Conservation the Idaho Way

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COMMISSION, PARTNERS EMPLOY BMPS TO REDUCE NITRATE CONTAMINATION IN GROUND WATER

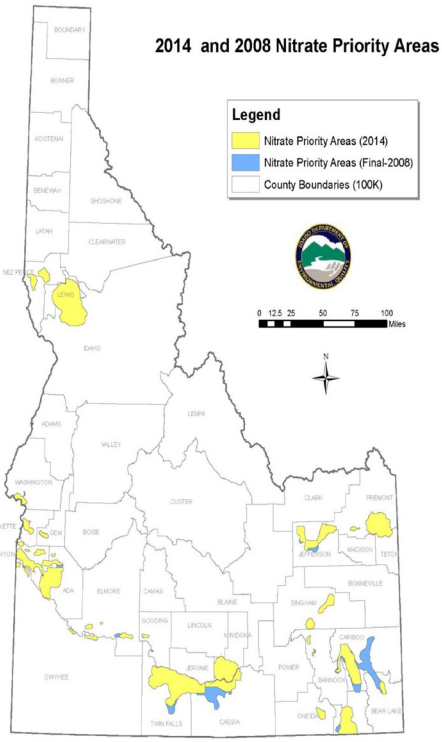
Water meters used in the Hamer potato fields to measure the water use.

By Steve Stuebner

Nitrates in ground water have been a growing concern in Idaho over the last 10 years or more, and the issue became more prominent in September when Boise State University Public Radio did a story about how the city of Ashton, Idaho, had to finance a $5 million drinking water facility to treat the water for nitrates so it was safe for the community to drink.

Ashton is a town in Eastern Idaho surrounded by farm country. Ashton Mayor Teddy Stronks told Boise State Radio that building the water plant in 2012 was challenging because of the property tax impact on residents. “It’s hard for a little community of this size to do these kinds of things,” he told Boise State Public Radio.

But knowing nitrates can pose major health risks to infants and pregnant women, the community supported the treatment plant.



Excessive nitrates in ground water can be caused by three things, according to the Idaho Department of Environmental Quality:

- Inorganic fertilizers used to grow crops leaching into ground water.
- Animal waste seeping into ground water.
- Human waste – typically septic systems – filtering into ground water.

Idaho DEQ has been tracking nitrates in ground water for at least 15 years in the state. Over time, it has created Nitrate Priority Areas where there are concerns about nitrates leaching into ground water. The area around Ashton has been listed as a Nitrate Priority Area for a number of years, but in the latest ranking process in 2014, it was ranked 17th among 34 priority areas statewide with a decreasing tendency.

Since 2001, a number of proactive initiatives were implemented by the Yellowstone Soil Conservation District with

assistance from the Idaho Soil and Water Conservation Commission and Natural Resources Conservation Service to install best management practices on participating farms to reduce fertilizer use, and increase soil pH with liming.

"To me, the Ashton area is one of the shining examples where our projects had a positive impact on the nitrate levels in the ground water," says Carolyn Firth, a water quality specialist with the Conservation Commission who works on projects in Eastern Idaho and the Magic Valley.

This work is emblematic of other nitrate-reduction initiatives around the state by NRCS, the Conservation Commission, conservation districts, University of Idaho Extension and other entities to reduce nitrate threats to ground water. The challenge is that it can take a number of years to reduce nitrate percolation into ground water, and as population growth occurs or agricultural industries grow, new sources of contamination can occur.

Ed Hagan, ground water program manager for the Idaho DEQ, says the issue of nitrate contamination is very difficult to assess. Every situation can be different.

The good news is "generally, the number of areas with a decreasing trend is greater than the number of areas with an increasing trend," Hagan says, referring to the list of 34 Nitrate Priority Areas.

Areas with a "decreasing tendency" and "decreasing trend" include the Ashton/Drummond area, Clearwater Plateau, Twin Falls, Minidoka, Lower Payette and Purple Sage (northwestern Canyon County). Areas with "increasing tendency" and "increasing trend" include Marsh Creek (Cassia County), Lindsay Creek (Nez Perce County), Blackfoot and Mud Lake.

"When we test the wells, we might find elevated nitrates but it's very difficult to try to assign a percentage to the causes of the problem," Hagan says. "It's often really difficult to tell. It's a much more complicated process than I realized at the outset. Contamination can be caused by all sorts of things, and it's a super dynamic problem."

Firth, who has worked with farmers on addressing fertilizer use, irrigation water use, soil-liming and other issues, agrees.

Gravity irrigation can lead to more leaching into ground water vs the more efficient sprinkler irrigation

"Every nitrate priority area is different," she says. "There's a complex series of conditions that caused the contamination. It's usually not one specific cause, but multiple causes, plus the geology of the area, soil pH, and soil type all can affect what's happening to the ground water."

