How To Maintain A Healthy Pond

By Peter V. Fossel

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It might be pushing things to call our farm pond a "pond," because you can't actually see much water in summer. What you see instead is algae, weeds, and bullfrog eyes.
"You don't have a pond, you have a wetland," says Fred Snyder, district specialist with the Ohio State University extension service, "and if that works for you, you're in business."

It doesn't work for many people, however, so Snyder's services are highly sought after by those who want their ponds "fixed."

"The main problems ponds have are too many weeds, too much algae, and not enough oxygen in summertime," he says. Depleted oxygen causes fish to die.

To keep a pond healthy, you've got to do several things, he says. The first is to reduce weed growth by eliminating nutrient sources such as lawn or farm fertilizer, livestock manure, or septic tank leachate (liquid produced by water trickling through the waste).
"Pond weeds are a natural process, but we speed it up with fertilizer runoff," he explains.

"Autumn leaves are a double-whammy if you have trees around the pond," he says. Falling leaves contain 60 percent of the nutrients a tree takes in during a year, he explains, so those nutrients now feed pond vegetation. In decomposing, leaves also take up dissolved oxygen, thus competing with fish for the oxygen supply. This results in more nutrients to feed even more pond weeds.

"It's a natural ecosystem," Snyder says. "Mother Nature wants plants in a pond. People don't. There's been a change in our mindset since the days of bullfrogs on lily pads. Now people want ponds to be like a swimming pool, with crystal clear water full of 5-pound bass. But you can't have both."

To eliminate the shallow water where weeds thrive, a pond should have relatively steep sides and good depth. A good slope is 1 foot down to every 3 feet across, and Snyder recommends that 25 percent of the pond be more than 8 feet deep - both for fish habitat and weed reduction.

Oxygen depletion causes fish kills in summer because oxygen is less soluble in warm water, which is exactly when fish are most active and need more oxygen.
"Learn to spot the problem," Snyder says, "because if it's serious, it's immediate, and you have to act. You don't have time to price-shop for an aerator."

Farm Pond Maintenance

Caring for your farm ponds properly will ensure they remain a healthy, well-balanced water source. Learn how to prevent and troubleshoot some common pond problems to keep your ponds in good shape for years to come.

Ponds are a water source for livestock, a place to gather with friends and family, a relaxing addition to an already scenic view, and a potentially endless source of recreation and food.

Ponds aren't just passive bodies of water. They are living, breathing ecosystems that change not just as the seasons change, but as they age. Young or old, every pond is different, and each one needs to be tended like a garden. The plant communities, the fish, the frogs and turtles and bugs, even the water itself are all in a constant state of change. Left alone, that change could result in a gradual decline in health.

"It's a rare pond that doesn't need some sort of care, especially older ponds," says Penn State Extension Water Resources Coordinator Bryan Swistock.

Choked with weeds

One of the most common problems is an overabundance of vegetation, either in the water or around the edge of the pond itself. Submerged or emergent aquatic vegetation by itself isn't necessarily bad. In fact, not only can aquatic plants add to the beauty of the water, they can benefit a variety of fish and wildlife and even the water quality itself. Shoreline vegetation, like cattails, catches sediment before it makes it into the water. Submerged vegetation, like pondweed and elodea, helps remove excess nutrients, resulting in clearer water.

The problem, says Swistock, is that many aquatic plants never stop spreading, and eventually swallow the shoreline or the entire body of water itself. Cattails can grow so thick they actually block easy access to the pond. Hydrilla, a non-native, highly invasive plant, can grow a foot or more per day. Left unchecked, it forms a dense, unsightly mat on the surface, making boating and fishing nearly impossible.

"The first thing you need to do is positively identify what's growing in or around your pond," says Swistock. "There are a number of good resources on the internet to help identify aquatic plants. You can also send a picture to your local extension office. If they don't have an expert on hand, they'll certainly know who to contact to get answers."

No matter what plants are growing in or around your pond, there are a number of ways to keep emergent and submerged aquatic vegetation in check. The simplest way is to use an herbicide, but make sure it's made specifically for ponds. Glyphosate-based products, among others, are harmful to fish and other aquatic organisms. Read the label before applying any chemical.

"Some chemicals only control specific types of plants, also, so it's important to know what you have before you start applying any chemicals, and whether that herbicide will control the plants you want to control," says Swistock.

