

# the **AQUIFER**

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A PUBLICATION OF THE GROUNDWATER FOUNDATION

## **The Groundwater Foundation Celebrates 25th Anniversary**

This issue of *The Aquifer* is dedicated to commemorating The Groundwater Foundation's 25 years of educating people about the important natural resource of groundwater. You'll find articles from the first edition of *The Aquifer*, updates from first issue authors, Groundwater Foundation staff reflections, and a photo album from various programs over the years.

Thank you for celebrating with us!



2009 Rain Garden Workshop



2004 Groundwater University



2000 Sandhills Sojourn

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# Groundwater: The Future Has Arrived

## Looking Back at The Groundwater Foundation's First Symposium

By Owen Goodenkauf, Principal Hydrogeologist, HWS Consulting Group

A generation has passed since The Groundwater Foundation first explored the future of groundwater. Twenty five years ago, the first Foundation Symposium examined "Groundwater for the Future: Choice or Default." That first symposium was a wide-ranging review of groundwater science and policy issues. Some of the presentations dealt specifically with Nebraska, the Foundation's home state. Many more, however, had universal application, perhaps pointing the way to the Foundation's later expansion in membership all across the U.S. and beyond.

The 1985 Symposium's first session was a virtual advertisement for the benefits of good science in understanding an important resource. Several scientific "heavy hitters" explained the occurrence, movement, and use of groundwater. Twenty five years later, groundwater continues to supply millions of people with clean drinking water. Billions of gallons are pumped to irrigate crops and used by industry. Despite the occasional newspaper headline related to contamination, the vast majority of groundwater (most studies cite >95%) remains clean and uncontaminated.

The next session of that first symposium began a review of specific groundwater contaminants which were becoming a concern at that time. In the years since 1985, these contaminants have been much better defined and regulatory enforcement schemes developed to begin remediation of many of these problems:

- Natural radioactive materials in groundwater were the first symposium chemicals discussed. The Nebraska Department of Health and Human Services (and similar agencies in other states), and the U.S. EPA now regulate these materials in drinking water, as well as numerous other natural and man-made contaminants.
- The buildup of nitrogen fertilizers in some groundwater is being addressed by local Natural Resource Districts in Nebraska and the Department of Environmental Quality, and similar authorities in

other states. Local controls have been applied to attempt to limit movement of nitrogen compounds to the groundwater beneath irrigated cropland. Groundwater Management Plans developed strategies. Farmers improved their practices. Point source releases of industrial nitrogen also are being investigated and cleaned up by state regulation. For example, a release of raw nitrogen product resulting from a tear in the liner of an industrial storage basin, in the symposium year of 1985, was cleaned up over this 25-year period. The equivalent of over 120 tons of nitrogen was recovered by groundwater pumping and piped to nearby cropland for beneficial reuse.

- An aggressive groundwater remediation program also attacked the problem of leaking petroleum fuel tanks. A single gallon of gasoline can contaminate a million gallons of groundwater. All across the country, state programs have directed the cleanup of tens of thousands of fuel releases that contaminated soil and groundwater. A large industry developed to perform these cleanups. Through these efforts, aquifers beneath numerous spill sites were restored, and further leaching of hydrocarbons to groundwater eliminated or controlled.
- Synthetic organic chemicals in groundwater, an emerging issue in 1985, are now regulated strictly by the Federal Resource Conservation and Recovery Act (RCRA). A responsible party that releases a hazardous chemical(s) to the soil and groundwater must undertake

a rigorous response to define the contaminated area, provide financial assurance to guarantee cleanup occurs, and clean up the soil and groundwater. If the site is not completely restored to EPA action levels by the remediation, the responsible party must perform groundwater monitoring for 30 years

or more to protect groundwater.