In the Ashton farm country, for example, the geology is volcanic with multiple fractures in the earth, she notes. The soil is porous and drains quickly. It's also an area with high winter precipitation, and it melts fast in the spring. "If there's an over-application of fertilizer, it has a better chance of leaching into the ground water because of all of those factors," she explains.

In 2001, the Yellowstone SCD got a Section 319 grant from Idaho DEQ to begin work on nitrate issues in the Ashton area. The project ran for six years, focusing on nutrient management, which means paying more attention to specific amounts of fertilizer being applied to crops. Working with farmers, they came up with a nutrient budget for fertilizer application, a per-acre amount to be followed. The project reduced nitrogen application by 14 pounds per acre or 18 percent.

In addition to the 319 grant, the NRCS received federal funds for a Conservation Security Program, led by NRCS. That program provided incentive payments to farmers to participate in nutrient management projects on their farms. During those years, NRCS District Conservationist Ken Beckman, now retired, "was superb in getting things done and getting funding for those programs," Firth says.

Another issue in the Ashton area was low pH in soils, which meant the soils were more acidic and would not uptake nitrogen-based fertilizers as much as other soils might, and thus, also contributed to nitrogen leaching into ground water. In 2010-2012, the Yellowstone SCD and NRCS worked on a major lime-application project, covering about 19,700 acres with 54 farms participating.

Using soil maps, lime was applied to areas with the most acidic soils in the area. "That was another really positive project," says Firth.

In the same region, the Marysville Irrigation Company, with considerable financial and technical assistance from NRCS, installed a pressurized water pipeline to serve farms in the area. The project started in 2006 and has been running nearly every year since to expand the pipeline to 23 miles, serving 43 farms covering 6,100 acres of land. The pipeline improves water efficiency and keeps water that might be tainted with nitrates from percolating into the ground. Phase 1 and 2 have been completed, and a Phase 3 is expected to begin soon.

There also was an initiative to test water wells in the Ashton area. Conservation

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NITRATE REDUCTION, *cont. from Pg. 2*

officials formed a Ground Water Improvement Committee to develop a program that provided free water-testing for farmers and community residents. The DEQ provided test strips that people could use to test water in domestic wells.

"I think that initiative really helped with public education on the issue," Firth says.

In the western Magic Valley region, Firth also worked on irrigation water management and nutrient management with farmers to address elevated nitrates in ground water in the Mini-Cassia area. The project occurred from 2007-2011, funded with a Section 319 grant from Idaho DEQ and funds from the Conservation Commission's Water Quality Program for Agriculture (a program not currently funded).

The project focused on how much irrigation water was being applied on fields and how much fertilizer was being applied to fields. Dairies are required by state law to create nutrient management plans, but crop farmers are not. Even so, farmers don't necessarily want to pour on fertilizer because it's expensive, Firth notes.

"It's best for farmers to not over-apply fertilizer because it's not cheap," she says. "But it's in the best interest of farmers to know how much they're applying."

On the irrigation side of the project, they installed water meters in farm fields to gauge moisture in crop fields. They also did soil testing in the spring and fall and set nutrient budgets. They worked with 16 different farmers and treated 8,000 acres.

Rodney Lind, a farmer in the Springdale area, a "hot spot" for nitrates in the ground water, says he thought the project was valuable to track water and fertilizer use. "We used water meters to make sure that we're not pushing too much water down through the soil profile."

And for nutrient management, conservation professionals mapped the whole farm showing different soil types. They created a map for applying fertilizer by soil type. "There are low spots, areas where you don't want to use as much, and other areas where you might use more," Lind says.

Overall, the amount of fertilizer he used stayed about the same, but the yields increased where they used higher amounts of fertilizer in soils that could absorb it, and decreased in areas where they used less. Overall, the crop yield averaged about the same as before. "We've done this for quite a few years now," he says. "When we did it on potatoes, the revenue paid for the improvements, but the wheat and alfalfa don't cover the costs as well."

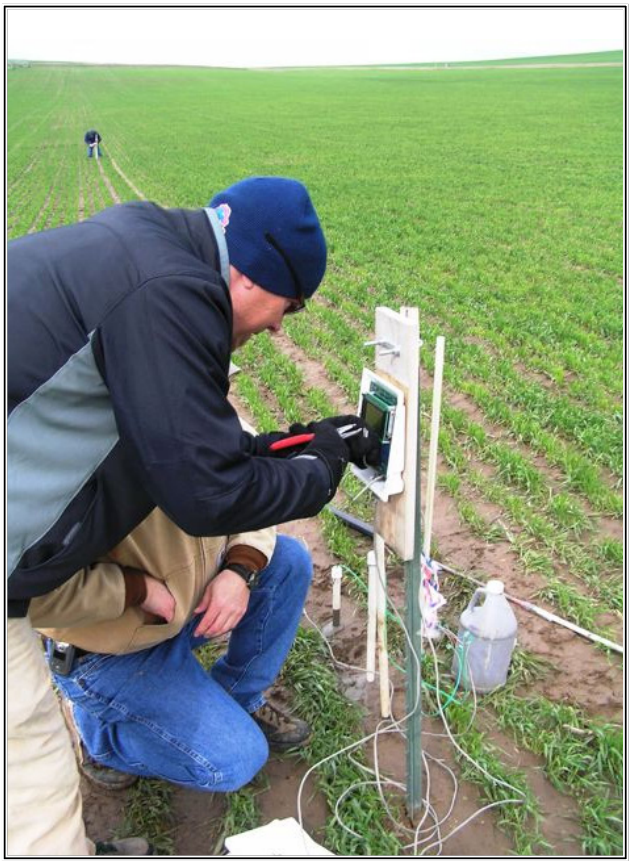
The Lind family has been testing their drinking water well on an annual basis, and it's testing clean because it's drawn from a deeper aquifer, about 200 feet below the earth's surface. The shallow aquifer in the area is 30-50 feet deep and it has the higher nitrate levels.