If you don't want to use any chemicals, a handful of natural methods have shown good results. Cutting, raking, and pulling by hand can be an effective way to reduce or remove unwanted plants. Manual control can be

labor-intensive, especially if the weeds are abundant. Swistock also warns that cutting can actually make the problem worse.

"Some plants will actually grow from pieces, so if you cut one plant into many little pieces, you've just created a lot of plants that could spread to new areas," says Swistock.

Cutting or pulling aren't necessarily realistic in large ponds, which means you'll have to use chemicals, or grass carp. These non-native fish are available through licensed fish farms and are a common tool in aquatic weed control. They won't eat lily pads, cattails, and other above-surface vegetation. Nor will they eat filamentous algae. The thick, green, hair-like mats of filamentous algae are a common sight in some ponds in the summer. Like other plant life, filamentous algae can be raked out and tossed into the garden, but that's a temporary solution. In addition, pulling by hand may be a monumental task in larger, deeper ponds.

Coping with algae

"Some algae is actually beneficial to the health of a pond. It's the base of the food chain. A lot of pond owners in the South actually fertilize ponds to stimulate algae growth, which feeds the bottom of the food chain and can result in better fish populations. Unless you want what's essentially a swimming pool, you don't want to completely eliminate algae from your pond," says Swistock.

Too much of a good thing can lead to serious issues, though. A sudden die-off of a large amount of algae can deplete a pond's oxygen levels, and this can lead to a fish kill. Excessive algae also results in unsightly and foul-smelling water. No one wants to swim in a pond of "pea soup."

It's certainly possible to rake or otherwise manually remove filamentous algae, but suspended microscopic algae can't be controlled by hand. That is, you can't rake it or otherwise remove it from the water. Grass carp don't eat it, but blue tilapia do. A common food source now found throughout the world, tilapia are also becoming more popular as a biological algae control.

Check your state's biology regulations before you stock tilapia, though. Because they're native to parts of Africa and Asia, some states won't allow private citizens to stock them. What's more, tilapia aren't tolerant of cold water and will typically die when the water falls to the mid-to-low 50s, making them a poor choice for northern ponds. Check with your state fish and wildlife office to find out if tilapia are an option.

If you stock tilapia, you'll not only see a reduction in algae, you'll be able to net fish for dinner. (They're difficult, if not impossible, to catch on a baited hook.) They grow rapidly and will reproduce as frequently as every 30 days. Baby tilapia are outstanding forage for the bass and catfish in your pond. The fish you don't eat can be converted to fertilizer, giving your soil a tremendous boost of nutrients.

Other methods, like chemical treatments and dyes, can also decrease the algae in a pond. Some pond owners have used barley straw to reduce algae growth. Scientists aren't exactly sure why barley straw prevents algae blooms, but various research has shown it to be fairly effective. It won't control filamentous algae, and adding and then removing it can be labor-intensive.

Like tilapia, though, barley, dyes, and even chemicals are only temporary fixes. You'll be fighting algae for the life of the pond if you don't get to the root cause.

Find the source

That root cause is almost always an excessive amount of phosphorous, nitrogen, or both. Find that source and reduce or eliminate it.

"One of the most common sources of those nutrients is from fertilizer, either from a lawn surrounding the pond or from a nearby agricultural operation. Fertilizer on crops or manure runoff can put a very high level of nitrogen and phosphorous in the water, which feeds the algae," says Swistock.

Preventing those nutrients from getting into your pond can be as simple as reducing or eliminating the use of fertilizer on the land directly around the pond, or as difficult as creating buffer strips along feeder streams. A strip of unfertilized vegetation adjacent to a stream or even along the pond itself can trap nutrients before they reach the water.

"Another option is to build a small, deep pond upstream from your main pond. That can trap sediment and reduce the level of nutrients that reach the main pond," says Swistock.

Drastic solutions

In the most extreme cases, you might need to drain, dredge, and refill the pond. Years of sedimentation can shrink a pond. So can decades of leaf litter and layer upon layer of dead aquatic vegetation. The muck created by decaying plant matter can result in a cycle of excessive nutrients that can only be solved by removing that muck.

