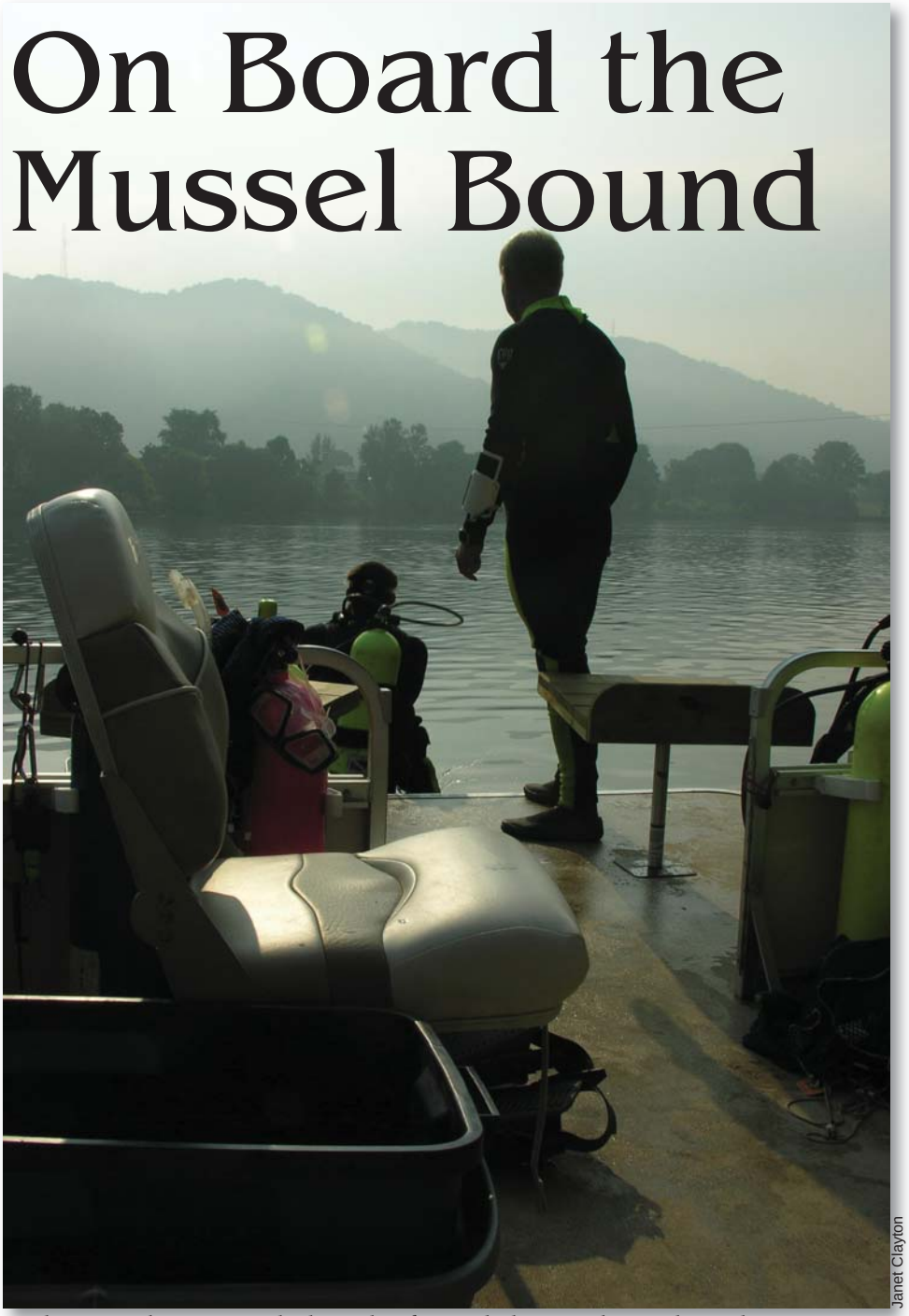
On Board the Mussel Bound



Janet Clayton

Early morning hours are standard procedure for DNR biologists on the Mussel Bound.