Lind is still glad he participated in the project. "I think it's good, getting to know if you're putting on too much water or not enough. It makes you more aware of what you're using. I don't feel it saved me any money on fertilizer, though. It's pretty much a break-even deal."

In the same area, the West Cassia Soil and Water Conservation District worked with NRCS and the Conservation Commission to convert farms from gravity to sprinkler irrigation. The Conservation Commission's Water Quality Program for Agriculture (WQPA) program, along with the NRCS Environment Quality Incentives Program (EQIP) helped fund the conversions. The agencies worked with seven farmers to convert 356 acres to more efficient sprinkler irrigation, either pivots or wheel lines. "Those projects saved water with more efficient sprinkler irrigation, and we reduced water runoff by a lot," Firth says.

From 2011 to 2015, the Conservation Commission and NRCS worked with farmers and the West Cassia, East Cassia and Minidoka SWCD's to implement a Conservation Cooperative Partnership Initiative (CCPI) project that focused on mapping farm fields to set specific amounts of fertilizer to be applied in specific areas, also known as "Precision Agriculture," and high-intensity irrigation water management. The project included grant funds to provide incentives for farmers to try the technique.

Special equipment was used to measure electrical conductivity in the soil to help determine how much fertilizer to apply. The electrical testing showed more detail about the properties of the soil, Firth says. "It's an expensive thing to do. Some farmers thought it was a really good thing to do, others not. But these are all tools to help farmers make the best use of fertilizer and educate them about their fertilizer use."



Collecting the soil moisture data

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NITRATE REDUCTION, *cont. from Pg. 3*

Firth is working on a new project in Twin Falls, Cassia, and Minidoka counties – in the Twin Falls, Marsh Creek, and Minidoka Nitrate Priority Areas in particular – to conduct deep soil tests on farms after harvest time to check on nitrate levels below the root zone. The testing will be done free of charge, she says.

This is a project supported by the Conservation Commission, Idaho DEQ, Twin Falls and Mini-Cassia Ground Water Quality Improvement Committees, and the Snake River, Balanced Rock, Twin Falls, Minidoka, West Cassia, and East Cassia Soil and Water Conservation Districts. The tests will be done in 1 foot increments down to six feet (if possible) to determine the length of travel by nitrates from below the root zone toward ground water below.

Farmers can sign up by contacting the Snake River, Balanced Rock or Twin Falls SWCD at 208-733-5380 x3, the Minidoka SWCD at 208-436-4777 x3, the East and West Cassia SWCD at 208-678-1225 x3, Carolyn Firth with the Conservation Commission, 208-678-1225 x110, or Chuck Pentzer with the Conservation Commission, 208-810-0765.

While there are a number of proactive projects going on around the state to reduce the level of nitrates flowing into ground water, there will continue to be much work to do in the future, says Commission administrator, Teri Murrison. "Idaho's growing. We need more resources to respond. Over time through programs like WQPA, we've seen significant improvement to ground and surface water through the installation of voluntary BMPs. That trend will continue if resources are sufficient."

Simplot testing electrial conductivity of the soil

Adds DEQ's Hagan. "As our population increases, there will be more nitrates going into aquifers from multiple sources," he says. "But the good projects that have occurred with our 319 grants and other initiatives give us hope that we can manage this problem in the future."

The Commission, districts, DEQ, and other state and federal agencies are watching areas where nitrate levels are increasing or are still a concern in ground water used for public consumption, in particular.

"The BMPs that reduced nitrates in one area, might not work in another area if they have sandy, porous soil and a shallow aquifer," Hagan says. "It's a really tough situation, and it's hard to achieve really good results. The solutions seem to be very specific to each area of the state."

To review a map of Nitrate Priority Areas in Idaho and learn more about the nitrate issues, go to http://www.deq.idaho.gov/water-quality/ground-water/nitrate/

Steve Stuebner writes about conservation projects on a regular basis for the Conservation Commission.

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