There are biological tools that can work. Beneficial (and harmless) bacteria can be added to a pond to "eat" the muck. However, products such as MuckAway are expensive and can take months to have any impact, and they may never catch up to decades of accumulated organic debris on the bottom.

"Adding an aeration system is another viable solution. By oxygenating the entire water column, you help the good bacteria break down the muck where it might not be able to without adequate oxygen," says Swistock. "Diffused aeration is best, but surface aeration from a fountain can work in certain situations, as well."

Dredging and aerators may seem like an expensive fix, but when you consider all that your pond gives you, that cost is a little less painful. After all, that body of water down the hill from your house isn't just a nice addition to the view. It serves as a bond between you and your family and friends. It's a source of food and a place to relax and get back to nature. Take care of it, and it will take care of you.

Manage the Fish

Whether your pond is a source of food, a place to cast for trophy-sized bass, or a little of both, the fish need to be managed. Although every pond is different, there are some general rules that help create a healthy fishery. In most situations, that management includes removing fish, lots of them. Sunfish and crappie in particular are prolific breeders and can overpopulate a pond in just a few years if left unmanaged. An overabundance results in slow growth rates and thinner fish.

Although there are formulas for how many fish of various species to keep, Virginia Department of Game and Inland Fisheries biologist John Odenkirk says there are too many variables to use any concrete numbers.

"It depends on the water quality, the size of the pond, even the goals you hope to accomplish," he says. "One general rule is to keep 5 pounds of prey fish, like bluegills, for every pound of predator, like bass. Again, though, that depends on your goals."

Most biologists don't recommend adding crappie to ponds, but lots of ponds already have them. If yours does, keep every crappie you catch, says Odenkirk.

"They compete with the bass for forage, so if you have a lot of crappie, you will probably have a lot of small bass, too," he adds.

According to Odenkirk, catfish rarely repopulate, so they must be stocked regularly. That means they can be kept as soon as they're big enough to eat. Even better, channel catfish don't compete with bass and bluegill and are a good addition to almost any pond.

Resources

Your state cooperative extension service likely has a pond management expert who can offer advice. Most don't do onsite visits, but they can answer your questions over the phone or via email. A quick Google search can put you in touch with your local extension office.

"We also have organized, on-site, day-long workshops that cover a wide variety of pond-related management activities," says Swistock. "They're a great learning resource for pond owners."

The answers to most questions may be available online. The internet is filled with great pond management information, including everything from resolving water quality issues to basic fish management advice. The site www.Pondboss.com is a great starting point. It has a busy forum where you can get answers to most every pond question you might have.

If you still aren't sure, consider hiring a pond management consultant. They specialize in everything from new pond construction to water management, troubleshooting, and even fish stocking. They charge for their services, but it could be money well-spent.

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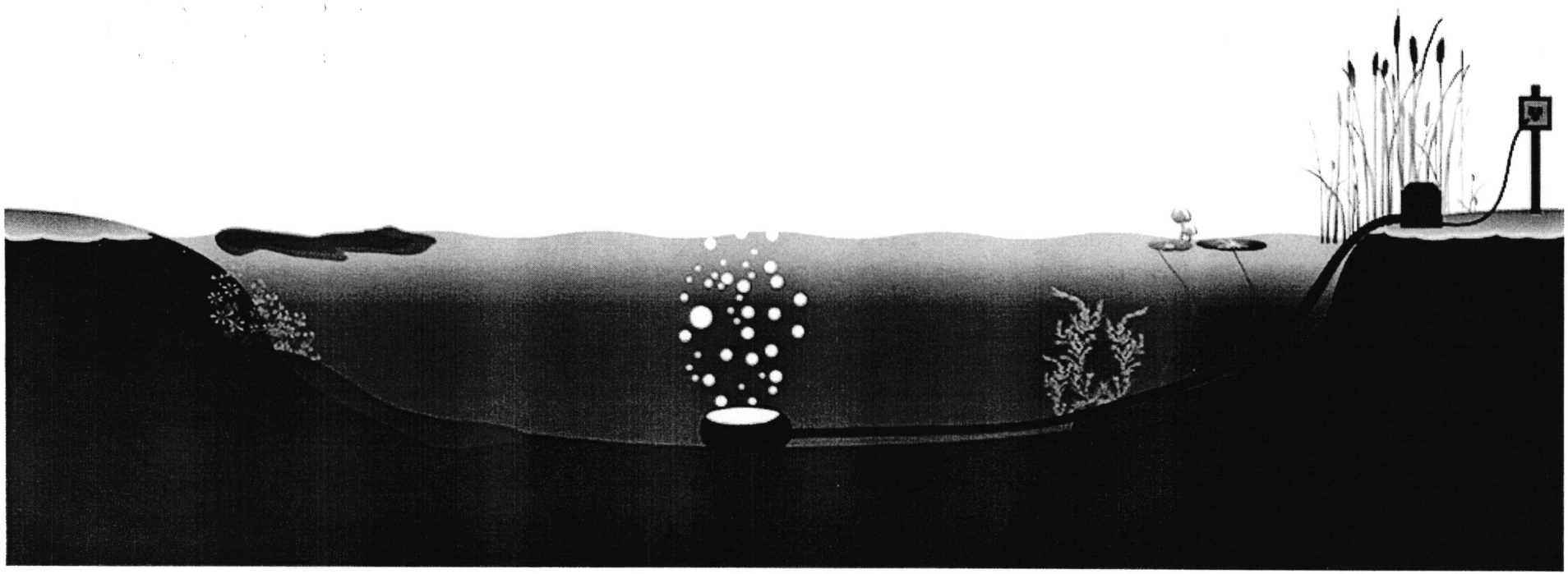

