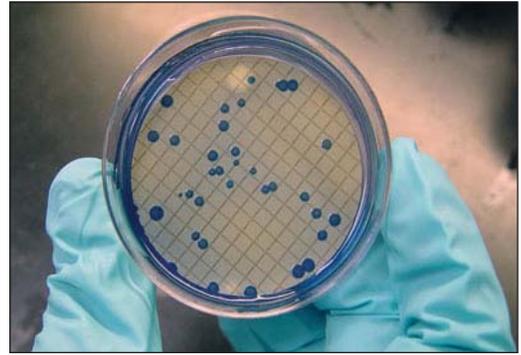


Living Downstream: Atrazine and Coliform Bacteria Effects on WaterQuality—A Debate Case

by

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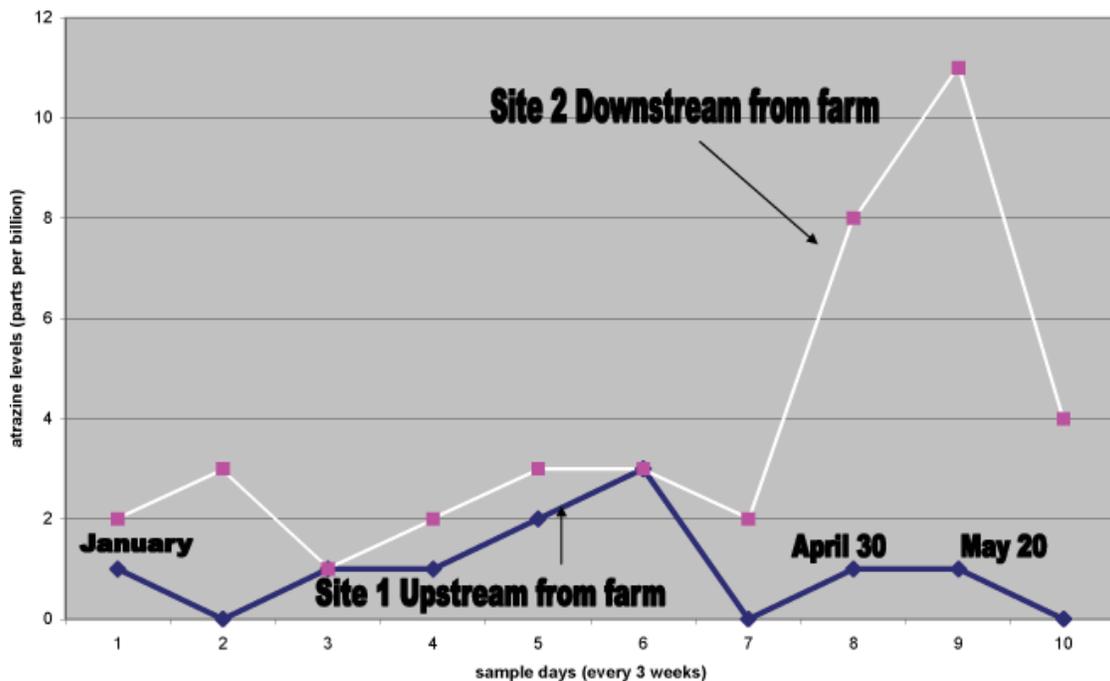


