



Nebraska Agricultural Water Management Network
“The Nebraska Story”

Nebraska Lincoln EXTENSION Know how. Know **now.**






Randy Pryor
 Extension Educator
 University of Nebraska-Lincoln



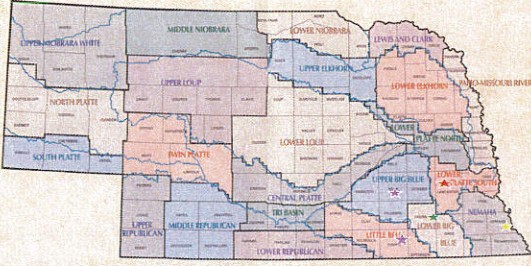

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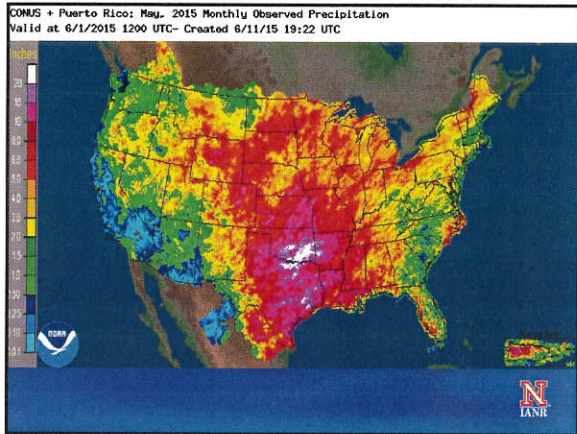
Czech Capital of the USA

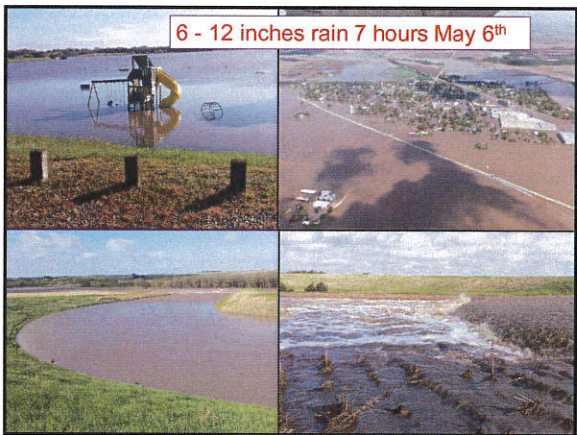




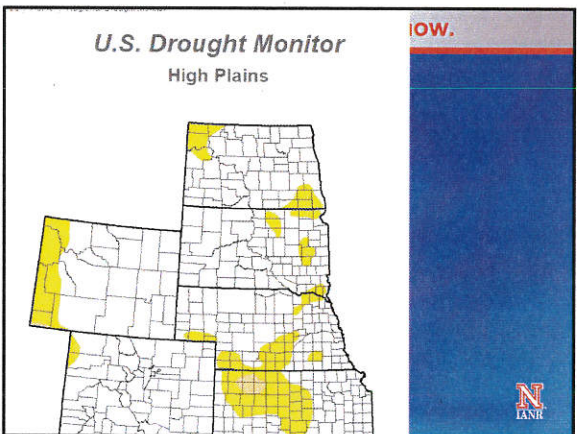
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Natural Resources Districts

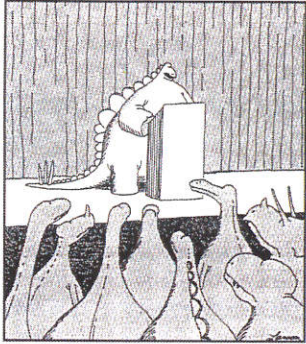







Know now.


The Far Side



The picture's pretty bleak, gentlemen...
The world's climates are changing, the mammals
are taking over, and we all have a brain
about the size of a walnut.




