving time, and reducing the number of excavations in a reach. If you visibly counted 25 mussels/ m^2 in the next bed, a more realistic estimate applying the B-factor is 40 mussels/ m^2 (25 * 0.6 =15 buried mussels). This estimate is the density within the bed; to apply it to a whole reach, you'd need average wetted width, total area searched and area of beds.

Example 2: A 50m reach of a 4m wide stream had one 5m^2 mussel bed of 40 mussels/ m^2 = 200 total mussels in the bed and 1 mussel / m^2 (200 mussels / 200 m^2).

Identification Key to Montana's Mussels

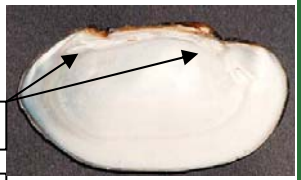


Western Pearlshell Habitat in the Clearwater River

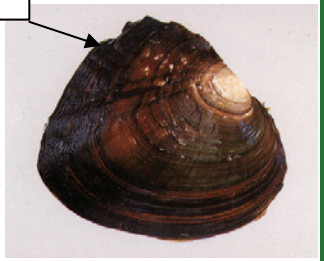
Key to the shells of Montana's Mussel Species

1. **Hinge without teeth, shell light-weight** (Native) ……..(Giant Floater) **Pyganodon grandis (Say)**

1'. **Hinge with teeth, shell heavier**..……2

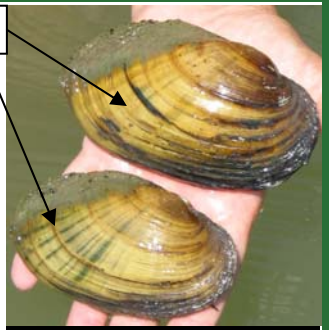


2. **Inside of shell white**



2a. Outside of shell dark brown to black, usually without rays, but with a dorsal wing (Introduced)…….. (Creek Heelsplitter**)** **Lasmigona complanata (Barnes)**

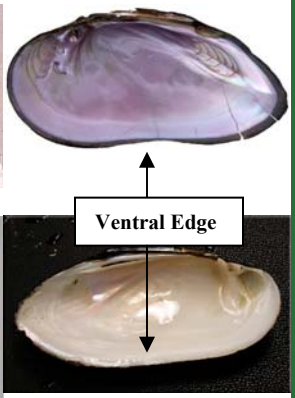
2b. Outside of shell light brown to tan, often with greenish rays & without a dorsal wing (Native)……. ……....(Fatmucket) **Lampsilis siliquoidea (Barnes)**



2c. Outside of shell light brown to tan, without green rays, but with radiating rows of pustules or ridges (Introduced)…… ……(Mapleleaf) **Quadrula quadrula (Rafinesque)**

2'. Inside of shell purple or pink……..……..……..……**3**

3. Ventral edge slightly concave, shell and teeth weak (Native) (Western Pearlshell) ……...**Margaritifera falcata (Gould)**



3'. Ventral edge convex, shell heavy and teeth strong (Introduced) (Black Sandshell) ……..…**Ligumia recta (Lamarck)**

Native Mussel Species Accounts

Giant Floater

Scientific Name: *Pyganodon grandis* (Say)

General Description: Shell is up to 6 inches across. Generally thin, elliptical and light weight. Hinge has no teeth - previously known as "Anodonta." Shell color is brownish to tan-yellow-green; inside is pearly-blue sheen.

Status: Native-Year-round resident - **G5 S4**
Abundance: Locally common, secure populations.

Primary Habitat: Prefers pool and side channel areas of small to large warm prairie rivers with a mud, sand or gravel substrate. In Montana, they can be found from permanent pools of small prairie streams to side channels of our largest river, the Missouri. This mussel is tolerant of silt and warm water temperatures.

Host Fish: Native species: Iowa Darter, Brook Stickleback and Channel Catfish. **Introduced Species:** Common Carp, Yellow and Black Bullhead, Centrarchids and Yellow Perch.

Key Watersheds: Within the Missouri, Milk and Little Missouri River drainages; more evenly distributed in the Northern Glaciated Basins (Battle Creek, Big Muddy Creek, Frenchman Creek, Poplar River, Rock Creek).

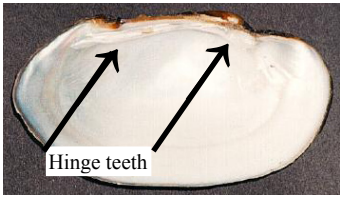
Fatmucket

Scientific Name: *Lampsilis siliquoidea* (Barnes)

General Description: Shell is 4 to 6 inches across. Generally heavy shell with large hinge teeth. Males tend to be thinner; females can be highly inflated laterally. Outside of shell can be light brown, yellowish to tan, often w /greenish rays; inside is white.

Status: Native-Year-round resident - **G5 S5**
Abundance: Locally common, secure, our most abundant species.

Primary Habitat: Prefer side-current areas, runs and pools of medium to large warm prairie rivers with pebble, gravel, sand or silt substrates. In Montana, they can be found as far upstream as the Three Forks of the Missouri River. This mussel is fairly tolerant of silt, cool and warm water temperatures.



Host Fish: Native species: Freshwater Drum, Channel Catfish, Stonecat and sturgeons. **Introduced Species:** Common Carp, Black Bullheads, Centrarchids and Yellow Perch.

