

Kansas Pearly Mussel Newsline

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Successful stocking of Neosho mucketts in the Fall and Verdigris rivers

Chris Barnhart, Southwest Missouri State University

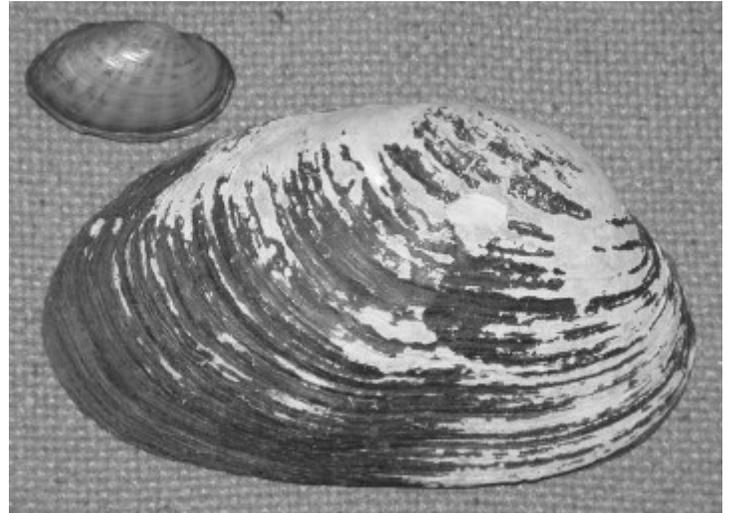
The *Kansas Pearly Mussel Newsline* is published on an occasional basis by the Kansas Dept. of Wildlife & Parks, and includes topics about freshwater mussels and other aquatic critters.

Brian K. Obermeyer, Editor
Edwin J. Miller, Associate Editor
Karen J. Couch, Illustrator

Native mussels once paved the bottom of rivers in incredible numbers, filtering the water and providing habitat

and food for other animals. The present plight of many rare and threatened species, such as the Neosho mucket, belies their reproductive potential. A female mussel produces millions of larvae over a lifespan of decades. This huge output compensates for enormous odds against survival. Only a tiny fraction of larvae will ever reach the correct species of host fish, and only a fraction of these will land on suitable habitat when they leave the fish. Although these bottlenecks in the life cycle can limit mussel reproduction, they also provide opportunities for biologists to augment and restore populations.

In Missouri and Kansas, we have been trying to help Neosho mucketts and a few other species through the bottlenecks in their life cycle. With funding from the U.S. Fish and Wildlife Service and Missouri Department of Conservation, and the cooperation of many persons, we transformed larval mussels on fish at Chesapeake State Fish Hatchery in Missouri, and released juvenile Neosho mucketts at sites in the Fall River and Verdigris River in Kansas, and Shoal Creek in Missouri. Approximately 52,000



Neosho mucketts were released in Kansas in 1999 and 2000. The number sounds large, but all of these would have fit in a thimble. At the time of release, each was about the size of a grain of table salt!

Brian Obermeyer and Ed Miller recently found proof that stocking of Neosho mucketts is working. Raccoons had easy access to mussels this past fall and winter because of low water levels, and performed useful fieldwork by leaving behind the shells of mussels that they ate. Brian and Ed found fresh shells of young Neosho mucketts at two release sites. Nine were recovered in the Fall River Wildlife Area and 18 at a release site on the Verdigris. The Fall River site lacked Neosho mucketts before being stocked in 1999 and 2000. The Verdigris site was stocked only in 2000. All of the recovered shells are 4-6 centimeters long. Hopefully, there are hundreds of others at these sites. We plan to survey a third release site in Missouri this spring, and to carry out further releases this summer. Our success is among the first nationally, and was reported in March at a national workshop on mussel propagation.

These are the first young Neosho mucketts that we have ever seen in Kansas. Surveys over the past decade in the Fall, Verdigris, and Neosho rivers have yielded only mature individuals, mainly old adults. Only 12 Neosho mucketts were found among 7,416 mussels sampled in the



Verdigris River between 1991 and 2001. Survey work by Brian Obermeyer indicates that this species has been lost at 34 of 79 sites and 5 of 9 streams in which it formerly occurred in Kansas and Missouri. According to Susan Rogers (U.S. Fish and Wildlife Service), these losses and the lack of recruitment led to designation of the Neosho mucket last year as a candidate for federal listing as threatened or endangered.