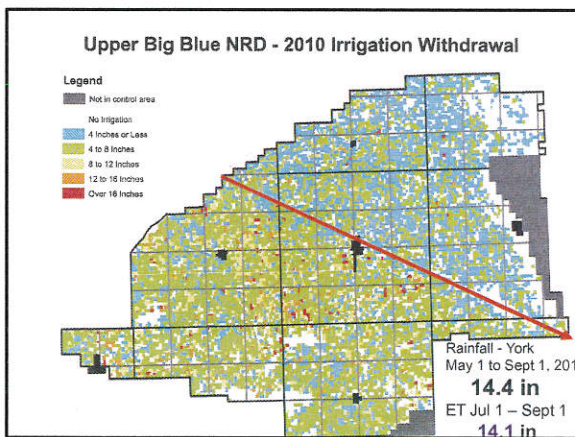
Nebraska LAND EXTENSION **Know how. Know now.**

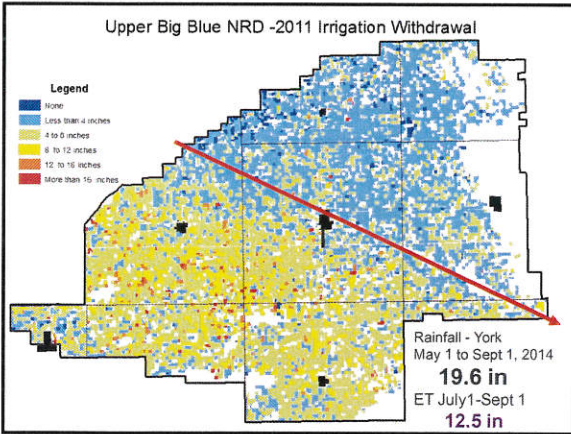


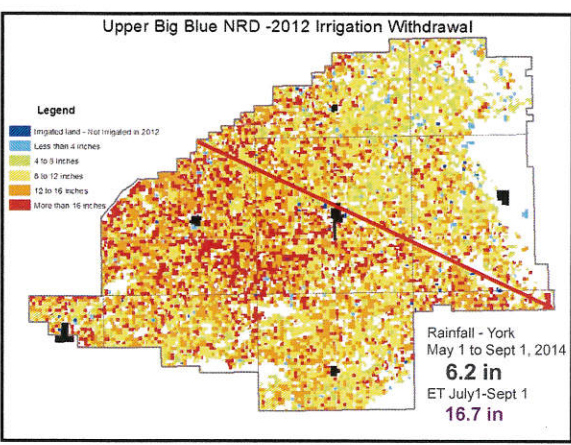
Irrigation water applications over 5 years Upper Big Blue NRD York, NE

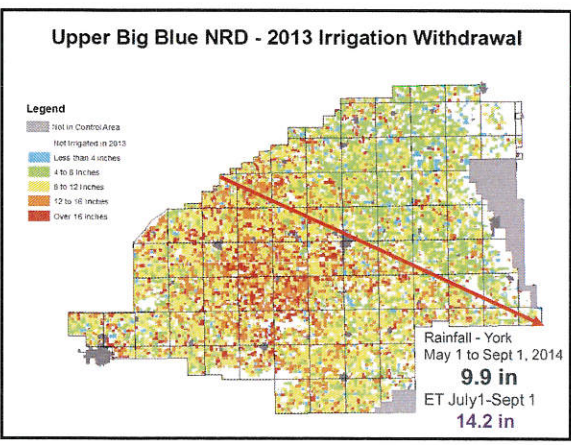
- Heart of where Irrigation Started in Nebraska