The Foundation's luncheon speaker in 1985, then-Nebraska State Senator Chris Beutler, was instrumental in helping pass many groundwater protection measures, including the Nebraska Petroleum Release and Remediation Act. As previously described, that program led to the cleanup of millions of gallons of groundwater in the state. Mr. Beutler is now the Mayor of Lincoln, Nebraska. In an interesting update,



one of his administration's projects currently involves the planned cleanup of soil and groundwater to allow beneficial re-use of old industrial property. The West Haymarket Redevelopment Project will allow a new arena, hotels, and other businesses to be built on historically contaminated railroad and industrial property. This is just one example of a new practice started over the past 25 years, called "Brownfields Redevelopment." All across the country, thousands of formerly abandoned or under-used contaminated industrial properties are being investigated, cleaned up, and redeveloped to a new, higher use, and returned to the tax rolls. The U.S. EPA has a sizeable grant program to encourage the voluntary cleanup and redevelopment of these properties.

### What about the next 25 years?

Where do we go from here? Certainly, much work remains to be done in continuing the progress of the past 25 years

– protecting our groundwater resources, and continuing the cleanup in those areas where degradation has occurred.

New issues continue to arise:

- “The Contaminant of the Month.” It seems some new chemical contaminant is frequently making headlines. Compounds that caught the attention of groundwater specialists in recent years include a component of rocket fuels and munitions, of all things; another chemical that hit the news was a plasticizing agent in soda bottles. The number of chemicals used in our modern society is staggering, and many have the potential to reach groundwater if not handled properly.
- Increasing technical sophistication of our laboratories lets us detect chemicals at lower and lower concentrations. Some trace compounds are now detected at fractions of a part per trillion. This is equivalent, in terms of time, to one second in about 30,000 years. The science of risk assessment is also evolving. Scientists are now investigating potential health impacts of certain chemicals at these very low levels, much lower concentrations than anything envisioned in 1985.
- Pharmaceuticals and endocrine disrupting compounds are examples of new chemicals showing up in our surface water and groundwater that were never dreamed of in 1985. Traces of caffeine; nicotine metabolites; heart, blood pressure, and other medications are showing up in our water resources – some from the longtime practice of disposal down the drain but most from passing through the body and through our wastewater treatment systems. The potential health impact of these trace chemicals is still being investigated.
- Groundwater is an energy source. Many schools, businesses, government buildings and private residences already use groundwater source heat pumps and heat exchange systems for heating and cooling. These systems extract energy from groundwater for heating purposes, and essentially “dump” heat energy into the groundwater when in a cooling mode. Groundwater’s constant temperature allows for highly efficient energy transfer. As the world transitions from carbon-based energy to renewables over the next several decades, groundwater will become

an increasingly important source of energy.

- The necessary repairing and re-investing in our crumbling infrastructure over the next 25 years will include many water supplies and water treatment systems. Many of our water wells, pipes, and treatment systems are showing their age and will need to be upgraded, replaced or expanded. Our water and wastewater treatment plants will need to be able to handle many new chemical contaminants, at lower concentrations.
- Localized water shortages will require innovative designs in water and wastewater systems. Already, many reclamation systems have been designed to take very highly treated wastewater and land-apply it or

inject it to recharge groundwater in water-short areas. Orange County, California, for example, routes some of this reclaimed wastewater to the coastal aquifer to make a hydraulic “barrier” to salt water intrusion, thus protecting the area’s fresh water aquifers.

We can only begin to speculate on the other fascinating things we will see related to groundwater over the next 25 years. One safe prediction, however: The Groundwater Foundation will continue its excellent work toward conservation and protection of our groundwater resources. ♦

*Editor’s note: Owen Goodenkauf wrote about The Groundwater Foundation’s first Symposium in the initial issue of The Aquifer.*

# the aquifer

Volume One  
Number One

Special Symposium Edition  
October, 1985

The Nebraska Groundwater Foundation and its co-sponsor, the Nebraska Association of Resources Districts, announces its first Annual Symposium: “Groundwater for the Future: Choice or Default”, on November 5, 1985, at the Nebraska Center for Continuing Education in Lincoln. The all day seminar features Keynote Speaker Governor Robert Kerrey, and luncheon speaker Senator Chris Beutler. The Foundation considers its theme and participants especially appropriate, given the emphasis on groundwater legislation expected in this year’s legislative session.

