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Researchers surveying Saginaw Bay Watershed for answers to underwater mysteries

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They found them on a recent Monday morning -- thousands upon thousands lying dead in their beds, with no sign of what killed them or when.

It's only the first of many mysteries researchers hope to unearth from the bottom of the Flint, Shiawassee, Cass and Tittabawassee rivers as part of a massive underwater search for Michigan's missing mussels.

The weeklong survey of freshwater mussel species in the Shiawassee National Wildlife Refuge was a joint research effort headed by federal fish and wildlife biologists.

The 9,500-acre refuge sits at the bottom end of the Saginaw Bay Watershed, Michigan's largest watershed. It's where all four rivers come together on their way out to Saginaw Bay in Lake Huron.

Anything that happens anywhere in that entire water system eventually ends up in the watershed -- from lawn fertilizers running into Kearsley Creek in Goodrich to dioxin contamination in the Tittabawassee River from Midland manufacturing plants.

The research team spent the last week of August in scuba gear, snorkels and waders, scooping clamshells from river bottoms at various points in the refuge's 18 miles of river.

The search of Flint River waters turned up a live lilliput -- state-listed as endangered and previously unknown in the Saginaw Bay Watershed -- and a live pink papershell, which is state-listed as threatened.

"Right now what we know the refuge's mussel population is pretty much a total blank slate," said refuge Manager Steve Kahl.

"In the first day our list of known species grew from five to 14. We know so little about what's here right now, by the end of this survey we'll be just getting to the point of knowing what questions to start asking."

Like the mysterious mass die-off of threeridge mussels discovered at the point where the Shiawassee, Cass and Tittabawassee converge.

The divers found plenty of live mapleleaf and giant floater shells -- species that thrive in similar conditions -- but every threeridge was long dead, some of the shells so old they crumbled like chalk when handled.

"Was it the water quality? Has the bottom of the river changed? We could be seeing the effects of a single event that happened decades ago. There might be no way to ever know for certain," said Kahl.

Flint Journal extras

What is a freshwater mussel?

• **Freshwater mussels**, also called Unionids or native clams, are bivalve animals that live in a hinged shell buried in the sediment of river and lake bottoms, filtering water for food.

• **Their larvae attach** to the gills or fins of a fish host, where they live until ready to drop off and develop into an adult clam.

• **They can live for decades**. Michigan has 45 species, more than one-third of which are state-listed as endangered, threatened or of special concern.

Invasive versus Native

• Native mussels are impacted by water quality and habitat loss due to factors including fertilizer run-off, dredging and soil erosion.

• Native clams are also under threat from invasive zebra mussels, which attach to their shells and cut off their ability to feed or reproduce. Zebra mussels have already wiped out native mussel populations in some areas of the lower peninsula.

Live mussels species found at the Refuge:

• mapleleaf

• pink heelsplitter

• white heelsplitter

• deertoe

• pink papershell (state threatened list)

• fragile papershell

• giant floater

• plain pocketbook

• lilliput (state endangered list)

• zebra mussel

• Asian clam

• paper pondshell

• threeridge (one specimen)

• fat mucket

• Wabash pigtoe

• mucket

• creeper

• black sandshell

• fluted-shell

• rainbow

• ellipse

Source: Shiawassee National Wildlife Refuge

Historically, North America was the world's "rain forest" for freshwater mussels, with more than 300 species of native clams. Today, 43 percent of those species are in danger of extinction.

In the Midwest -- once home to the most diverse collection of mussels in the world -- more than half the 78 known mussel species are listed as endangered, threatened or of special concern. More than one-third of Michigan's 45 native freshwater mussel species are state-listed.

So why should we care about a clam burrowed in a river bed, doing nothing more interesting in its 20-50 year lifespan than sitting in one spot filtering water for bits of algae and bacteria?

That's always the first question people ask, said biologist Tony Brady of the Wisconsin-based Genoa National Fish Hatchery.

As filter feeders, mussels are highly sensitive to contamination so they make ideal "canaries in the coal mine," alerting us to changes in water quality.

They also are an important link in the aquatic food chain, providing habitat for insects and crayfish and an important food source for a wide variety of animals.

"The good news is we're seeing live specimens under five years of age at almost every site. That's a good sign of a currently reproducing population," said Brady.

But their real significance may be something we won't even realize until they're gone -- like a rain forest plant whose petals hold a cure for cancer or a keystone species whose disappearance causes an entire system to collapse.

"Mussels tend to be an unglamorous, unrecognized group. But who's to say which species are the most important to save? They all have their different roles in the ecosystem," said U.S. Fish and Wildlife fisheries biologist Jim Boase.

"Sometimes it's the little things we ignore that tend to contribute the most. What don't we know about these mussels that could play a key role in our lifetime?"

Thus far, 21 live species and the shells of six other species have been identified in the research at the refuge. Once completed, the survey will be used for future mussel conservation and restoration plans.