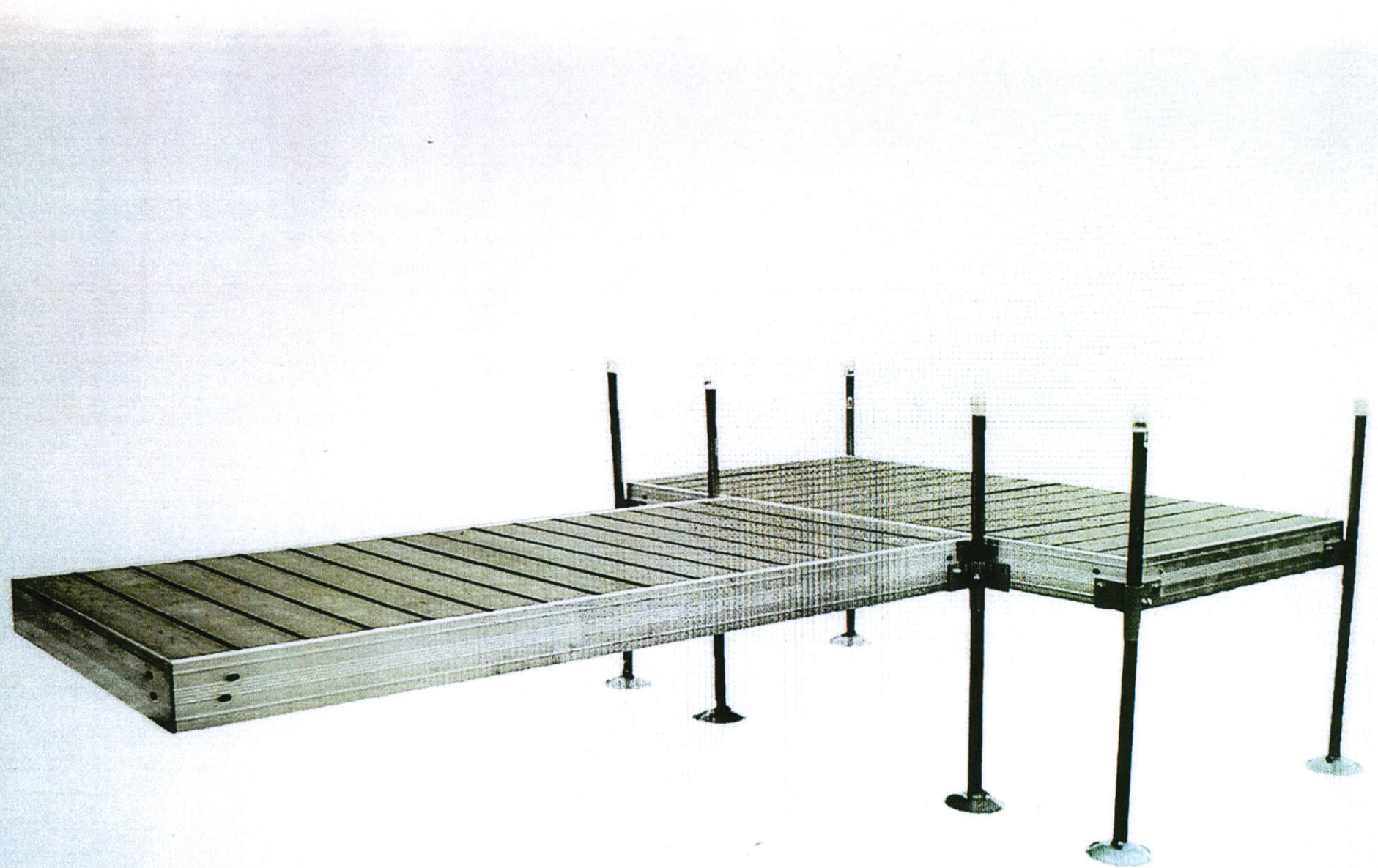

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INFO SHEET

Is that sheen contaminated water? What is that orange stuff?

Iron and Iron Bacteria in Water

Water quality inspectors receive calls about contaminated water or sheens that look like petroleum spills. Sometimes it may be a natural occurrence of iron bacteria.

What are iron bacteria?

Several kinds of microorganisms, including bacteria and protozoa, consume naturally occurring iron. They grow and multiply in stringy clumps in ponds, puddles, lakes, creeks and streams. They are a natural part of the environment in most parts of the world.

A result of the metabolic process of these microorganisms is the reaction of dissolved iron with oxygen from the air that forms yellow and red-colored iron oxides. These oxides do not dissolve in water. They sink to the bottom or are stored in slimy gelatinous material that surrounds iron bacteria cells. Chemically speaking, water-soluble bivalent iron (Fe^{2+}) is transformed (oxidized) into water-insoluble trivalent iron (Fe^{3+}).

What does water affected by iron bacteria look like?

In surface waters, slimy rust-colored material may be deposited on the bottom of water bodies, drains or on surrounding soils. Along with the rusty deposit there can be an iridescent sheen or oily-looking slick on the surface of the water called biofilm. It causes no environmental problems. In some areas, groundwater seepages leave harmless rust-colored stains on sidewalks and driveways.

Where is the iron coming from?

Iron is one of the most common elements found in nature; almost all water supplies contain measurable amounts of iron from iron-bearing soil or rock through which groundwater flows. Anaerobic groundwater (water that does not contain oxygen) seeps through the ground, cut banks and natural slide areas and retaining walls.

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Iron and Iron Bacteria in Water