SYMPOSIUM PROGRAM SUMMARY

8:30 a.m.	<u>Keynote Address</u> – Governor Robert Kerrey
9:00 a.m.	<u>Physical Setting of Groundwater</u> – Vincent Dreeszen, Director of Conservation & Survey Division; Darryll Pederson, Hydrologist, University of Nebraska-Lincoln; Dick Engberg, Hydrologist, Water Resources Division, US Geological Survey
10:15 a.m.	<u>Case Studies of Groundwater Quality</u> – Roy Spalding, Hydrochemist, Conservation & Survey Division; Owen Goodenkauf, Hydrogeologist, Hoskins-Western-Sonderregger, Inc.; Beth Rowen, Hydrogeologist, Nebraska Department of Environmental Control; Jim Schepers, Soil Chemist, UN-L Department of Agronomy
11:45 a.m.	<u>Luncheon</u> – Senator Chris Beutler, Guest Speaker
1:00 p.m.	<u>Drinking Water and Health</u> – Candice Jacobs, Toxicologist, Nebraska Department of Health; Dr. Dennis Weisenberger, Director of Hemopathology, University of Nebraska Medical Center
1:45 p.m.	<u>Local Policy Considerations</u> – Jim Goeke, Geologist, Conservation and Survey Division, North Platte Station; Cindy Veys, Water Resources Planner, Hoskins-Western-Sonderregger, Inc.
2:45 p.m.	<u>State Policy Considerations</u> – Dennis Grams, Director, Nebraska Department of Environmental Control; Senator Rod Johnson; Senator Loran Schmit; Senator Sandra Scofield
4:00 p.m.	<u>Wrap-Up</u> – Susan Seacrest, President, Nebraska Groundwater Foundation

An Official Publication of the

## Nebraska Groundwater Foundation

# Educating into the Future

By Tom Spears, Chair, Groundwater Foundation Board of Directors

**I**n the late 1990's, it became apparent to me that mankind was flirting with disaster of a new variety. Rising populations and rising standards of living were putting strains on our natural resources in a way that they have never done before. Nowhere was that strain more evident than with fresh water.

Man has harnessed fresh water resources for drinking, washing and irrigation since the beginning of civilization. Now we are reaching the limits of the available resources. Seven billion plus people, growing both in number and in standard of living, are continuing to demand more and more fresh water. In some regions of the world we are already fully utilizing or even over utilizing the available supply.

I'm not an anti-industry or anti-development advocate. And although I believe we must maintain our environment to be supportive to other species and natural beauty, I also believe continued economic growth is necessary for the advancement of mankind.

All of which led me to the conclusion that we must learn to protect the fresh water resources we have, and make water usage more productive – getting more output for every gallon of water we use. I found this conclusion to be consistent with the mission of The Groundwater Foundation – to protect groundwater, and improve the effectiveness of its utilization.

The Groundwater Foundation has elected to try to accomplish this mission through education and local community action, rather than through confrontation, legal action, regulation or divisiveness. It is a long way to success to accomplish

goals through incentives, information, and positive support, but fundamentally we believe that positive engagement will lead to people taking direct responsibility for the future of the resource.

After 25 years, The Groundwater Foundation has made some amazing strides. Over five hundred communities have participated in our Groundwater Guardian program, a program which impacts groundwater on a local level in communities across North America. Our Wellhead Protection program has helped rural communities in Nebraska protect their sources of drinking water from various sources of contamination. One of our newer programs, Groundwater Guardian Green Sites, helps green space managers and users of landscape water to implement best conservation

and protection practices, and provides them recognition for doing so. In just two short years while in prototype, this program has documented the savings of over 330 million gallons of water, and eliminated the use of some 730,000 pounds of fertilizers and 37% fewer pesticides. LEAP into Groundwater is our latest program, targeted at educating middle school and high school aged children culminating in the implementation of a local groundwater conservation project.

We see a future that allows The Groundwater Foundation to continue our philosophy – positive, education based, and local. And because we've learned a lot over the last twenty-five years about the complex relationship between groundwater and surface water, many of the programs our organization has developed

have applicability in areas where the primary source of fresh water are surface flows. As a result, we see a continuing broadening of our programs across the United States.

