



Benthic Macroinvertebrates Brief for Death Valley National Park



What are benthic macroinvertebrates?

Death Valley National Park is home to many iconic animals, from the desert bighorn sheep to the Devils Hole pupfish. But there are many smaller animals found only in the springs of Death Valley. These animals are benthic macroinvertebrates (BMI).

Benthic means they live underwater on the bottom of springs and streams. **Macro** means they can be seen with the naked eye, and **invertebrate** means they lack a backbone. Common BMI include insects, arachnids, crustaceans, worms, and snails.



Malaysian trumpet snail, Saratoga Spring
This snail is an invasive springsnail. Invasive species are not native to the location they are found in, and can often outcompete native species for their resources.



Dragonfly larvae collected by MOJN I&M
This larvae is only about 1/2 inch long. It lives and grows underwater in the benthic zone of springs until it emerges to live its adult life in the air.

Why are Death Valley benthic macroinvertebrates special?

Death Valley is home to at least a dozen endemic BMI, meaning they are found in the park and nowhere else in the world! One of the largest BMI is the Saratoga belostoman bug (*Belostoma saratogae*), a water bug that lives only in Saratoga Spring. These bugs are commonly called toe-biters, although our field crew can tell you they nibble on fingers as well. Other endemic BMI only live in a few springs near Furnace Creek. For example, two insects we typically find at these springs are the Nevares naucorid bug (*Ambrysus funebris*) and the Nevares riffle beetle (*Microcylloepus formicoides*). In addition to insects, there are also several species of springsnails found only in Death Valley. The Badwater snail (*Assimineia infima*) is the size of a grain of sand and lives in several springs in the park, including the small pools visible from the parking lot at Badwater. Although the pools are hot during the summer and full of dissolved salt, the Badwater snail has adapted to survive and thrive in these extremely harsh conditions.

Saratoga
belostoman bug
This bug, nearly 1 1/4 inches long (one of the largest BMI in Death Valley), is found only in Saratoga Spring.



Nevares
naucorid bug
This little guy is small enough to fit on your pinky nail and is found in only a few springs near Furnace Creek.

How does MOJN I&M monitor benthic macroinvertebrates?

As part of our Selected Large Springs monitoring, the Mojave Desert Network Inventory & Monitoring Program (MOJN I&M) collects BMI samples every two years from five springs in Death Valley National Park. To collect samples, we use nets to scoop up benthic material (the sediment surface at the bottom of the spring) at multiple areas across each spring. Then, we sort through the material in trays and put the BMI we find into jars for preservation. At the end of each field season, we send our preserved BMI samples to the [Utah State University BugLab](#) for identification. They send us a report back containing data about the diversity, abundance, and richness of each sample.

By collecting samples at the same five springs every two years, we stay up to date on the amount and variety of BMI species living in the springs. This data allows us to keep track of changing BMI populations over time, which can tell us if the overall health of the spring is improving, declining, or remaining stable.



MOJN Hydrologic Technician, Michael Steiner, uses a net to collect benthic material at Saratoga Spring.

Why are benthic macroinvertebrates important?

Certain types of BMI are considered to be indicators of good water quality and spring health:

- Three types of insects (mayflies, stoneflies, and caddisflies) are particularly sensitive to pollution and disturbance. If we find their larval forms in a spring, we know that overall water quality is good.
- The presence of species with long life cycles, such as riffle beetles and diving beetles, tells us that water quality and habitat conditions are stable.
- Dragonfly and damselfly larvae, which are predatory species, keep food webs in balance by serving as both predator and prey in aquatic systems.
- Some BMI circulate spring water that may otherwise be stagnant, causing the cycling



Tools we use to collect BMI samples

of nutrients in the water.

Because BMI are confined to spring bottoms and cannot escape stressful environments, we can be confident that their presence reflects the conditions of the spring.

Unfortunately, many BMI populations are threatened. In the past, humans have diverted water at these springs, drying up many of their habitats. The introduction of non-native species, such as aquarium fish, has also displaced native species from their habitats and reduced their numbers.

MOJN I&M monitors BMI to detect changes in abundance and diversity that might indicate a decline in spring health. For example, if we start seeing fewer mayfly larvae and more midge larvae, which are more tolerant of pollution and poor water quality, we can go back to the stream and look for any factors that might be stressing the environment and the animals living there.

Where does MOJN I&M monitor benthic macroinvertebrates in Death Valley?

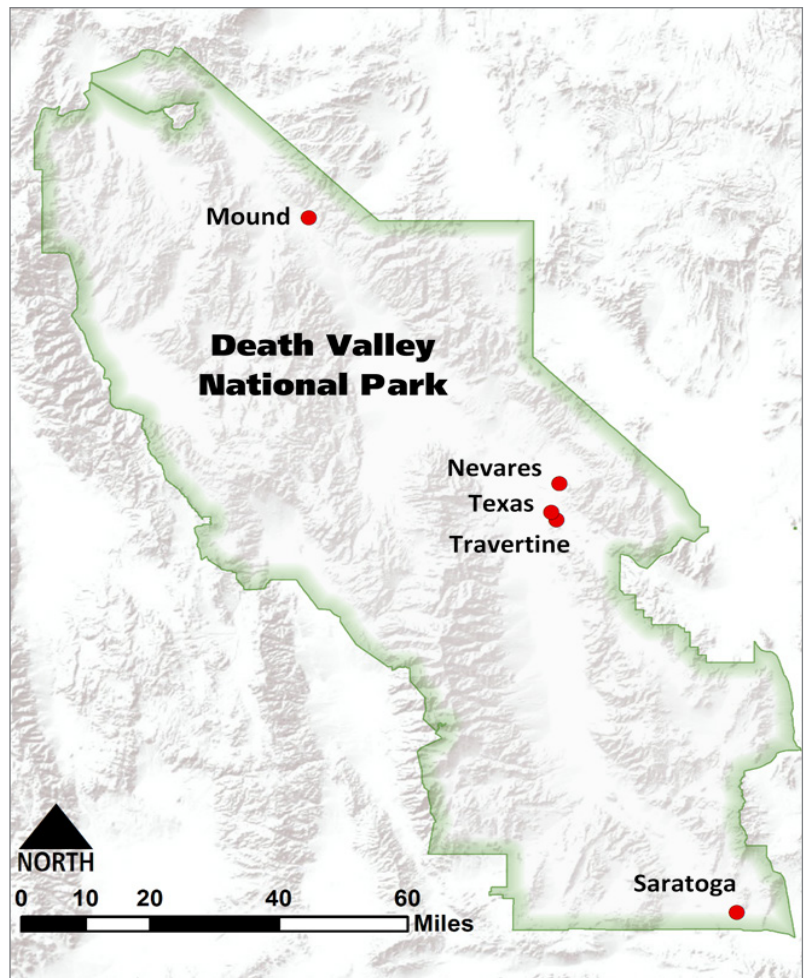
The five springs in which we monitor BMI across Death Valley National Park are Mound Spring in the northern area of the park; Nevares, Texas and Travertine to the eastern side; and Saratoga Spring located at the southern edge of the park.



MOJN Hydrologic Technician, Jennifer Bailard, separates soil sediment to find BMI by running the collected sediment through a mesh strainer.



MOJN Hydrologic Technician, Carissa Wilkerson, searches strained sediment for BMI at Nevares Spring during the 2017 field season.



Interested in learning more? [Click here to read the 2014-2015 Selected Large Springs BMI and Springsnail Data Report for Death Valley National Park](#)