What are common effects of iron on water quality?
Generally, the presence of iron bacteria on surface water is not a human health concern. However, a large amount of precipitated iron may be detrimental to fishes, bottom-dwelling invertebrates, plants or fish eggs.

Iron bacteria occur naturally and are not harmful. The feasible solution is to accept their presence.

How can I tell the difference between an oil slick and iron bacteria?
The best way to tell the difference between an oil slick and iron bacteria sheen is the stick or rock test. Touch the sheen with a stick or throw a rock in the water. If you observe a smooth ripple effect, it's probably oil. If the slick breaks into scale-like pieces, then it is likely to be an iron biofilm. A contract lab can test for iron bacteria using SM 9240B. (Standard Methods for the Examination of Water & Wastewater, 21st edition, 2005)

Effects of iron bacteria buildup in well systems:

- forms a slimy coat on the inside surfaces of plumbing infrastructure
- reddish-brown color of the water
- reddish stains on laundry
- unpleasant odors and taste due to dead and decaying bacteria
- plugged piping and water softeners with rusty sludge
- increased organic content in water favoring the multiplication of other bacteria (for example: sulfur bacteria)
- pump problems may occur if the iron biofilm clogs the well systems

What to do if you see iron-bacteria stains or sheens:
Iron bacteria naturally occur and pose no harm. If drinking water from wells is affected contact your local health department for advice.

Iron bacteria sometimes have a septic or sewage-like odor. This odor comes from low oxygen groundwater and the anaerobic conditions in which iron bacteria grow. If you notice a foul odor near a septic system, however, you may need to call a plumbing contractor or your local health department's onsite sewage program.

King County

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