Finally, it is my hope that The Groundwater Foundation will become even more actively involved in water conservation in agriculture, where a very large proportion of consumptive water use occurs, and will continue to occur as the world population continues to rise, and people eat diets richer in meats.

As the next 25 years unfold, The Groundwater Foundation is positioned in a unique way to have a major impact on the availability of clean water for our children and our children's children. It is a responsibility that the board and staff of The Groundwater Foundation takes very seriously. ♦



▲ The Groundwater Foundation Board of Directors. Front row: John Chapo, Cindy Kreifels, Tom Spears. Second row: Jay Beaumont, Jane Griffin, Rick Karlin, Don Kraus, Dayle Williamson, Warren Arganbright, and James Burks. Not pictured: Catherine Chertudi, E. Robert Meaney, Steve Seglin, and Nancy Wright.



**Jane Griffin**  
President

Two and a half years ago, I accepted the position of president of The Groundwater Foundation. Many people would comment, “Those are big shoes to fill.” I would usually try to respond with something light-hearted like, “Yes, I know, during the interview process I did ask Susan what size she wore.”

And yes, I do agree that the “shoes do make the outfit” but must also recognize that all of the components of the outfit are vital; in this case I am talking about The Groundwater Foundation team. These are the components that are key to the success of the organization.

First of all The Groundwater Foundation is blessed with a learned, dedicated, passionate staff. It is always remarkable to see the effort put into every action – with the ultimate goal of providing the best educational experience. For example, in July we were in Wayne, Nebraska at the annual Chicken Show. I joined the festivities for the afternoon shift at our booth in Bressler Park (which, by the way, was recently designated as a Groundwater Guardian Green Site). The booth was perfectly set up and organized to ensure maximum learning and fun for the families that visited the booth. They were able to learn about the water cycle by making water cycle bracelets as well as the characteristics of groundwater by experimenting with the groundwater flow model. Youth and adults alike were able to learn about the interaction of surface and groundwater, see the effects of contamination, and attempt to remediate by pumping out the contaminated water. Every participant agreed whole-heartedly that protection is a lot easier than clean up.

Second, The Groundwater Foundation has excellent leadership provided by a dedicated Board of Directors. It has been a pleasure to work with this group of people who care about groundwater and the mission of the organization, and are dedicated to identifying the best path towards a sustainable future.

Lastly, but just as important, is the network of volunteers, members, students we reach through educational efforts, and citizens who benefit from a safe, clean supply of drinking water. As we at The Groundwater Foundation have often said; it is because of the people that groundwater must be protected, but it only through the efforts of the people that it can be accomplished.

Therefore, I see my job as making sure the shoes fit and that they are pointed in the right direction to make the most effective impact. And I am honored and excited about being a part of the great outfit The Groundwater Foundation has established!💧



**Cindy Kreifels**  
Executive Vice  
President

Seventeen years ago, I was offered a job with an organization I knew very little about, The Groundwater Foundation, to manage information about the growing number of people with whom the Foundation came in contact. At that time, the Foundation was in the early years of the Children’s Groundwater Festival, held an annual symposium, and shared information through The Aquifer publication. In 1993, the Foundation had around 1,500 individual entries in its database and was looking to grow. In 1994, the Foundation launched the Groundwater Guardian program with eight communities from across the country and Canada. Growth was what we were looking for and growth is what we got – the database now has over 43,000 entries and Groundwater Guardian has included over 500 entities. So what has really been accomplished?

I could answer the question with statistics about how many programs we have developed, or how many people we have reached which while important don’t really tell the full story. Instead, I think a couple of short stories that represent many that have been related to us tell it all. For instance, just this week while at a meeting I ran into a young person who attended the Foundation’s Groundwater University program during her middle school years. Today she has just been hired as an Environmental Health Educator and is so excited about her future educating people about water and other environmental issues.

Another example of accomplishment comes when communities, by their own initiative, are working hard locally to protect groundwater through water festivals, wellhead protection programs, zoning ordinances, and watershed planning projects. This year alone, Groundwater Guardian communities are reaching over 13 million people with their projects.