The Problem

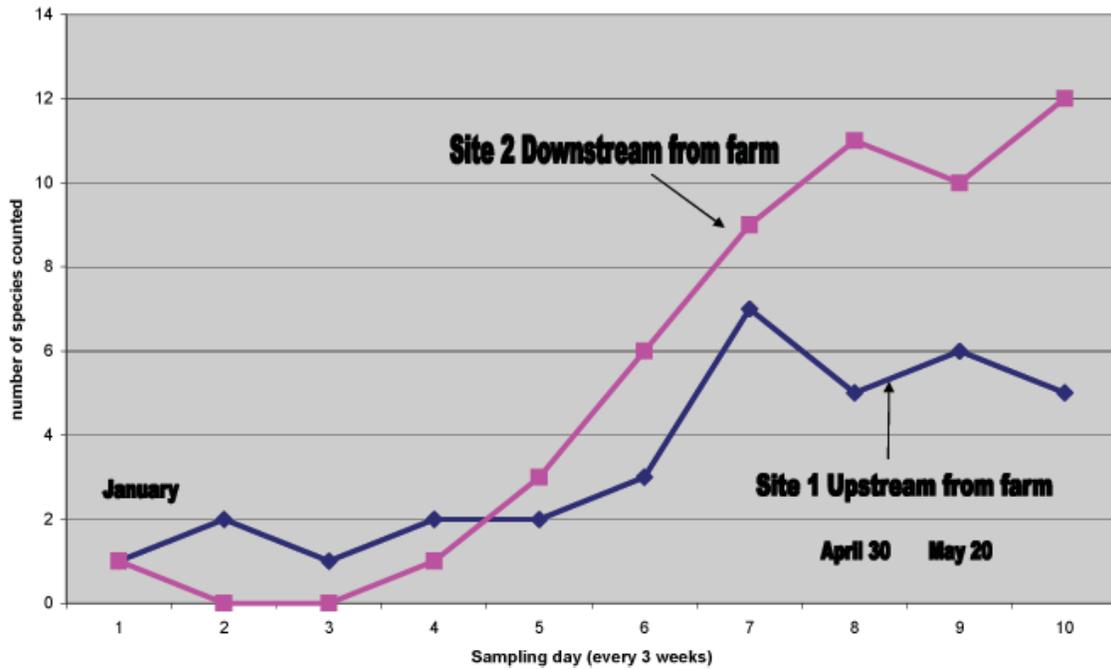
Here are the facts: Recent water samples show high levels of fecal coliform bacteria and atrazine in the Turkey River, which flows through the Milford property. Levels were high on two consecutive sampling days three weeks apart. A hearing has been called by the County to investigate how this happened, what the possible effects are on aquatic life in the river, and what can be done to prevent it from happening again.

Data shown below on levels of fecal bacterial levels, atrazine levels, and macroinvertebrates have been collected every three weeks by a water quality sampling team.

