

## **NEBRASKA AGRICULTURAL WATER MANAGEMENT NETWORK (NAWMN) UPDATE**

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Water is the life support of irrigated and rain-fed agriculture and economy of Nebraska and other Central Plains and mid-western states. Nebraska's approximately 8.5 million acres of irrigated lands are extremely vital to the state's economy with an approximate five billion dollars per year of revenue.

Withdrawal of fresh water resources for irrigation in Nebraska represents the largest of the state's water pumping demands. Irrigated agriculture consumes more than 90 percent of groundwater pumped in Nebraska (Irmak et al., 2010). Thus, collaborating to maximize the net benefits of irrigated crop production is of growing importance in Nebraska as we need to produce more food with less water. Many areas in the state are involved in significant management changes to conserve irrigation water (Irmak et al., 2010).

The Nebraska Agricultural Water Management Demonstration Network (NAWMDN) was established in early 2005 for testing cutting-edge irrigation management technologies. The Network includes growers, UNL Extension, Natural Resource Districts, the Natural Resource Conservation Service, crop consultants and other interested partners — all key to the adoption of water and energy efficiency measures.

From its inception thru 2011, the NAWMDN has grown from 15 to over 700 participants, so it is no longer a demonstration, it's a network (NAWMN)!

The NAWMN was designed to encourage farmers to adopt newer technologies associated with water and energy resources in irrigated crop production. Education and information about the use of appropriate technologies are delivered to agriculture professionals and irrigators through field demonstrations, the website, and educational meetings. Detailed descriptions of the goals and objectives of the Network, components, operational functions, and procedures used as well, as the quantitative impacts in terms of water and energy conservation, have been reported in (Irmak et al., 2010).

#### History and Goals....

The NAWMN partnership in 2005 between UNL Extension, the Upper Big Blue Natural Resources District, and 15 growers from south central Nebraska expanded to include the state Natural Resources Conservation District (NRCS) in 2006. The demonstration projects that started in the Upper Big Blue NRD were extended to other parts of the state and NRDs in 2007 and subsequent years.

The goal of the NAWMN is to transfer high quality information to Nebraska producers through a series of demonstration projects established in farmers' fields, and to implement newer tools and technologies to enhance crop water use efficiency and energy savings.

We believe that this interdisciplinary demonstration project:

- Increases the adoption of appropriate newer technologies and methods to obtain higher crop water use efficiency on a field scale.
- Enhances communication and information exchange between farmers, research faculty, academics, NRCS, UNL Extension, NRDs, and other state and federal agencies.
- Promotes water conservation.

The NAWMN is working hand-in-hand with growers and crop consultants on strategies on how to achieve efficiency through a series of field demonstrations, initiated in the Upper Big Blue NRD in south central Nebraska.

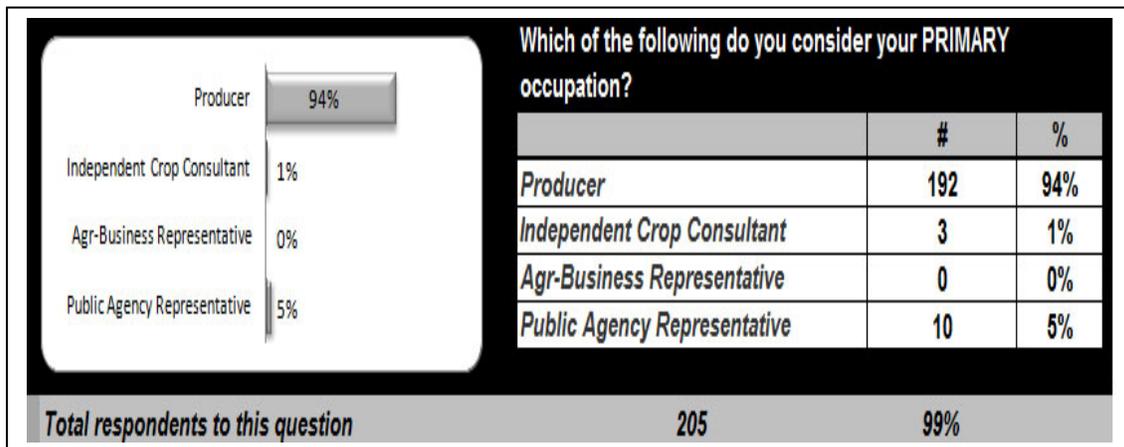
The demonstration project is supported by the extensive research projects conducted by Suat Irmak on newer technologies at the South Central Agricultural Laboratory (SCAL) near Clay Center, Nebraska where research on the accuracy, durability and other operational characteristics of ET-based ET gages and Watermark sensors and other type of soil moisture and ET measurement technologies have been investigated since April 2004.