Why are mussels declining? Will the propagated individuals be able to reproduce and sustain populations? Natural recruitment of Neosho muckets is apparently failing in many rivers, but the few surviving adults still produce larvae, and we now have evidence that the juvenile mussels can survive. One possible factor limiting natural recruitment is the availability of host fish, probably primarily spotted bass and smallmouth. The abundance of bass may relate to still other factors. There are many problems facing mussel populations, and certainly propagation is a stopgap measure. Our ability to prevent extinctions and to restore the natural fauna of our rivers is completely dependent on restoring and protecting the health of the environment.

Edward O. Wilson has written that life is passing through an ecological bottleneck. Over the next few decades, human population and pressure on the environment will peak. On the other side of the bottleneck, hopefully, we will reach a more harmonious balance with the earth. However, not all species will survive to reach the other side. Our actions to preserve species now are crucial, because there will be no second chance if we fail. Public support for conservation, and responsible stewardship of private lands, are critical if we are to preserve the natural world and its living inhabitants for our children and the generations to come.

Recent and historical changes in the molluscan fauna of Kansas

Robert T. Angelo and M. Steve Cringan, Kansas Department of Health and Environment

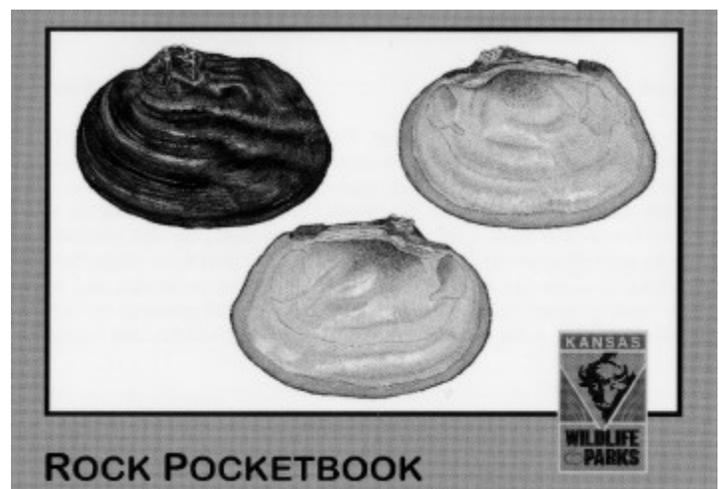
Changes in the distribution and abundance of freshwater mollusks in Kansas were examined by comparing information from archeological studies and historical biological surveys with data from recent field investigations, including stream biological monitoring operations implemented over the past two decades by the Kansas Department of Health and Environment. At least two viviparid snail and three unionid mussel species were extirpated from the state during the late nineteenth century, coinciding with the conversion of native prairie to cropland and with the attendant, heavy siltation of many

grassland streams. Populations of another gill-breathing snail and several other mussels declined during the first half of the twentieth century, apparently in response to the destruction of suitable stream habitats, pollution of surface waters, elimination of appropriate fish hosts for larval mussels, commercial shellfish harvesting, and other factors. In recent decades, populations of some native aquatic mollusks have continued to decline, whereas colonies of the exotic Asian clam, *Corbicula fluminea* (Müller, 1774), have become firmly established in streams and reservoirs throughout the state. Eight taxa of native aquatic mollusks are now considered extinct in Kansas, and some individual streams support less than half their original complement of mussel species. State regulations currently list thirteen species of mollusks as threatened or endangered and an additional twelve as "species in need of conservation." Ultimately, the recovery of these species will depend on society's willingness to mitigate environmental damages to streams and watersheds caused by nearly two centuries of urban, industrial and agricultural development.

(Abstract of presentation given at the 133rd Annual Meeting of the Kansas Academy of Science, the University of Kansas, Lawrence, Kansas, April 7, 2001)

Freshwater mussel identification cards

The Kansas Department of Wildlife & Parks (Environmental Services) is distributing freshwater mussel identification cards to the public. These have the same design and format as the popular Joe Tomelleri fish ID cards. The mussel ID cards feature 11 endangered and threatened Kansas mussel species. The artwork for the cards is from Karen Couch's "An Illustrated Guide to the unionid Mussels of Kansas". Ed Miller provided biological and distribution information for each species on the back side.