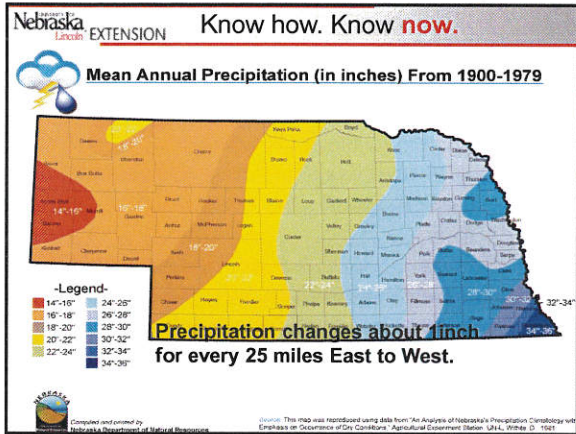


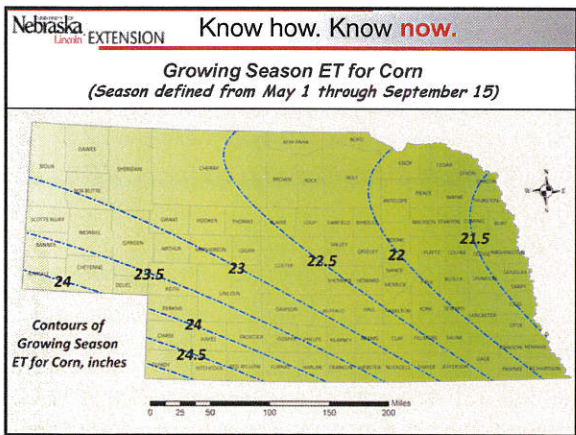












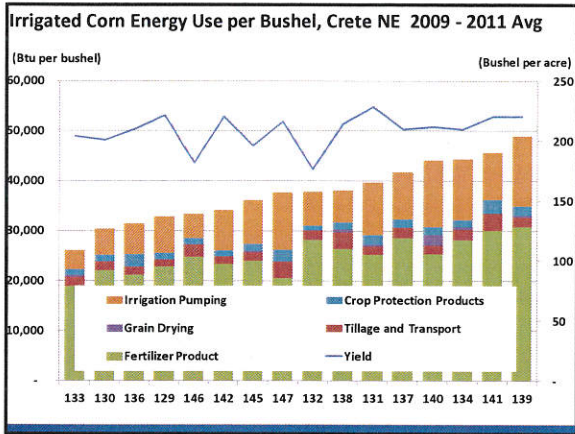
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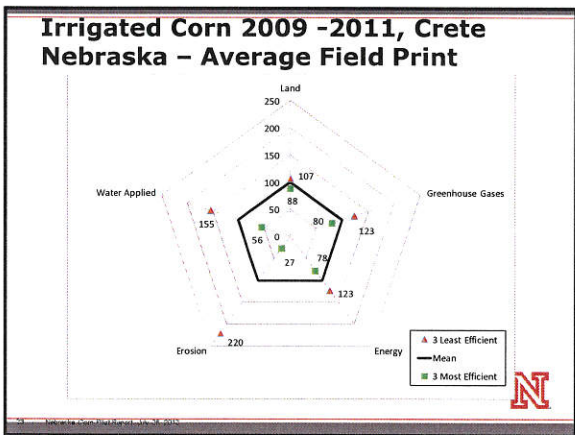
Sustainability Movement in Agriculture

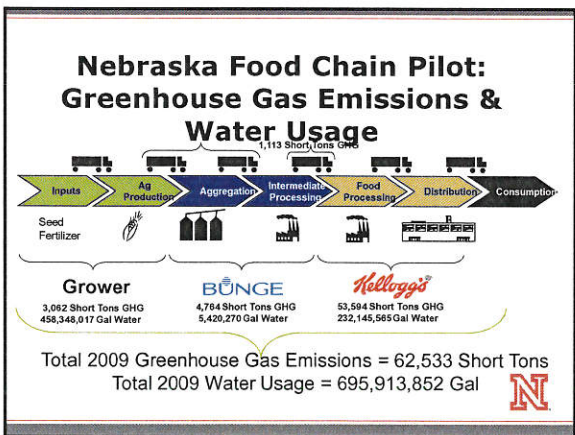
“Meeting the needs of the present without compromising the ability of future generations to meet their own needs”,

In this sense, sustainability is not a destination but a process of learning and action (i.e. continuous improvement).

Fred Luckey, former VP Bunge









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Water is the lifeblood of agriculture!

NAWMN
Integrating Research and Extension

<http://water.unl.edu/NAWMN> 

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NAWMN Program Goals
Established in 2005


- Translational research – convey current agricultural irrigation water use research to Nebraskans.
- Foster adoption of newer irrigation water management tools & technologies to help growers improve water use efficiency, reduce energy costs and protect the environment.
- Enhance communication and information exchange among farmers, crop consultants, educators, NRDs, NRCS, NDNR, etc.