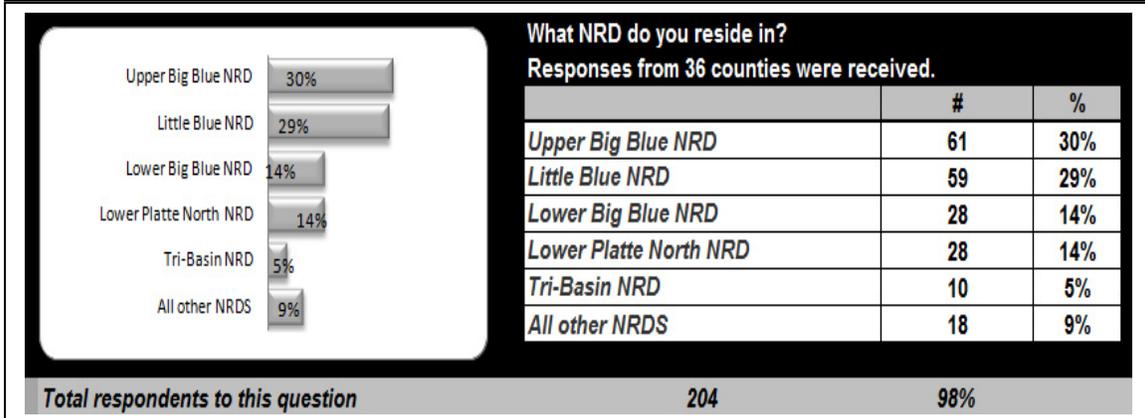
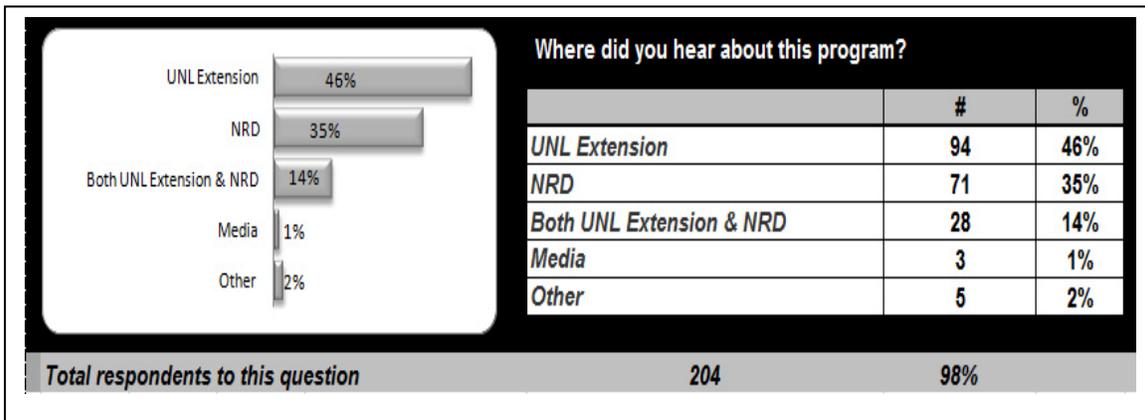
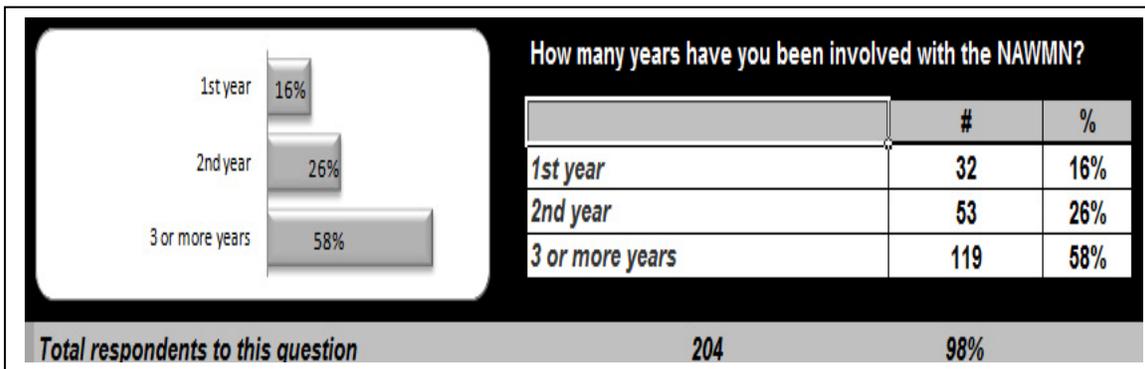
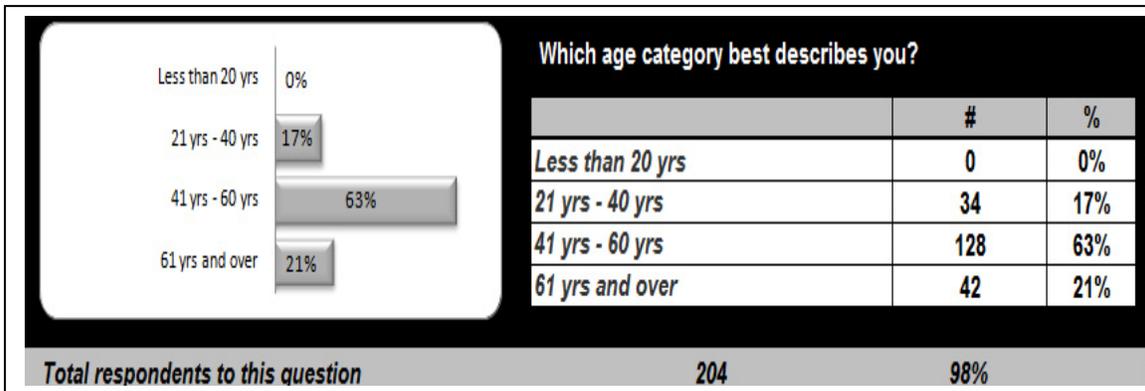
Suat Irmak, UNL Irrigation Specialist, and Extension Educators from UNL Extension and Upper Big Blue NRD (UBBNRD) personnel developed a partnership to initiate the Network and install ETgages and Watermark sensors in producer's fields to teach producers strategies for water and energy conservation. Due to the success of the Network, the UBBNRD cost shared with producers and consultants for the equipment in 2006. This became the pattern in successive years as more partners joined with equipment cost-share coming from the local NRD's. A grant was obtained from the USDA to allow for expansion of the NAWMN statewide.