Knowledge about the importance of groundwater is spreading, one person at a time. It is a slow and arduous process at times, but Groundwater Foundation employees creatively develop and implement some of the most awesome education programs in the country and I am privileged to be a part of it.

As the Executive Vice President for the past few years, it has been a delight to look back at our accomplishments and envision our future. Each day offers the challenge of how best to reach people and inspire them to take action to protect our life-giving groundwater. The staff of The Groundwater Foundation has changed over the years, but the one constant has been the dedication and inspiration of each individual to our cause – a future of groundwater educated, action-oriented citizens!💧



**Brian Reetz**

*Program Coordinator*

Since I've just wrapped up my first year with The Groundwater Foundation, it's given me a great chance to look back at all of what I've learned. To say that I've learned a lot about groundwater and the issues related to it is an understatement.

One of my first experiences at the Foundation was working with the youth camp that we have each summer through Bright Lights. That first year I felt like in some ways I was learning right along with the campers, which made the trivia challenges a lot of fun for both the campers and myself.

Since then I've been able to travel the state on a couple of different fronts. One of those is working with the Groundwater Guardian Green Sites program. I've been able to sit and chat with a number of different people, be it park directors, golf course superintendents or even staff at colleges. They all realize that even though they are doing great things there is still more that can be done to protect groundwater.

But I'm also fortunate to work with our newest program, Let's Keep It Clean! The program has given the Foundation a chance to work directly in and with communities, and I've had the chance to work with some of the leaders in three communities in the state so far. It's been a privilege to talk to them about the groundwater in their towns and what they can do to help make it sustainable for future generations. I've also worked with youth at libraries through the fun and interactive Freddie the Fish activity.

I'm excited about the future of groundwater, The Groundwater Foundation and the small part that I play in making the community, nation and the world more educated on the issues related to it.💧



**Lori Davison**

*Database Manager*

When asked to write about my history with The Groundwater Foundation, my first thought was where did all those years go and where do I begin....so here goes! My journey began a little over 25 years ago when Susan Seacrest called to see if I would help her with some correspondence for a new project she was working on. Her mother, whom I had worked with at the University of Nebraska for many years, had told her that I had left my job to stay at home with our new baby and might be interested in a little part-time work. That was the beginning of my journey at the Foundation. I had the typewriter and Susan had the idea!

For a long time, we met in Susan's kitchen or my dining room. Eventually, more staff was added and we moved into offices. During this time, the Foundation grew rapidly, from being a Nebraska-based organization to becoming recognized nationally for its many outstanding educational programs.

One of my favorite programs that I was involved with was the Children's Groundwater Festival. I really enjoyed seeing the thousands of children learn about groundwater by participating in fun activities.

The Groundwater Foundation has continued its pioneering spirit through many other programs and events that have taken place over the years. So, here I am 25 years later...still part-time, but a full-time supporter. Instead of a typewriter, we have computers and six full time staff. My main duty is managing the Foundation's database plus a variety of other duties.

People comment to me, "You've been there a long time...you must like it." I respond with, "I work with great people, enjoy what I do, and groundwater is such a great cause!" Being involved with The Groundwater Foundation has taught me that we can make a difference in the world we live in.💧



**Doug Sams**

*CPA, Financial  
Services Accountant*

Ready for a hiatus from 15 years of income tax preparation and auditing in Florida, I made what I thought at the time was a temporary move to Lincoln, Nebraska to be closer to family and to contemplate new "directions." I happened upon a web ad for a part-time accounting position at an environmental organization. I remember thinking this opportunity would be a new and fresh experience – and a perfect complement to the relaxed schedule I was enjoying in Lincoln.

After submitting my credentials I was called in to meet with Susan Seacrest, Groundwater Foundation President at the time, and Cindy Kreifels, Executive Vice President. What I encountered was a forceful whirlwind of energy, passion, and commitment towards education and protection of our groundwater! I saw that energetic culture in all the staff. I signed on and it's been a fun and rewarding adventure ever since.