Neosho mucket recovery team

Susan Rogers, US Fish & Wildlife Service, Arkansas

In October 2001, the Neosho mucket (*Lampsilis rafinesqueana*) was elevated to federal candidate status by the U.S. Fish and Wildlife Service (Service) due to the decline of the species across its range. In anticipation of this elevation and in response to the species' decline, the Neosho Mucket Recovery Working Group was formed in July 2001. This working group was formed to begin coordinating recovery efforts for the species. Because the Neosho mucket's range overlaps four states, as well as four regions of the Service, the number of people involved in the recovery of the species had the potential to become unwieldy, and a coordinated effort was needed to keep everyone informed. In addition, it was important to ensure that efforts were not duplicated needlessly between various states and institutions working on the species. The group met in Neosho, Missouri, and consisted of members of various state and federal agencies, universities, non-governmental organizations, and private individuals.

The working group has undertaken the rather large task of developing a conservation plan for the species that will serve as a road map for the recovery of the species. The plan will prioritize conservation efforts according to the severity and scope of the stresses to the species at particular sites. Brian Obermeyer is working on adapting The Nature Conservancy's site conservation planning workbook to help the group achieve this goal. This workbook helps the user identify stresses, sources of stress, and conservation activities necessary to relieve these stresses. The conservation activities are then prioritized in terms of ease of implementation and effectiveness. The working group will use the prioritized tasks to develop the conservation plan. The plan will help guide the efforts of group members, as well as provide an overall context of the specific tasks to be accomplished. Many conservation and recovery efforts have already begun by Chris Barnhart, Brian Obermeyer, Sue Bruenderman, Andy Roberts, and others, and their efforts along with the energy of the working group will help to recover the Neosho mucket.

Delta hydrobe: a newly discovered snail in Kansas

Robert T. Angelo and M. Steve Cringan, Kansas Department of Health and Environment

The delta hydrobe, *Probythinella emarginata* (Küster, 1852), is a small (≤ 5 mm) gill-breathing snail found in lakes and perennial streams throughout much of eastern North America. It usually occurs at depths of 1.5 m or more in association with submerged aquatic vegetation or gravel, sand, mud, or marl substrate. Like many other

members of the family Hydrobiidae, this snail is relatively intolerant of sedimentation, organic enrichment, and elevated surface water temperatures. The discovery of the delta hydrobe in a given stream or lake often signifies an uncontaminated water body receiving continuous hydrological inputs from cool-water springs and seeps.

In the Great Plains, the delta hydrobe is abundantly represented in the Pleistocene fossil record but only rarely encountered alive. Sediments deposited by the ancestral Cimarron and Smoky Hill rivers in Kansas have yielded numerous fossils of this gastropod. Fossil specimens have also been recovered from Pleistocene deposits along the Fall River in southeast Kansas and from various other locations in the central and southern plains. Several streams in Iowa and Missouri historically supported large populations of the delta hydrobe, and some of these water bodies continue to maintain viable colonies. Historical records also exist for sites in Nebraska, Oklahoma, and Texas, but the current status of these populations is uncertain.

On June 28, 2001, Steve Cringan and Jim Fry, KDHE, collected three live specimens of the delta hydrobe from Cedar Creek, a spring-fed tributary of the Cottonwood River in Chase County. The identity of these immature specimens, each measuring 1.5 mm, was confirmed by Robert Hershler of the National Museum of Natural History. This discovery represented a new faunal record for Kansas but was not entirely unexpected. Water quality measurements and macroinvertebrate surveys performed by KDHE over the past decade have consistently ranked Cedar Creek among the state's least contaminated and most biologically diverse aquatic ecosystems. Outside the state, the nearest recent locality for the delta hydrobe is in Osage County, MO, approximately 400 km east of Cedar Creek.

Future surveys of springs, spring-fed streams, and artesian marshes in Kansas may lead to the discovery (or rediscovery) of other indigenous aquatic gastropods. For example, the mud amnicola, *Ammicola limosus* (Say, 1817), was abundant and widespread in the central plains during the late Pleistocene and survived in Kansas until at least the turn of the twentieth century. A few small creeks in Wabunsee County were among its last known strongholds in the state. These streams have not been systematically surveyed in recent decades, and the mud amnicola may still occur in the county or surrounding area. Further efforts to document the remaining populations of the mud amnicola, the delta hydrobe, and other relict snail species would contribute significantly to our knowledge of the state's natural history. The concomitant study of the aquatic habitats supporting these animals would also enhance our understanding of the environmental conditions prevailing in this region in the historic and prehistoric past.