Key Watersheds: Within the Missouri, Milk, Yellowstone and Little Missouri River drainages. Highest densities are found in the Missouri River Wild and Scenic reach from Fort Benton to Judith Landing. They are also numerous in the Lower Yellowstone and Musselshell Rivers.

Western Pearlshell

Scientific Name: *Margaritifera falcata* (Gould)

General Description: Elongate shell is normally 2.5-4 inches (50-80mm) in length with a concave ventral edge. An old specimen may be 5 inches (>100mm). Interior shell (nacre) has a purple to pink hue, especially in fresh specimens. Outside of shell can be dark brown to black with a whitish tan area where the umbo (dorsal hinge) has been worn down.

Status: **Native**-Year-round resident - **G3G4 S2S4**
Abundance: Regionally rare, locally common, but declining statewide.

Primary Habitat: Prefer stable gravel and pebble substrates in low-gradient trout streams and intermountain rivers. Found in runs and riffles in stable main-current channel areas. This mussel is intolerant of silt and warm water temperatures.

Host Fish: **Native species:** Westslope Cutthroat Trout, Bull Trout, Steelhead and Chinook Salmon (Idaho)
Introduced Species: Rainbow and Brook Trout.

Key Watersheds: Within the upper Missouri tributaries to the Beaverhead, Big Hole (Bloody Dick, Deep, and Grasshopper Creek), and Madison Rivers. Upper Clark Fork-Upper Rock Creek (Willow and Sand Basin Creek), Blackfoot-Clearwater Rivers, Thompson River, Kootenai-Yaak River (East Fisher, Little Wolf, and 5-mile Creek).

Introduced Mussel Species Accounts

In Mt, the Mighty Missouri River is home to 2 native and 2 introduced mussel species; 7 species are found in SD.

Black Sandshell

Scientific Name: *Ligumia recta* (Lamarck)

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General Description: Elongate, pointed shell normally 4-6 inches long with a convex ventral edge. A large, old specimen may be 7-9 inches (>16cm) in length. Shell interior (nacre) has a purple to pink hue, especially in fresh specimens. Outside of shell can be dark brown to black with a whitish tan area where the umbo (dorsal hinge) has eroded.

Status: Introduced-year-round resident - **G5 S4**
Abundance: Regionally rare (a species of concern S2 & S3 in many Midwestern states), locally abundant in Montana. Increasing distribution in the Missouri River basin.

Primary Habitat: Medium to large warm prairie rivers in riffles or runs with pebble, gravel or firm sand substrates. This mussel is fairly intolerant of silt and warm water temperatures.

Host Fish: Native Species: Sauger. **Introduced Species:** Centrarchids, Walleye and Yellow Perch.

Key Watersheds: In the Missouri, Musselshell and Milk Rivers, probably spreading upstream from a Fort Peck Reservoir introduction. Highest densities have been reported in the Missouri River Wild and Scenic reach upstream from Fort Benton to Judith Landing and the Milk River near Dodson to Malta.

White (Creek) Heelsplitter

Scientific Name: *Lasmigona complanata* (Barnes)

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General Description: Ovate shell rounded and laterally compressed, normally 4-6 inches long and about as high as long. Dorsal margin straight with a large wing (hence "Heel-splitter"). Outside of shell dark brown to black. Young individuals can have green rays (bottom photo). Shell interior (nacre) with a bluish-pearl to white hue.

Status: Introduced-year-round resident **G5 SU**

Abundance: Regionally common and locally abundant, increasing distribution in the Milk River basin.

Primary Habitat: Pools in medium to large sluggish prairie rivers with a mud, sand, or fine gravel bottom. Usually not found in stream reaches with swift current.

Host Fish: Native species: None. **Introduced Species:** Common Carp, Green Sunfish, Largemouth Bass

Key Watersheds: In the Missouri Basin, known only from the Lower Milk River upstream to Bjornberg Bridge and Beaver Creek, a tributary of the Little Missouri River. Outside of Montana this is a widespread species in the central part of the continent.

Mapleleaf

Scientific Name: *Quadrula quadrula* (Rafinesque)

General Description: Ovate shell thick and heavy, normally 3-5 inches long and about as wide as long. Outside of shell tan, "maple-syrup," (especially in younger individuals) to dark brown. Generally 2 rows of "bumps" pustules on raised ridges. Shell interior with thick teeth and a white hue (nacre).

Status: Introduced-year-round resident **G5 SU**
Abundance: Regionally rare, elsewhere common and locally abundant, distribution in the Missouri River basin.

Primary Habitat: Pools or runs in large prairie rivers or reservoirs with a mud, sand, or gravel bottom. It is usually not found in stream reaches with swift current.

Host Fish: Native species: Channel Catfish. **Introduced Species:** Yellow and Black Bullhead

Key Watersheds: In Montana, this species is known only from the Lower Yellowstone River and the Tongue River, a tributary of the Yellowstone. Point of Introduction: Tongue River Reservoir. Outside of Montana this is a widespread and abundant species in the Midwestern large warmwater rivers.

Watch for Exotic Nuisance Bivalve Species

Asian Clam
Corbicula fluminea

If you spot these exotic "mussel" species (really clams) anywhere in Montana's rivers or lakes please contact me or Eileen Ryce; Aquatic Nuisance Species Coordinator for Fish, Wildlife & Parks: (406) 444-2448.