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History of NAWMN

- Suat Irmak & Extension Educators lead a collaborative effort among the Upper Big Blue NRD and 15 area farmers in 2005 to debut the NAWMN in south central Nebraska between York and Clay Center.
- Partnerships grew with Nebraska Natural Resources Districts (NRDs) across the state.
- Many NRDs cost-share on equipment with farmers.
- Extension educators/NRD staff demonstrated and helped farmers and crop consultants learn how to and use the tools.




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NAWMN Efforts

- Today the network has grown to over 1,229 participates statewide.

192 new cooperators in 2011
 100 new cooperators in 2012
 272 new cooperators in 2013
 138 new cooperators in 2014
 ___ new cooperators in 2015


- With the importance of water to Nebraska our goal is to continue to expand the NAWMN.



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Accomplishments


- The Network has become the largest and most comprehensive agricultural water management network in the United States.
- Network participants represent approximately 1.5 million acres of irrigated lands.
- The total fuel energy saving due to reduction in water withdrawal exceeded \$45 million since 2005.



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Know More - Irrigate Less More Crop per Drop

- How much water does my crop require?
 - Each field has a different need. Guessing can be expensive and wasteful.
- When should I begin irrigating?
 - Soil water data and crop growth stage is essential.
- When should I stop irrigating?
 - Leave room for off-season precipitation without sacrificing yield.



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Two Irrigation Management Tools

Soil Moisture Sensors



Atmometer (ET gage)





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Reference ET (ET_r)

Calculated from Weather data

- Solar Radiation
- Air Temperature
- Relative Humidity
- Wind Speed

What Equation is used to calculate ET?


Daily Penman (ET_{pen})

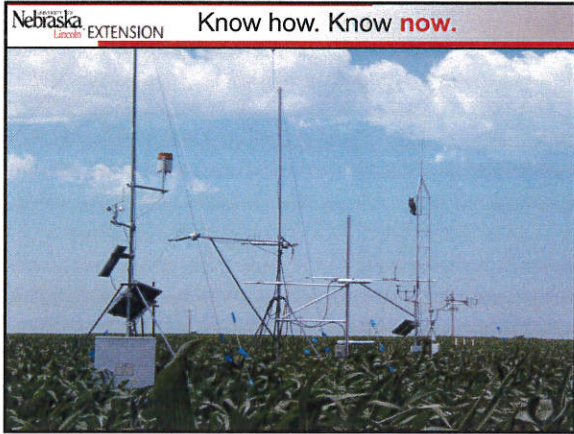
$$ET_{pen} = \frac{\lambda}{\Delta + \gamma} (R_n - G) + \frac{T_a}{\Delta + \gamma} (e_a - e_s)$$

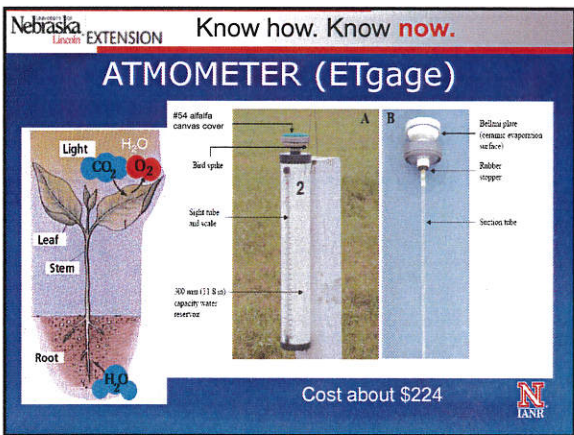
R_n = net radiation, estimated from global solar radiation
G = heat flux in soil, estimated as zero
e_a = actual vapor pressure
e_s = saturated vapor pressure
Δ = (1.8 + 0.00066 T_a)² / (1 + 0.00066 T_a)²
γ = daily wind cut