By Janet Clayton

On any given summer morning, biologists with the Wildlife Resources Section Wildlife Diversity program are pulling up wetsuits and strapping on scuba gear getting ready for another day of working underwater. As divers and support staff cluster towards the front of the *Mussel Bound*, the DNR's new research boat, mist rises off the river. After a few last minute instructions, the divers drop backward into the water. The search for mussels continues.

The *Mussel Bound* is a fitting name for the 24-foot pontoon boat because the DNR is *bound* to conserve and restore mussel populations within the state's streams. The boat provides a stable platform for scuba divers searching for mussels as well as ample space to carry personnel and equipment needed to process samples and record data during surveys on the state's large rivers.

Previously, mussel work on large rivers such as the Kanawha and Ohio was limited, and relied upon U.S. Fish and Wildlife Service equipment or boats borrowed from the Wildlife Resources warmwater fisheries unit. Funds for the purchase of *Mussel Bound* were provided by the U.S. Army Corps of Engineers as part of a mitigation package related to upgrading the locks at the Marmet Dam on the Kanawha River. The lock upgrade will increase navigation traffic which in turn will have significant impact on the aquatic resources in the Marmet Pool.

The goal of the mussel program is to conserve and restore mussel populations in the state's streams and rivers. To do this, biologists must first determine the number, type and location of mussel resources. Over the last two years, much of the work has focused on the Kanawha River where WRS personnel have been systematically surveying the entire Marmet Pool to determine the status and distribution of remaining mussel populations. As of this past summer, preliminary surveys have been conducted in nearly three quarters of the pool.

Surveys involve stretching a transect line from one shore of the river to the other and marking it into 10-meter (approximately 10-

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Funds were provided by the U.S. Army Corps of Engineers as part of a mitigation package related to increased navigation on the Kanawha River.

yard) segments. An area approximately one meter wide is searched for mussels along this line. Biologists record data separately for each 10-meter segment. This allows researchers to map the distribution of mussels throughout the pool. Of over 60 transects surveyed thus far, only two were found completely devoid of mussels. Those two lines only spanned a portion of the stream due to the active barge loading facilities nearby.


Jim Walker

Mussels from Pennsylvania's Allegheny River were collected for transportation to the Monongahela River to enhance West Virginia populations.

These surveys produce some fascinating results, such as finding the extremely rare spectaclecase mussel. This species was first observed in West Virginia in 2002 and is still only known from the Marmet Pool. Several more individuals have been observed in the last two years. The endangered fanshell mussel was also found nearly 17 miles downstream of its most recently known location in the free-flowing section of the river below Kanawha Falls. One fanshell was found near Watson Island within a fairly large mussel bed which consisted mainly of the elephant ear mussel, another species declining throughout much of its range.


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DNR technician Mike Everhart wearing an audio diving mask, uses a gravelometer to measure the size of rocks in the streambed then relays information to surface.

Not only are biologists searching for mussels, but also for suitable mussel habitat. The process can be painstaking. Components of the streambed in designated transects are recorded for size -- from pea-size gravel to large boulders. This is done using a gravelometer, which is nothing more than an aluminum frame with various sized holes corresponding to various sized groups of gravel and cobble. The smallest hole through which each pebble will fit is recorded. Silt and sand are graded by touch, and rocks over 7.1 inches are measured and grouped into size classes of large cobble, boulders or bedrock. Because it would be impossible to record this information underwater with paper and pencil, it is communicated to a data collector on the surface by means of a specially designed diving mask that has a microphone and ear piece. These measurements provide an accurate description of available mussel habitat.


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DNR biologist Craig Stihler keeps in constant communication with the diver.