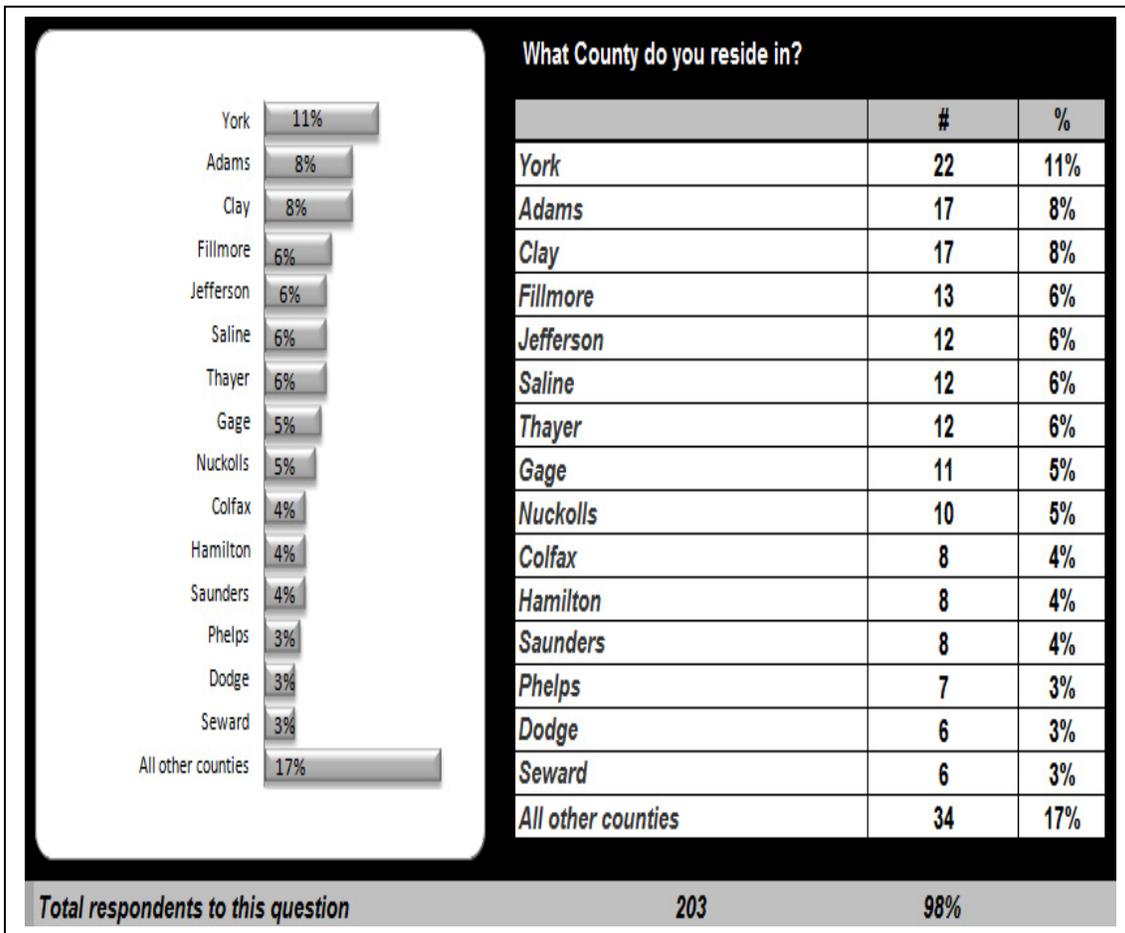
The two primary tools adopted initially in the Network are ETgages and Watermark sensors. The ETgage is used to estimate crop water use from reference evapotranspiration and crop coefficient information. The Watermark sensors are used to monitor available water in the crop root zone over time. The Network participants learn how to utilize these tools to make better-informed decisions in their irrigation management operations.