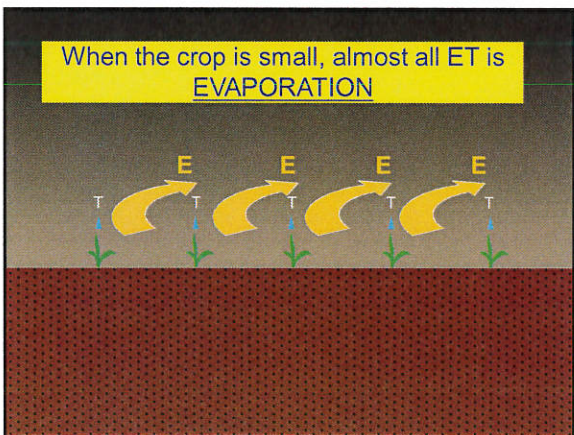
Wind function was for reference crop: alfalfa
 ET_{pen} = K_c ET_r

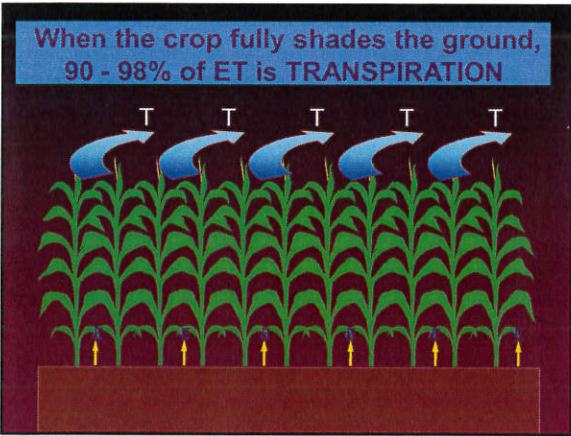
K_c is for the crop of interest

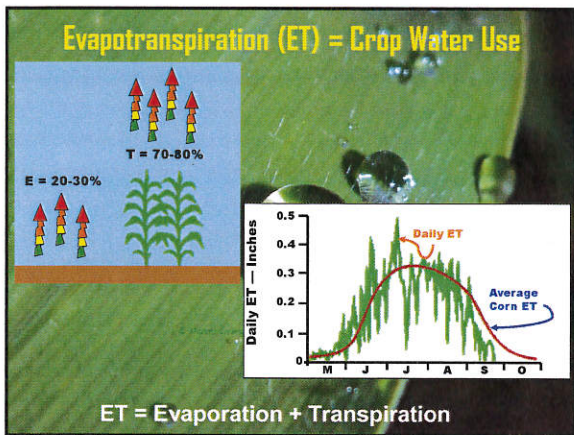


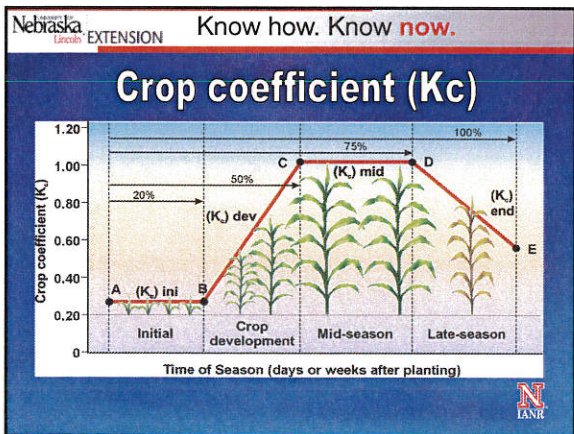












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Watermark soil moisture sensors




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Sensor Installation Tips



- At least 2 stations
- Install in crop row
- Mark spot well
- Hole size critical
- Don't use a slurry
- Default temp is ok
- Wash water alone off-season
- Consider O ring

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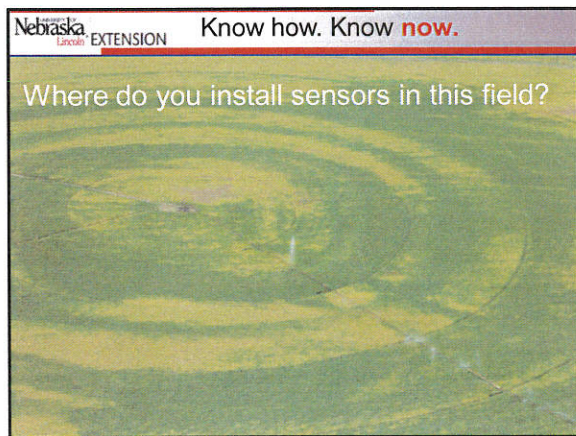
JMC Backsaver Soil Probes