Another part of this project consists of increasing the mussel populations within the Marmet Pool through artificial propagation. The DNR has contracted the U.S. Fish and Wildlife Service National

(Continued on next page)


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In the pan are threehorn wartyback, pink heelsplitter, pocketbook, black sandshell and fluted shell mussels.

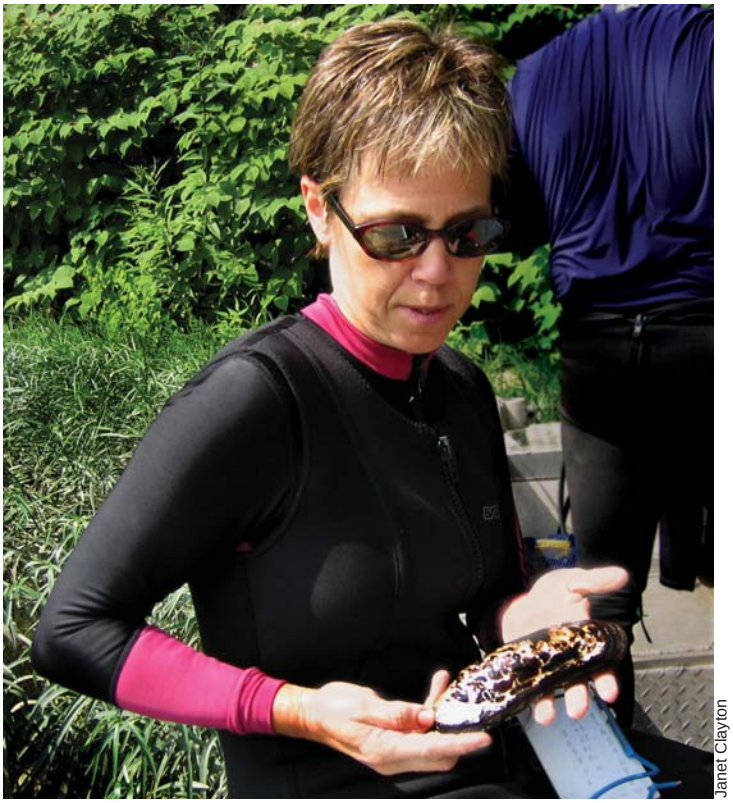
Why Study Mussels?

West Virginia at one time supported as many as 63 native species of freshwater mussels in its streams and rivers. Of this number, two are now believed to be extirpated (locally extinct), and five are on the federal endangered species list. In addition, two introduced alien species may threaten native populations.

Our mussels require very high water quality to survive. Reductions in dissolved oxygen levels or increases in pollutants, acidity or sediment quickly kill off entire mussel beds. We study mussels because they are part of our state's rich diversity of life, but from a more practical perspective, they serve the role of the coal miner's canary in assessing the health and safety of state waters. Mussels are the early warning system that tells us when something goes wrong in our streams. Mussel populations are recovering in many of our river systems, but we still experience huge die-offs from pollution events.


Siphoning mussel

--Walt Kordek



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USFWS biologist Janet Butler shows an extremely rare spectaclecase mussel found in West Virginia only in the Marmet Pool of the Kanawha River.

Fish Hatchery at White Sulphur Springs to propagate mussels for restocking areas selected by the Wildlife Resources Section. The chosen sites have optimal mussel habitat but low population densities -- areas that would benefit most from restocking.

Only in recent years has artificial propagation of mussels been successful. Mussels have a unique life cycle in which their young or larvae (glochidia) attach to fish and live as a parasite on the fish for several weeks. To propagate mussels, one must first find a pregnant female mussel which has the larvae brooding in its gills. The mature glochidia are flushed from the gills and suspended in a water bath into which host fish are placed. The glochidia then infect or attach to the fish. The fish are held in tanks until the larvae mature into juvenile mussels. In six to eight weeks the larvae fall off the fish. This year, WRS personnel stocked over 33,000 mussels less than a week after their transformation into juveniles. Nearly 4,500 two-month-old juveniles were also stocked.