In January, 2008 my part-time position turned into full time employment. My focus has been on improving accounting processes and related systems that enhance the Foundation's proficiency in managing the funds we receive from grantors and donors that enable us to fulfill our mission. My primary responsibilities are preparing grantor financial reporting, GAAP financial reporting, project reporting, and management reporting. Providing effective reports is the challenge I enjoy each day with the Foundation.

While I'm a native Nebraskan I was raised in another state and wasn't aware of groundwater's importance or the environmental stresses we place on our groundwater resources. Each day I continue learning from my talented co-workers about groundwater along with the many youth, adults and communities that we serve through our work.💧



**Jamie Oltman**  
Program Manager

We learn by doing.

Part of my work at The Groundwater Foundation is in youth education. From two-year-olds to high school students I have had some great experiences while teaching youth about water and the environment. Sometimes I wonder who has more fun, the students or me? Regardless of who is having the best time, it's gratifying to know many youth from across the country have learned more about groundwater because of The Groundwater Foundation's youth education programs.

There are the Science Olympiad middle school students from across the country that compete in Awesome Aquifers, who know more about groundwater than most high school or even college students. We ventured to several National Tournaments; in 2005 at the University of Illinois at Urbana-Champaign, Illinois; in 2006 at Indiana University in Bloomington, Indiana; and in 2007 at Wichita State University in Wichita, Kansas. In addition, the Foundation has participated in the Nebraska State Science Olympiad tournament every year since 2005. This year we will be part of the national event line-up and will once again meet youth from across the country at the National Tournament in Madison, Wisconsin in May 2011.

There was the overnight at the Henry Doorly Zoo in Gorilla Valley with Hydro Heroes, a youth camp in 2006. For two days we traveled across eastern Nebraska with 40 students stopping in Aurora at the Edgerton Explorit Center, Seward's Wastewater Treatment Plant, the Aksarben Aquarium at Schramm State Park, and Eugene Glock's Farm in Rising City. What an awesome experience for those kids.

And the past three summers we have spent a week holding a day camp through the Bright Lights Summer Learning program. Middle school youth meet each day to travel to places in and around Lincoln to learn about water, including Branched Oak Organic Dairy Farm, Spring Creek Prairie, and Holmes Lake. We have tons of fun and I know the students talk about their wet and muddy adventures long after camp is over.

Then there are the festivals and day camps I get to go to, such as the Nebraska Children's Groundwater Festival, the Earth Wellness Festival and the Nebraska Game and Parks Outdoor Expo. This summer I also spent a day in Deshler with a group of students as we explored water in their home town. There are other visits to educational centers and youth programs but cannot list all of them.

It's through these experiences and seeing how youth better understand their environment through hands-on and experience-based learning that has had a huge impact on me and my understanding of how we all, young or old, learn.💧



**Jennifer Wemhoff**  
Program Manager

I first heard of The Groundwater Foundation when I was a junior at Doane College in Crete, Nebraska, just outside of Lincoln. I was searching for an internship when I saw a posting for a part-time intern at the Foundation, which started my incredible journey with groundwater. I had no idea how much this internship would help shape my future.

When I started, I knew what groundwater was ("It's the water under the ground, right?") but quite honestly, not all that much more. My knowledge of and enthusiasm for groundwater was expounded by working with the founder of The Groundwater Foundation Susan Seacrest. Susan's passion for her work inspired me to embrace my role at the Foundation and see that the work we did can truly make a difference.

I've been fortunate to work on a variety of programs and projects over the last 10 years, which have given me rich and unique experiences. I was a water fortune teller at the Children's Groundwater Festival, sharing with students how I "saw" them protecting groundwater in the future. I've worked with Groundwater Guardians from across the U.S. and Canada, and am continually amazed at the innovative, creative activities they implement in their communities. I've had my eyes opened to the abounding beauty of my home state through countless road trips along its many two-lane highways. I've been ankle-deep in mud and water, learning about our natural resources in a hands-on way right alongside student participants in our youth programs. I've given presentations on topics from pathogens to septic systems to groundwater basics and had the opportunity to travel the country, see and learn new things, and meet new people. I've been privileged to

work with wonderful, dedicated colleagues over the years, who share the same desire to have an impact.

