Conservation the Idaho Way

IDAHO SOIL & WATER CONSERVATION COMMISSION

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Soiltech Wireless soil moisture beacon is inserted into the top profile of the soil. (photo courtesy Soiltech)

WQPA GRANT FUNDS 70 SOIL MOISTURE BEACONS FOR WOOD RIVER, GOODING DISTRICT PRODUCERS

By Steve Stuebner

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The Wood River and Gooding Soil Conservation Districts received a \$34,650 grant from the Idaho Soil and Water Conservation Commission under the state Water Quality Program for Agriculture (WQPA) to install soil moisture beacons in farm fields and see if the devices help producers conserve water and improve water quality.

Fourteen producers in the districts engaged in this Precision Agriculture best practice by placing a total of 70 beacons in a variety of crop fields to assist in deciding when to irrigate crops, how much water to use, when to harvest, etc., and potentially conserve water over the course of the summer irrigation season.

Farmers in the two districts had heard positive feedback from sugar beet growers in Southern Idaho who have tried the soil moisture beacons from Soiltech Wireless. They wanted to see how the beacons might assist growers in raising other crops like alfalfa hay, corn, oats and more.

"We wanted to get a bunch of the (beacons) out in the fields and see how they could help our producers, and I think we were successful in that," said Carl Pendleton, Wood River District Chairman who farms in the Shoshone area. "Water management and water conservation are important to us as a district, no matter what the crop, so we wanted to try them out."

Experts say the soil moisture beacons have the upside potential to save up to two or three pivot rotations for producers during an irrigation season. Each pivot rotation would consume approximately 2.8 million gallons of water over a 48-hour period in a 130acre field, officials said, so the water savings could be substantial.

The WQPA grant project investment



The beacons transmit soil moisture, humidity, soil temperature and other data digitally to a smart phone, tablet or computer. An annual subscription is necessary to receive data. (courtesy Soiltech Wireless)

in the Soiltech Wireless beacons provided 5 beacons each to the participating farmers to assist in their watering decisions while growing a variety of crops in different types of soil. The beacons cost about \$500 each. A \$99/year subscription is required to use a Soiltech Wireless App that provides real-time data on soil temperature, soil moisture and humidity in their crop fields on a smart phone, tablet or computer.

"That gives the landowners the ability to make real-time informed decisions about their current watering situations," said Barbara Messick, administrator for the Wood River and Gooding Districts.

Within the past few years, the main conservation practice in the districts has been converting irrigation systems from flood to sprinkler irrigation. With a reduced need for sprinkler conversions, the soil beacons could be used in combination with more efficient pivot sprinklers to further improve water management practices, she said.

The project covered roughly 560 acres in the two districts. By using the soil moisture beacons to track soil moisture during the irrigation season, there is potential for the producers to not only save water but also improve water quality, Messick said.

Several major streams that run through the project area are listed on the 303(d) list of water quality impaired waters, according to the Idaho Department of Environmental Quality. In addition, portions of both Lincoln and Gooding counties are underlain by groundwater used as a source for private and public drinking water. The participating farms also overlay the Eastern Snake Plain Aquifer (ESPA), which has been in general decline for more than 70 years. The Idaho Department of Water Resources is currently working with irrigation interests on a new management plan

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for the ESPA to reduce groundwater pumping and find a long-term solution to rebuild the aquifer to sustainable levels.

"The ESPA is in decline, and groundwater users are at risk of water calls from surface water entities if conservation efforts are insufficient to mitigate declining ground water and surface water resources," Messick noted.

"Irrigation water management is a critical practice in protecting groundwater quality and quantity," she said. "It can prevent nutrients from leaching off of fields and into drinking water sources."

She noted that there is a nitrate priority area in Gooding County due to groundwater concerns.

"Irrigation water management can also prevent over-watering of crops; this is particularly important for fields irrigated with well water," Messick said. "Surface water quality can also benefit from irrigation water management. Making more efficient use of irrigation water can prevent field runoff and irrigation return flows into canals and other water bodies, thus keeping sediment, nutrients, and pathogens out of surface water."

Soiltech Wireless beacons developed in cooperation with Idaho producers

Soiltech Wireless beacons were developed by working together with a number of sugar beet and potato farmers in Southern Idaho, said Ehsan Soltan, Founder and CEO of Soiltech Wireless.