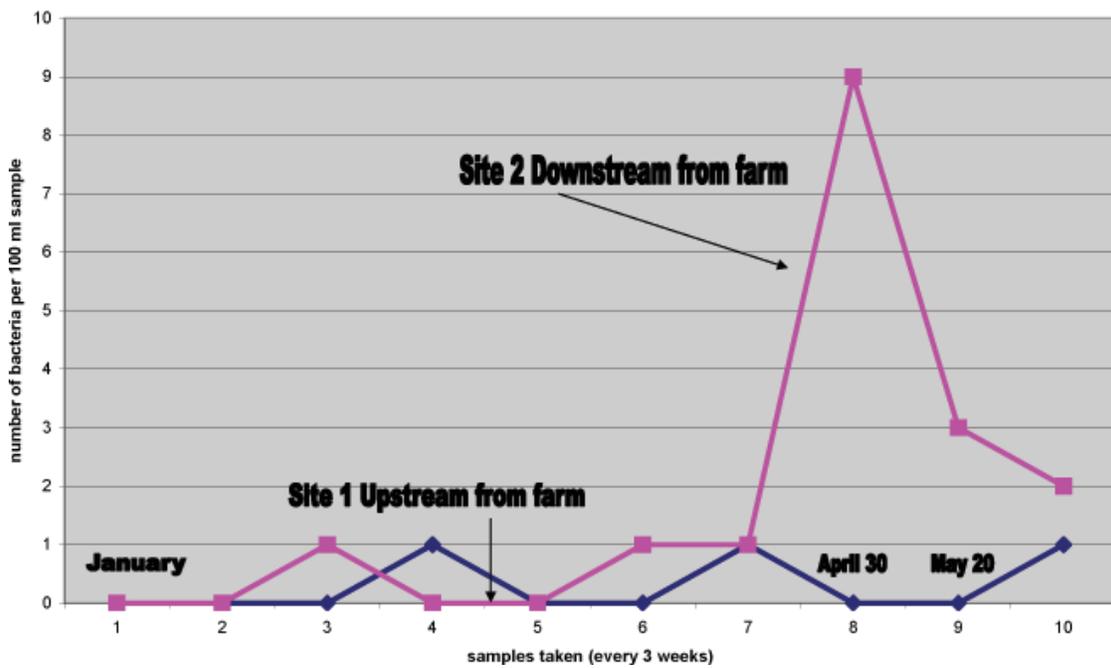
Atrazine levels in Turkey River



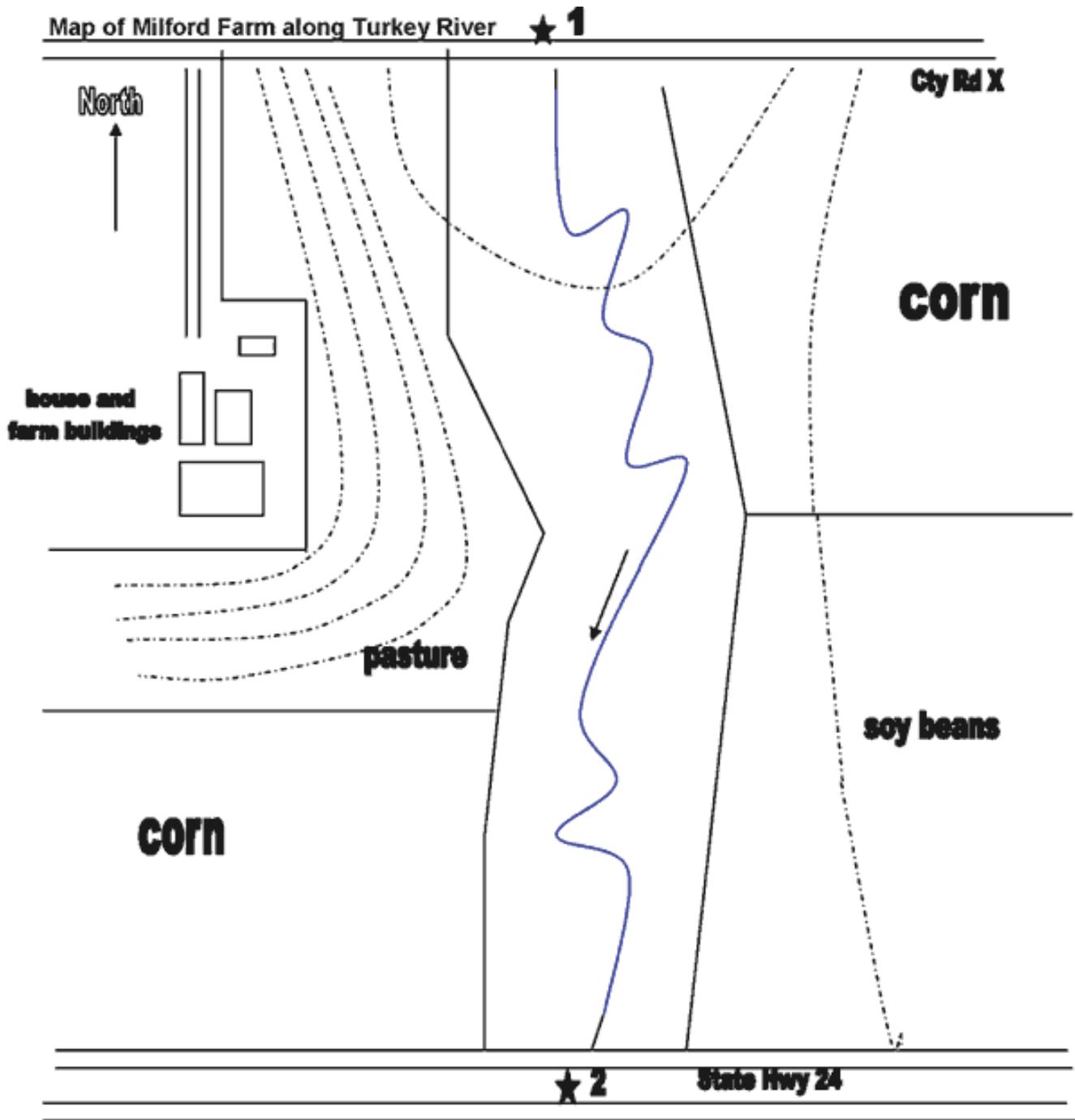
Species Richness of Aquatic Macroinvertebrates in Turkey River



Fecal Coliform Bacteria Levels in Turkey River



As shown on the map below, County Road X goes across the north end of the property and the 4-lane state highway (Highway 24) traverses the southern end of the farm, thus allowing sampling access from public land on highway right-of-ways.



Dotted Lines are 20 ft contour lines; house and buildings sit up on a hill above the river; solid lines are fences; land on both sides of river has been planted with switchgrass as a buffer strip; stars indicate sampling sites – #1 is upstream from farm, #2 is downstream

This sampling process has been going on for eight years and has used similar sampling sites further upstream and downstream, each of which have not shown any problems with high levels of atrazine or fecal bacteria.