In addition to the demonstration projects, the information is shared and delivered to Network participants and others through field days, seminars, workshops, outreach publications, media reports, refereed journal articles, etc. A webpage was developed and producers were encouraged to post ETgage data on the website on a weekly basis to encourage the use of this information. In addition, High Plains Regional Climate Center automatic weather station data is also available.

Following the 2010 season, 506 NAWMN participants were surveyed to measure the Network's impact. Two hundred and eight participants or 41% responded and they reside in 36 counties across Nebraska. Several demographic questions were asked. Ninety four percent of the respondents were producers and 63% were in the 41-60 year age bracket and nearly 60% have been involved in the network for three or more years. See the following tables for some demographic information.







The surveyed participants were asked to identify their interest in reducing inputs such as energy costs, water usage, improving irrigation efficiency, networking with other producers, practicing irrigation management and increasing knowledge of irrigation management technologies. Seventy one percent of the responses were to reduce energy input costs and to improve irrigation efficiency on their farm.

Participants were asked to estimate their water applications to both corn and soybean crops in 2010. Irrigation application amounts on corn and soybean crops varied from 0 to 11 inches and averaged 5.4 inches on corn and 4.6 inches on soybeans. When asked to estimate their savings, the average response was 2.4 inches on corn and 2.1 inches on soybeans. Annual participant surveys showed average irrigation water savings of 2.0 inches for both corn and soybeans the past five years along with the associated energy savings.

As of 2011, the number of active growers who have joined the NAWMN has increased to more than 700. Irrigated acreage that were represented by the NAWMN producers has increased from 1,482 acres in 2005 to 342,500 acres in 2010. Due to the information and strategies taught in the NAWMN participants are changing their behaviors of how they manage irrigation and as a result, the NAWMN is having significant impacts.

When asked if using the equipment or the NAWMN information influenced the growers on the amount of irrigation water applied. 97% of the respondents indicated 'yes'. The participants were asked if they planned to be involved in the NAWMN the following year and 98% indicated yes!

The NAWMN and technology is assisting growers to reduce inputs such as energy costs, water usage, improving irrigation efficiency, and networking with other producers practicing irrigation management and increasing knowledge of irrigation management technologies.

The NAWMN is continually working to increase its outreach, increasing by 200 members in 2011.

The NAWMN is striving to improve and expand and survey respondents share valuable insights and suggestions to help the program reach a larger audience. The 2010 survey respondents made the following suggestions when asked what did you like best about the NAWMN program?

#### **Savings - 30 responses**

- Saving both water and dollars!
- Saving fuel!
- Water conservation - more crop per drop!
- Most people know that underwatering a crop hurts, many don't realize the damage they do overwatering.