Some mussel species require host fish which are difficult to maintain in the hatchery, so WRS fisheries

Mussel Love 101

Freshwater mussels have a most unusual means of ensuring species survival. It is of great survival advantage for a species or an individual to distribute its young over a wide area. That way, if part of the population succumbs to a disaster, others elsewhere will survive to carry on. There are a wide range of familiar dispersal mechanisms that plants and animals use to distribute their young or their seeds over a wide area--parachuting dandelion seeds, spores that disperse on the wind, and mammals that drive their young away so they can populate other areas. However, mussels have evolved a mechanism to distribute their young that makes most other dispersal strategies appear boring. Here's the scoop on the reproductive strategy of one group of mussels.

When a pregnant female mussel is ready to release her young into the world, she opens her shell and wiggles or shakes worm-like or bait-fish-like appendages to attract larger fish. Actually she is fairly picky and only selects from a few species of fish. The choosiest mussel species are interested in only a single fish species. As the target fish draws close to the attracting mussel, she expels a cloud of larval mussels (glochidia) into the face of the curious fish. The cloud of baby mussels flows over the fish's gills and many glochidia find a place to attach themselves.

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The wavy-rayed lampmussel has modified mantle flaps which mimic food of the host fish.

The young mussels live in a non-damaging parasite-host relationship on the fish's gill for six to eight weeks and mature into miniature versions of their mom. While they mature the host fish wanders much more widely than the parent mussel could ever hope to do. Eventually the mussel drops off, sinks to the bottom and, if conditions are right, may start a new mussel bed far from where the parent mussel lives.

This host fish/mussel relationship has evolved in one native species to even a higher level. In a mussel species called the snuffbox, the parent mussel attracts the host fish and, rather than releasing a cloud of glochidia, it actually closes its shell over the head of the fish and holds it while it injects a stream of mussel larvae onto the gills.

To see this remarkable process in action go to: www.wvdnr.gov/Wildlife/Mussels.shtm

Walt Kordek

Dick Esker

DNR and U.S. Fish and Wildlife Service biologists, from left, Janet Clayton, Janet Butler, Julie Devers, Patty Morrison and Mike Everhart on board the Mussel Bound.

biologists collected wild fish by electrofishing. These were then infected with glochidia and released directly into the Marmet Pool. The juvenile mussels fall off the fish as they swim through the pool, hopefully landing in suitable habitat.

Mussel populations are also being enhanced in the Monongahela and Elk rivers as the result of a bridge demolition project in Pennsylvania. This past year WRS biologists obtained adult mussels that were being relocated from an area on the Allegheny River where a bridge was being torn down. Working with the Pennsylvania Fish and Boat Commission, WRS staff brought over 2,100 mussels of 11 common species back to the Monongahela River for stocking between Morgantown and Fairmont. This area once supported large and diverse populations of mussels, but they were decimated by pollution -- primarily acid mine drainage. The river appears to have recovered and has become suitable for mussels once again. However, because the pollution was so widespread, mussels were no longer found nearby. This created the need for reintroducing mussels, rather than relying on natural dispersal.

Another species, the rayed bean mussel, was also collected from the Allegheny River and relocated to the Elk River above Clendenin. Even though 24 species of mussels are still known from the Elk, this species had been exterminated during the last decade. DNR biologists now hope to re-establish it.

Surveying, monitoring and reintroducing new mussel species in the rivers and streams of West Virginia has come to a close because the water is too cold. The *Mussel Bound* has been put into storage, awaiting another season of service in conserving the state's important mussel populations.

Janet Clayton is a wildlife biologist stationed in Elkins.

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DNR biologist Jeff Hajenga sorts through the dive bags filled with collected mussels.

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Diver Mike Everhart holds a plastic jar filled with baby mussels that will be reintroduced in the Kanawha River.