IANR
















SOYBEAN MANAGEMENT FIELD DAYS

UNL Irrigation Apps

<http://go.unl.edu/qthb>




 Crop Water	 Water Meter Calculator
 Irrigation Pumping Plant	 Agriculture Irrigation Costs

SOYBEAN MANAGEMENT FIELD DAYS

Crop Water App

- Free App
- Available for Apple/Android
- Provides an easy way to estimate soil water status
- Will estimate water used/water available
- Log readings over time

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Four New Irrigation Apps Developed by UNL Extension

UNL Irrigation Apps

Crop Water **Water Meter Calculator**

Irrigation Pumping Plant **Agriculture Irrigation Costs**

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Crop Water App

- Calculate average reading down to 4 feet
- Water depleted in inches/foot
- Calculate water depleted in soil profile
- Also displays total water available

Description
The Crop Water App was developed at the request of Nebraska Agriculture Water Management Institute (NAWMI) as a public service. This free app is available on both the Apple and Android platforms.

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IrrigatePump App

- Cost - \$3.99
- Available in Apple and Android platforms
- Figure how well your pumping plants on your irrigation wells stack up against the Nebraska Pumping plant Criteria (NPC)
- Reasonable target for every new pumping plant

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IrrigateCost App

- Cost - \$1.99
- Available in Apple and Android platforms
- Calculates total irrigation cost as well as total ownership and total operating costs.
- It also breaks down costs by irrigation well, pump, gear head, pump base, diesel engine and tank and system and calculates per acre annual cost and per acre-inch annual cost.

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Water Meter Calculator App

- Acre inches pumped displayed
- Inches per acre displayed
- Total inches pumped during season
- Tracks annual allocations

LANR

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Cost Share Programs Work

ITEMS PURCHASED:			
No. of items	Description	Estimated Cost	Total Cost
	Watermark Sensors 2' Leads	\$30.00	
Quantity of each:	1' 2' 3'		
	Hand Held Reader	\$245.00	
	Data Logger w/ 6 Watermark Sensors (15' lead)	\$500.00	
Qty. of each of the 6 sensors:	1' 2' 3'		
	E-T Gauge	\$225.00	
	1' Handroll	\$74.00	
	JMC soil sampler backhoeer handle w/cleaner	\$375.00	
	18" Consultants Tube	\$95.00	
	1/2" Hole Sizing Mandrel	\$20.00	
	Total		
	Maximum \$500 NRD Discount		
			Sub-total
			Sales Tax (7%)
			Total Due (Sub-total + Sales Tax)

Do Not Include Payment


Despite cost share ending 3/31, equipment is available for purchase throughout the year. Contact F. for at 226-3402 or send an email to walahost@bbord.net with any questions regarding the equipment.

*NRD Discount will be 50% of the total cost up to \$500.00 per producer/year. If applying for cost-share this form must be signed (see below) & submitted by **March 31**, along with a W-9 and U.S. Citizenship Attestation form, available at the NRD office or online at www.bbord.net.

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Water is the lifeblood of agriculture!



NAWMN...


- Saves Water
- Improves Farm Profitability
- Sustains Rural & Urban Communities



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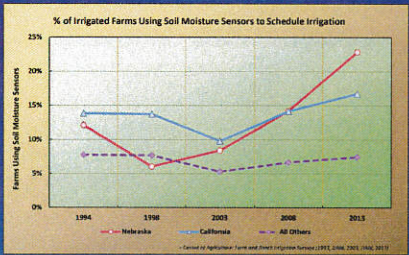
Our Challenge to Producers. . .

Take one field or pivot and install an ETgauge and soil water sensors and learn to manage your irrigation water using these tools on this parcel of land and compare your water use / energy savings with the other fields / pivots in your operation along with your yields.




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% Irrigated Farms Using Sensors




Year	Nebraska	California	All Others
1994	12%	14%	8%
1998	6%	14%	8%
2003	10%	10%	6%
2008	14%	14%	7%
2013	22%	16%	7%



Nebraska Land EXTENSION Know how. Know **now.**

Questions?



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