Up to this point there have been no effects of these levels on the brook trout population, which has a unique self-reproducing population in the Turkey River above and below the Milford property. Most trout found in local streams are stocked by the state's Department of Natural Resources.

The debate will center on discussion of the meaning of the data, their source, what might have changed to cause elevated levels, and what the effects of these levels are on aquatic life and human life downstream. It will include the viewpoints of a number of stakeholders including the landowner's rights to apply atrazine to control weeds as well as the role of fisheries biologists and a water quality specialist to address the problem and future implications of high levels of bacteria and atrazine in the Turkey River.

The two sides of the debate are represented by:

Side A—Fisheries biologists and local water quality program coordinator (and assistant).

Side B—The landowners, atrazine salesperson, and county supervisor.

The Roles

Brad and his assistant Brenda — Iowa Dept. of Natural Resources and State of Iowa fisheries biologists

Samantha and her assistant Lou — Local water quality monitor program coordinator and her assistant

Ben and Sandy Milford — Landowner and his wife

Mary — County Supervisor, head of zoning board

Suzie — Atrazine salesperson

Resource / Background Information

Fisheries Biologists

As fisheries biologists with the state, with Master's degrees in Fish Ecology, you have experience in developing fish habitat in streams and know what levels of certain pollutants can do to brook trout and macroinvertebrates. Be prepared to play the personality of your role: Be a conservationist; be concerned and informed (you should know about the effects of chemicals on land and aquatic organisms); be stubborn; use your past outdoor field experience to help answer questions and present data. Try to make the landowners feel guilty that this contamination has occurred in a stream that many people have put time and money into to make it prime habitat for brook trout.

Resources

Effects of fecal coliform bacteria on fish and aquatic life:

<http://www.water-research.net/Watershed/fecalbacteria>

<http://ga2.er.usgs.gov/bacteria/qanda.cfm>

Water Quality Monitor Program Coordinator

The water sampling program and budget you oversee are sponsored by the Friends of the Turkey River and the National Wildlife Federation; you have a BS in Water Resources and an MS in Natural Resource Management. Be prepared to play the personality of the role: Be a conservationist; be concerned and informed (you should know about the effects of chemicals on land and aquatic organisms); be stubborn; use your past outdoor field experience to help answer questions. Don't be afraid to show other data from other sites that show how fecal bacteria and atrazine have had negative effects on stream biology.

Resources

Fecal coliform bacteria and water quality:

<http://www.state.ky.us/nrepc/water/wcpfcol.htm>

Atrazine effects on water quality:

<http://muextension.missouri.edu/explore/manuals/m00167.htm>

Landowners

The Milfords, Ben and his wife Sandy, are farmers; they currently have 250 pigs and 50 stock cows. They raise soy beans and corn. They use some fertilizer and atrazine herbicide, which has helped them produce high yield corn and beans for many years. They say they have respect for the land. Sandy does the bookwork and orders supplies. Both have agriculture degrees. Advice: Play the personalities of your roles. Be farmers: be independent; skeptical; best way is your way; stubborn (of course I want to protect the quality of the land, but I need to feed my family too); ask other people to explain background of their data.

Resources

Farming practices to improve water quality:

<http://www.farmland.org/programs/environment/default.asp>

County Supervisor

Mary, the County Supervisor, owns property adjacent to Mr. Milford but rents all of the land to some other farmer. She is an absentee landowner and lives in town 25 miles away. She is more concerned about the monetary value of her land and its crops than its ecological value. She is concerned about the high levels of these chemicals in “her” stream, but also knows that there are costs of doing business and tries to defend her “fellow” landowners in their actions.

Resources

Absentee landowners:

<http://www.absenteelandowners.org/info-for-landowners>

Atrazine Salesperson

Suzie knows all the facts about the successful use of atrazine in the past. She is aware of its danger to aquatic animals at higher levels and is also aware of the best ways to apply it safely; she has a BA in Business. Suzie is known to get a bit testy when atrazine is described as a deadly chemical and its use is, in her view, unnecessarily criticized. She adamantly defends the use of atrazine as a safe, economically important herbicide that helps farmers be successful.

Resources

Atrazine information:

<http://www.epa.gov/waterscience/criteria/atrazine/atrazinefacts.html>

<http://extoxnet.orst.edu/pips/atrazine.htm>

Image Credit: Photo of Roberts Creek (northeast Iowa) where USGS scientists conducted a study of atrazine degradation. Courtesy of U.S. Department of the Interior, U.S. Geological Survey Toxic Substances Hydrology Program.

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