



Oh, Shenandoah, they long to heal you

By Val Van Meter, *The Winchester Star*

Instructions

Read the following newspaper article and answer the questions below in complete sentences.

...The Boyce resident, in his second year as the Shenandoah's first "riverkeeper," was formerly a fishing guide who took visitors out on the stream in search of smallmouth bass and other game fish. But, massive **fish kills** in 2004 and 2006 have stripped the Shenandoah of the fish that brought the fisherman. "It's painful to watch what's happening to the fish," Kelble said. "We may have lost half a million fish."

In addition to massive die-offs, which litter portions of the river with floating bodies, investigations have found fish with body lesions, fin rot, and **intersex**, a condition in which male fish develop female eggs in their reproductive organs. The only good thing to come of the fish kills, which have apparently stripped the river of red-breasted sunfish and 80 percent of the older smallmouth, is that the state, several universities and many private organizations have banded together to find the cause or causes for the problem. This is the Virginia Fish Kill Task Force.

Kelble outlined the many ailments that plague the Shenandoah, which the group has discovered in its investigation of the North and South Forks and the main stem of the river. Each in itself could stress the fish, he noted. In 2002 and 2006, droughts lowered the river's flow, he said. The river is also subject to rapid changes in water temperature. It can be under ice in February and 75 degrees in May, he said. In the past 30 years, Kelble said, the river's average temperature has risen by three degrees Celsius, with no corresponding increase in air temperature. Ammonia levels, which can suppress immune response in fish, have also risen, and so has pH. "The effects of ammonia are worse in a system with high pH," Kelble said. Lesions and fungus found on many fish testify to immune systems which are disrupting or failing. The fish can't fight off external enemies such as fungus and **bacteria** or internal **parasites**. "Fish outside this watershed don't have this parasite load," Kelble said. Many fish sampled have spleens that look like Swiss cheese, and gill hairs that have fused together, making them inoperative.

Then there are the chemicals. **Industrial pollution**, mercury, and **PCBs**, have contaminated the river for years. Kelble said he could not recommend eating fish from the river. They should "light up like a Christmas tree," he said. But recent tests show a variety of drugs taken by humans are ending up in the river, because of the many **sewage treatment** plants that empty into it. Such over-the-counter products as **acetaminophen** and ibuprofen, or prescription codeine and steroids, turn up in chemical tests, along with many synthetic **estrogen** compounds. The intersex found in almost all male fish tested could be because of exposure to high levels of estrogen. Other problems include sedimentation-from runoff from development and agriculture-which affects fish "nesting" to produce the next generation and bottom-dwelling organisms in the **food chain**.

Scientists have found many stressors in the river, Kelble said, but "no smoking gun." "I think there may be multiple causes," he said. "We're really dealing with a water quality problem. If we fix what we know is wrong, this thing is going to go away. But, he added, that means getting cooperation from many people: Developers and farmers must consider **sediment** issues. Sewage treatment plants must find ways to take chemicals, including medical chemicals, out of treated water. And agriculture must curb the over application of fertilizers and the buildup of **phosphorus**. "We need political will to fix this, and money," Kelble said. He praised the array of



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groups trying to solve the puzzle, including the FOSR, which has decades of data from twice-a-month sampling of the river and its **tributaries**. The work is done solely by volunteers who sample some 90 sites. The information is available to the public through the “Water Window,” sponsored by another volunteer group, Pure Water Forum...

Reading Comprehension Questions

1. What is meant by die-offs? What does intersex mean? _____

2. What are possible causes of the fish kills in the Shenandoah? _____

3. What suggestions are made in the article to deal with water quality problems? _____

4. Summarize the article in 50 words. _____