The Soiltech web site says that on a 10,000-acre potato farm, there is an upside potential of saving 500 million gallons of water, 250,000 gallons of fuel, and a 4 percent increase in yield by using the soil beacons.

With the beacons placed in the top profile in crop fields, farmers don't have to check the fields manually as often as they might otherwise, saving time and fuel, officials said.



Tim Silvers of Soiltech installs a unit in a corn field with Robert Lezamiz.

"The beacons can help a producer decide when to irrigate and how much water to apply, as well as when to plant or harvest," Soltan said.

"We built the devices with the help of Idaho growers, who were looking for more data and real-time information on soil moisture in their fields," he said. "The growers are the ultimate users of the product. We can learn from their experience and fine-tune our water management."

The soil moisture information is conveyed by the beacons as a percentage, Soltan said. Readings may show a range of 60 to 90 percent – with 60 on the dry side and 90 on the wet side. "If you're in the 90th percentile, you're reaching the field's capacity," he said. From years of experience, farmers generally know their soil types and how much irrigation water to use to grow a successful crop. But the devices can help producers be more precise in their water use. The beacons provide a constant stream of data from farm fields, with new data provided every four hours, Soltan said.

Aaron Firth, an agronomist for Amalgamated Sugar who serves producers in the Mini-Cassia area in Southern Idaho, said they had 12 sugar beet farmers try out the Soiltech Wireless beacons. "Overall, they work really well," he said. "You do have to have some tech savvy to calibrate the beacons to your soil type and your crop."

What is the potential water savings?

By paying close attention to the irrigation water needed for crops, producers could save significant amounts of water, Firth says.

One pivot irrigating a 130-acre farm field consumes 1,000 gallons of water per minute, or 60,000 gallons per hour, he said. If the farmer runs the pivot for 48 hours at a time, he would use 2.8 million gallons of water.

If the beacons allow a farmer to El save two or three pivot rotations Bu in an irrigation season, that could equate to more than 5.6 to 8.4 million gallons of water, or 17-25 acrefeet of water. One acre-foot of water equals one acre of land flooded to the depth of one foot.

Hearing about the potential watersavings is what convinced the Wood River and Gooding Districts to give the soil beacons a try, officials said.

"It still doesn't replace going out to check on a field with a shovel," said Daniel Butler, owner of Spring Cove Ranch in Bliss and a Gooding District supervisor. "But we wanted to see if we could help our landowners do some water conservation."

Butler installed four of his soil beacons in corn fields and one in an alfalfa field. Once the WQPA grant funds came through, the beacons were installed in July, later than normal, but the district producers will have a full year of experience with the beacons in 2024, he said.

Nearly all of the producers said they had issues with rodents or

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Ehsan Solton, CEO of Soiltech, gives local producers Mike Elliot, Garrett Lott, Daniel Butler (all sitting) and Carl Pendleton a demostration of the information provided by the soil beacons in real-time. (photo courtesy Barbara Messick)

other wildlife chewing on the beacon antennas and causing them to malfunction. The antennas can be covered with a protective cover to avoid that issue, Soltan said.

Farmers also had trouble finding the beacons after crops grew to maturity. "After the corn was 10 feet tall, I couldn't find the units," Pendleton said. "There was just some odd-ball stuff like that to learn."

Putting a stake in the ground next to a buried beacon helps locate them in crop fields, Soltan said.

"We are learning as we go, and that's OK," Butler said. "We wanted people to try them and have them share their experience. We've already had one meeting like that, and we'll have some more. Next year, we'll use them for a full season and see how that goes.

"We were just really pleased to hear from our producers and how willing they were to share their experiences," he said. "We're educating people in conservation. That's what it's all about for our districts."

Both Pendleton and Butler said the Soiltech devices can provide more information than they know how to tap into so far, but they'll learn more as their experience grows over time. "Frankly, they're a lot more powerful than I'm capable of understanding," Butler said with a chuckle.

"I'm not that tech savvy, but I think we'll learn more how to tap into their potential as time goes on," Pendleton adds. "Sometimes you need to get your feet on the ground and go from there."

For more information about Soiltech Wireless, go to www.soiltechwireless. com.

Steve Stuebner writes for Conservation the Idaho Way on a regular basis.