#### **Confidence—19 responses**

- Knowing!
- Taking the guesswork out.
- Piece of mind & dollars in my pocket!

#### **Support - 22 responses**

- Extension & NRD support!
- Assistance from Extension Educator.
- Help!
- One on one support!
- Guidance!
- Adopting at my pace.

### **New Technology - 22 responses**

- Information on what's new.
- Another tool!

### **On my farm - 9 responses**

- Gathering ET data on my farm!
- The large area involved & ET readings next to my crop.
- Bring the technology out to the farm and demonstrating it!
- Local ET.

### **Information & Training - 21 responses**

- Hands on!
- A better source of information!
- Being able to use the work of others.
- Self help.
- My own field trials and experiences!

When asked how the NAWMN could be improved and expanded they responded:

### **Technology - 19 responses**

- ***“Continue to monitor and try newer technologies to remain on the cutting edge.”***
- Continue your research efforts.
- Look for more automated ways to collect the needed information.
- Look for ways to relay the information to the home computer/lpad.
- Develop permanent sensor installation protocols.

### **Website Updates - 7 responses**

- Daily Updates on website of ETgage readings.
- Have a different color on ETgages not reporting.
- More timely reporting of ETgage readings.
- Make the website more user friendly.

### **Training - 13 responses**

- ***“Should be required for at least one field for every producer to realize the benefits - maybe incorporate into pesticide certification.”***
- I'd like a good pocket-sized, laminated card with the readings on it.
- More than one training session per year.
- More training on tying atmometer with sensors and how to use the two.

### **Good Program - 14 responses**

- ***“We are in a big growth year, we are doubling the numbers of our first three years. It's working for producers and the 1.5 - 2" of water saved is a significant cost item as well as a valuable resource.”***
- Keep doing what you are and encourage more producers.
- Keep up the work and continue to refine the program.

### **Cost Share - 10 responses**

- ***“Continue to cost share & provide technical support!”***
- Cost sharing on equipment is an excellent way to expand the program.
- Encourage more NRD involvement.

### **Other - 3 responses**

- ***“Over come the "herd instinct" that everyone else is watering then I should too!”***
- Mandate all producers that farm 1,000 acres + use this system.

When asked to share any additional thoughts with the NAWMN team participants responded:

### **Great Program:**

- “I feel that this program has saved us more irrigation water & fuel than anything! We are 150% sold on it. We use it on all our pivots!”
- “Could not trust the thing the first year. Now I have confidence in them.”
- “This the best program ever for knowing when to irrigate and when not to!”
- “Really appreciated the knowledge gained utilizing this program. Thanks!”
- “Keep up the Great work -- This is a "Premier Irrigation Event".”
- “This is a well-run program and can save a lot of our water resources.”
- “Great program, state wide would reduce water use.”

### **Training:**

- “The program allowed for learning and flexibility to change with conditions and schedule and I the producer had control.”
- “I'm not much for meetings. I prefer short sit downs with local extension educator, NRCS and NRD staff.”

### **Research/Technology:**

- “Get the sensors compatible with pivot panels so we can check them from our computer.”
- “Good concept, we need to go from Stone Age devices to what's available today!”
- “We need to continue to research the last watering!”

**In General:**

- “The NRD is requiring flow meters, but it might be more important to know when to irrigate rather than how much you pumped? A combination of both would be good.”
- “I’ve had some great Extension Educator support.”
- “For me the ETgauge was easier to monitor and read making it a better choice for me.”
- “The ETgauge doesn’t know if I have 36,000 or 25,000 plants/acre, but Watermark sensors do!”

The goal of the NAWMN is to enable the transfer of high quality information to Nebraskans through a series of demonstration projects established in farmers’ fields, and to implement newer tools and technologies to enhance crop water use efficiency and energy savings.

Growers, crop consultants, state and federal water regulatory agencies and other interested partners can contact any one of the members of the NAWMN if they would like to sign up to be a part of the network and efforts.

Contacts and additional information about the NAWMN can be found on the webpage: <http://water.unl.edu/web/cropswater/nawmdn>.

**References**

Irmak, S., J.M. Rees, G.L. Zoubek, B.S. VanDeWalle, W.R. Rathje, R. DeBuhr, D. Leininger, D.D. Siekman, J.W. Schneider, and A.P. Christiansen. 2010. Nebraska Agricultural Water Management Demonstration Network (NAWMDN): Integrating Research and Extension/Outreach. *Applied Engineering in Agriculture* 26(4):599-613.