In my youth and even in my college days, I never envisioned myself working in the nonprofit sector, let alone enjoying it! But I take satisfaction in knowing that I'm working for something instead of working for someone. And groundwater is certainly a worthy and important cause to work for.💧

## A Look Back at the First Aquifer

These articles appeared in Volume One, Number Two of *The Aquifer*, published in winter 1985-1986. This was the first "full" edition of the publication, as Volume One, Number One was an invitation to participate in The Groundwater Foundation's first Annual Symposium.

# the aquifer

October 1985  
Volume One  
Number Two

## Report on the First Annual Symposium

### "Groundwater for the Future: Choice or Default"

By Owen Goodenkauf

Nearly 150 members and friends of the Foundation heard Governor Bob Kerry say "...quality of a product is important" in his keynote speech, and the entire November 5 Symposium turned out to be a quality product. The Governor opened the proceedings at the Nebraska center for Continuing Education by relating the building of quality products to maintaining good quality water. He asked Nebraskans to "preserve for future generations this gift of water." Protection of quality groundwater will take "all of us," he noted, and complimented the Groundwater Foundation for its initial efforts.

Following Governor Kerrey's address, the Symposium opened with a discussion of the physical setting of groundwater. Dr. Vincent Dreezen outlined the geology of Nebraska and Dr. Darryll Pederson discussed the occurrence and movement of water within that geological framework. Dick Engberg of the U.S. Geological Survey summarized the water quality in the state's major aquifers.

The Symposium's second session involved discussion of specific groundwater contaminants found in the state. Dr. Roy Spalding provided an excellent explanation of natural radioactive materials and the resulting radioactivity measured in some Nebraska groundwater. Jim Shepers described the application of nitrogen fertilizer to cropland and the resulting build up of the chemicals in the subsurface. Owen Goodenkauf provided a summary of the problems caused by leakage of gasoline into the groundwater, and Beth Rowan, with the Department of Environmental Control, discussed the groundwater contamination by synthetic organic chemicals at Hastings.

At the Symposium luncheon, Gordon Kissel, Executive Director of the Nebraska Association of Resources Districts, introduced Senator Chris Beutler as speaker. The Senator provided an excellent summary of the major issues involved in groundwater protection and the legislative and political framework in which those issues must be resolved. He urged

the Foundation to be aggressive but impartial in its attitude and in its investigation of the state's groundwater problems and potential solutions. Organizations with objective points of view have an extra measure of credibility in the eyes of government officials and the public, he said.

Leading off the afternoon session were two talks dealing with the general topic of drinking water and health by Candice Jacobs, the State Health Department's toxicologist, and Dr. Dennis Weinberger with the University of Nebraska Medical Center. The program then moved into policy considerations, with Jim Goeke of the UNL Conservation and Survey Division discussing voluntary groundwater management in the Upper Republican NRD. Cindy Veys, a water resources planner with the Lincoln firm of Hoskins-Western-Sondereger, Inc., described the groundwater management plans being prepared by several NRDs. Dennis Grams, Director of the Department of Environmental Control, provided his agency's perspective on groundwater quality protection. To close out the afternoon program, three senators, Rod Johnson, Loran Schmidt, and Sandra Scofield, contributed to a legislative overview. The Senators urged the Foundation members and the general public to be aware of the activities in the legislature and to communicate with Senators regarding proposed legislation.

Foundation President Susan Seacrest concluded the Symposium. She summarized the Foundation's goals to educate Nebraskans about the use, conservation, and protection of our groundwater resources, and described future educational efforts the Foundation will make.

The Foundation's first Symposium was an unqualified success, and fulfilled the promise of being a "quality product." With this excellent first effort as a "stepping stone," next year's Symposium should be another exciting event. We look forward to seeing you there.

## Message from the President

Susan Seacrest

My first thought on writing this initial column for *The Aquifer* is an overwhelming thank you to you, the charter members of the Nebraska Groundwater Foundation. Without your support, this Foundation could not even begin to realize the enormous success it has already enjoyed during its formation. A personal thank you to each of you for your faith in the future of this organization, the State of Nebraska, and the importance of public education about our #1 natural resource - groundwater.