Lowhead dams and freshwater mussels

David Edds, Emporia State University

Although the effects of large dams on freshwater mussels (i.e., habitat degradation and decreased species richness) have been well established, the effects of lowhead dams (0.4 - 3 m in height) on mussels are poorly known. During August and September, 2001, the Stream Ecology class at Emporia State University (Joe Dean, Dave Gillette, Jeri Howard, Steph Sherraden, and Jeremy Tiemann) studied the effects of lowhead dams on freshwater mussel assemblages in the Neosho River, Kansas, by performing timed groping searches along transects and by searching haphazardly along a 100 m stretch at two sites each of four site types (i.e., upstream reference, upstream treatment, downstream treatment, and downstream reference) centered around two lowhead dams. They collected from four to 11 species of mussels at the eight sites, and a total of 13 species overall. Analysis of variance indicated a significant difference in species richness but not abundance among site types. Upstream treatment sites (inundated areas) had significantly fewer species than upstream reference sites, likely due to the lake-like conditions created by the dams, with deeper water, lower current velocity, and silty substrates. These sites only had four species: threeridge, white heelsplitter, bleufer, and mapleleaf. Mean abundance was not significantly lower at treatment sites, despite a decrease in Wabash pigtoe, creeper, and fawnsfoot, as the result of an increase in abundance of white heelsplitter. Despite the relatively small number of sample sites in this study, these data suggest a negative impact of lowhead dams on these freshwater mussel assemblages.

Freshwater Mussel Assemblages in two channels of the Neosho River

Stephanie Sherraden, Emporia State University

In the 1800s, the Neosho River naturally split south of St. Paul, Kansas, forming an island between a new and old channel. The new channel became dominant around 1950, and the old channel now only receives flow when the main channel has a flow of at least 300 cfs. During summer 2001, I sampled mussels at 26 sites in these two channels by groping from bank to bank along a 100 m reach. I found 20 species in the old channel and six in the new channel. Mussel species adapted to lotic systems might perish as the old channel changes to a lentic system. Mussel richness, abundance, and diversity were all greater in the old channel than the new channel. The old channel appears to have better habitat than the new channel, which is mostly bedrock. However, the old chan-

nel receives flow for only part of the year and consists of mostly silt substrates. The Neosho mucket, found in the old channel by Brian Obermeyer in 1994, may be extirpated from this channel. However, the threatened butterfly and seven species in need of conservation were present in the old channel. State listed mussels in the old channel may have to be relocated in order to avoid extirpation.

Graduate student projects as SMSU

Several graduate students are carrying out projects related to Kansas pearly mussels at Southwest Missouri State. Melissa Shiver is completing her thesis on the reproductive biology of Neosho mucklets. A surprising finding is that Neosho mucklets spawn in the spring, whereas all other related species that have been studied spawn in the fall. Angela Delp is investigating rhabdocoel flatworms as predators on juvenile mussels. Grad student Shannon Bigham is studying the host relations of ellipse mussels in the Spring River. Nathan Eckert, who graduated from Southwestern College in Winfield, is working on host relations of the western fanshell.



Above is a rainbow darter next to a Ouachita kidneyshell female releasing glochidial packets. Photo courtesy of Chris Barnhart.

Unionid mussels of the Walnut basin River basin, Kansas

Amanda K. Reed, Wichita State University

In 1980, Rose Hacker assessed the abundance and diversity of unionid mussel species inhabiting the Walnut River Basin, Kansas. The results of her study showed evidence that 18 species of unionid mussels were living

in the Walnut River Basin at that time. In 2001, a reassessment of the abundance and diversity of the unionid mussels living in the Walnut River Basin was made, using similar sampling methods. The results of the present study show evidence that there are only 8 species of unionid mussels currently living in the basin. These results suggest that the freshwater mussels existing in the Walnut River Basin are greatly reduced in species diversity.

(Abstract of presentation given at the 133rd Annual Meeting of the Kansas Academy of Science, the University of Kansas, Lawrence, Kansas, April 7, 2001)

Iowa State Research shows decline in Iowa mussel populations

A century ago large freshwater mussel, sometimes called clams, were so abundant in Iowa's waterways that the state was a world center for mussel diversity, and home of a lucrative shell industry. But an Iowa State University study shows a dramatic decline both in Iowa's freshwater mussel population and in the number of mussel species found in the state's interior rivers and streams.

The study looked at 118 stream sites where mussel counts were done in 1984-85 and repeated 15 years later. In the first count, there was an average of a little more than five species found at each site with a maximum of 22 at one site. The average fell to just less than two species with a maximum of 12 in 1998. Sites with no living mussels increased from 6 percent in the first count to 47 percent in 1998. A few sites showed slight increases.

"We knew mussel populations were declining worldwide, but the rates of decline we've seen in Iowa are alarming," says Kelly Arbuckle, the former graduate research assistant in the Iowa State Animal Ecology Department who traveled around Iowa to do the mussel counts.

"Other scientists have projected 123 of the 297 known species of mussels will be extinct within the next century," says John Downing, the Iowa State animal ecology professor who directed the research. "These local declines are how these extinctions occur."

Downing says mussels are important because they help keep freshwater bodies clean and clear. "They feed on particles that are suspended in the water. Under some conditions, a single mussel can filter all the particles out of several quarts of water each hour," he says. As a result, mussels also are indicators of stream health.

The researchers found the number of mussel species declined least dramatically at sites where wooded stream banks shaded the streams. And mussel biodiversity was lower in rivers with higher levels of agricultural nutrients such as nitrogen and phosphorus.

Downing says the survey indicates land-disturbing activities near streams adversely impacts mussel habitat and therefore, mussel communities. But a number of other factors also may be involved in the decline, such as mussel harvesting, the availability of host fish (mussel larvae attach to host fish during development), stream flow rates and sedimentation.

The research was funded by the Iowa Department of Natural Resources (DNR). Marion Conover, chief of the DNR's fisheries bureau, agrees many factors are involved. "Mussels are relatively long-lived and have a complex life cycle, so the factors causing the rapid decline experienced in the 15 years studied may have been set in motion many years ago," he says.

Conover says the agency would like to establish reference sites to monitor mussel populations on a regular basis. "We will be moving forward to list additional species on our threatened and endangered list, plus proposing rules that prohibit taking mussels for catfish bait or general interest," he says. "With additional funding, we would like to look at ways to recover species through reintroduction."

The Iowa State researchers, Arbuckle and Downing, say the study provides valuable tools for use in future mussel conservation and restoration work.

(Reprinted from ISU press release)

2001 mussel harvest summary

Tom D. Mosher, KDWP

During 2001, the Kansas Department of Wildlife and Parks sold nine resident mussel harvester permits, one non-resident harvester permit, and three mussel buyer permits. This is only one third the number of permits sold during 1999, and reflects the pessimistic demand and poor market value of the shells.

Musselers reported harvesting approximately 1,834 pounds of mussels in Kansas during 2001, as only one permit holder harvested shells. This represents nearly a 92% decrease from 2000. Harvest was restricted to 635 pounds of mapleleaf mussels (*Quadrula quadrula*) at Fall River Reservoir, and 1,040 pounds of mapleleaf mussels and 159 pounds of threeridge mussels (*Amblema plicata*) at Toronto Reservoir.

Based on 2000 prices, the 2001 harvest was valued at approximately \$2,140.00.

Although three individuals who purchased dealer permits in 2001, only one recorded any purchase. The other dealers purchased permits solely for their own activities. The most active buyer in past years did not purchase a permit in 2001 because of the uncertain market and low values.

KDWP review of mussel regulations

Tom D. Mosher, KDWP

The Kansas Department of Wildlife & Parks last reviewed and made significant changes to mussel regulations in 1992. Because of a number of concerns and issues related to mussel conservation, the Kansas Department of Wildlife & Parks is reviewing all mussel regulations.

As part of that review, we will consider several options to address the issue of commercial harvest. These options include, but are not limited to the following:

1. To make no changes and maintain current mussel regulations;
2. To close the commercial mussel harvest season for a period (5-10 years) to allow populations to recover (current regulations, 115-17-6 through 115-17-9, and 115-17-14 would remain, but the Department would not issue harvest permits);
3. To eliminate commercial mussel harvest in Kansas;
4. To close commercial mussel harvest in streams but not federal reservoirs.

In addition we will consider options to address the issue of certain limited uses of mussels that are currently regulated as commercial harvest, such as artwork. Questions that need to be addressed relating to this issue include, but are not limited to:

1. Whether using mussels for craft and artwork should be considered commercial use, or whether these activities should be included within the five mussel possession limit for non commercial purposes, and governed by regulation 115-17-15.
2. If crafts and artwork should be classified as commercial use, whether these activities should be governed by commercial harvest permit regulations or exempted from commercial regulation.
3. Whether mussels and mussel shells should be defined separately concerning commercial harvest and commercial use of mussel shells.

The Department will also explore if we need to better define how the non commercial use of mussels will be addressed within regulation 115-20-2.

Sampling results from last summer's mussel workshop

One stream site was sampled for freshwater mussels last summer during the Kansas Pearly Mussel Workshop. Ed Miller led a group to a Neosho River site south west of Iola in Allen County. Special thanks goes to Mr. James Miller for granting permission to sample. This site was sampled in 1982 by Charlie Cope and in 1994 by Brian Obermeyer. The number of threeridge has apparently dwindled. During last summer's survey less than 5% of mussels examined were threeridge, whereas twenty percent of the total was threeridge in 1994. Conversely, the percentage of monkeyface has increased from 34 percent in 1994 to 53 percent in the 2001 survey. See table for results.

River: Neosho River		
Landowner: James G. Miller		
GPS: N37.87276° W95.45754°		
Date: 10 August 2001		
Legal: T 22S R18E S17 (NW 1/4), Allen County		
Flow: low; 75cfs		
Search time: 1800 minutes		
CPUE: 24.1 mussels/hr		
Participants: Bob Angelo, Ken Brunson, Bill Busby, Diana Chamberlain, Brandon Chance, Chris Hase, Leonard Jirak, Greg Kramos, Jim Mason, Tim Menard, Ed Miller, Ben Mulhern, Bridgette Mulhern, Dan Mulhern, Bill Stark, and Curtis Wolf.		
Comments: Total mussels = 724 of 19 species. Rare finds were rabbitsfoot (Greg Kramos) and fluted shell (Leonard Jirak).		
Species		Live
threeridge	<i>Amblema plicata</i>	34
butterfly	<i>Ellipsaria lineolata</i>	8
spike	<i>Eliptio dilatata</i>	40
Wabash pigtoe	<i>Fusconaia flava</i>	44
plain pocketbook	<i>Lampsilis cardium</i>	22
Neosho mucket	<i>Lampsilis rafinesqueana</i>	17
fluted shell	<i>Lasmigona costata</i>	1
fragile papershell	<i>Leptodea fragilis</i>	12
washboard	<i>Megaloniais nervosa</i>	17
threehorn wartyback	<i>Obliquaria reflexa</i>	3
round pigtoe	<i>Pleurobema sintoxia</i>	1
pink papershell	<i>Potamilus ohioensis</i>	2
bleufer	<i>Potamilus purpuratus</i>	14
rabbitsfoot	<i>Quadrula cylindrica</i>	1
monkeyface	<i>Quadrula metanevra</i>	387
pimpleback	<i>Quadrula pustulosa</i>	33
mapleleaf	<i>Quadrula quadrula</i>	3
creeper	<i>Strophitus undulatus</i>	1
pistolgrip	<i>Tritogonia verrucosa</i>	84

2002 Pearly Mussel Workshop

The 8th Kansas mussel workshop has been set for July 25 and 26, 2002. Unlike previous years, the first day of the workshop will be the field day portion of the workshop. We will meet at the Marais des Cygnes National Wildlife Refuge Headquarters at 10:00 am before dispersing for field work. The second day will be held at the Fort Scott Community College, and will include presentations about mussels and other aquatic topics. There will be a mussel identification session at the conclusion of presentations.

If you have a presentation you'd like to share for Friday's session, please be sure to contact either Brian Obermeyer or Ed Miller. A meeting agenda will be sent out in late-June to those persons on the *KS Pearly Mussel Newsline* mailing list. We hope you all can make it!

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