Secondly, a progress report. Nebraskans have responded enthusiastically to the dual challenge of utilization and conservation of groundwater. There is great public interest in our groundwater as evidenced by all the citizen groups actively working to support their particular cause. However, I feel the Nebraska Groundwater Foundation's unique ability to serve the public rests with its determination to represent no single point of view on this complex topic. Rather, our dedication will be to illuminate the facts for the close examination of citizens and then to help motivate them to become actively involved, responding to their communities' unique needs and resources effectively as possible.

This public education emphasis is why the response to the Foundation has been so positive. Nebraskans want to have their intelligence respected, rather than having their interests manipulated by political and economic special interests. Together, as informed decision-makers, we will meet the groundwater challenges of tomorrow.

For example, consider the Foundation's first year accomplishments: state-wide and regional charter membership stands at 170. One-hundred sixty people attended the kick-off November 5 symposium "Groundwater for the Future." Through your support, the Foundation is sponsoring "Nebraska Groundwater Week" in May and instigating an award program honoring those Nebraskans creatively contributing to groundwater conservation.

National interest in the Foundation continues to grow. I have been invited to write about the Foundation in several national water publications. An auspicious beginning and perhaps, the beginning of a national model that may well become a national Groundwater Foundation based here in Nebraska.

Finally, and again, thank you, your investment is on solid ground.

I hope you will enjoy the four editions of *The Aquifer*. Plan, if possible, to attend the 1986 Groundwater Symposium and other Foundation events. We will try to give you many opportunities for involvement.

# the aquifer

Winter 1985-86  
Volume One  
Number Two

## Nebraska Groundwater Protection Strategy Summary and Status Report

By Dennis Grams

In 1981, the Nebraska Department of Environmental Control began work on a document intended to provide the framework for future legislation and regulation aimed at protecting groundwater quality in the state.

From the beginning, the people involved in the project worked from two premises: 1. That any plan for protecting groundwater quality would have to stress prevention and 2. That the plan would have to be multi-faceted and able to deal with the potential of groundwater pollution from a variety of sources.

On August 13, 1984, the NDEC unveiled the first draft of the Nebraska Groundwater Quality Protection Strategy. The department held a series of ten informal meetings across the state to discuss the draft and to hear what Nebraskans had to say about the issue of groundwater protection.

The strategy, even in draft form, was well received by the public. Favorable comments and suggestions were received from agricultural, industrial, and citizen's interest groups. Undoubtedly, the general feeling the department got was that the time had come for groundwater quality protection.

The strategy was finalized in February, 1985. In its final form, the Nebraska Groundwater Quality Protection Strategy identifies six major potential pollution sources and outlines various protective measures for each of the sources. The identified potential pollution sources are chemical and fuel storage tanks, agricultural chemicals, water treatment and disposal areas, water wells and test holes, industrial facilities, and leaks along transportation corridors.

A schedule for implementation of the various components of the strategy has also been developed. Among the many recommendations made within the implementation schedule was the need to draft legislation granting groundwater protection authority to the NDEC so that many of the potential pollution source categories could be effectively addressed.

A first step in drafting legislation came with the development of an omnibus groundwater quality bill. This omnibus bill provided a good picture of how the

various components of the strategy and legislative needs would fit together. The omnibus bill was reviewed by a number of water resource agencies in the state and then was broken down into several more specific bills, which, if passed, could provide for the development of the comprehensive, prevention-oriented groundwater protection program consistent with the goal of the Nebraska Groundwater Quality Protection Strategy.


During this legislative session, the NDEC will be offering two bills which correspond with the two major institutional mechanisms recommended in the strategy.

The first is the so-called "Superfund" bill, which is intended to allow the establishment of an emergency and remedial response fund for cleanup of groundwater. This state version of the Superfund would have much broader application than its federal counterpart under CERCLA. In addition, the fund could be used to match federal dollars at sites selected for the federal Superfund.

The other bill the department will offer addresses the concept of Special Protection Areas. As outlined in the strategy, a Special protection Area would allow areas with high susceptibility to groundwater pollution or areas already experiencing substantial contamination to have special protection measures placed upon them.

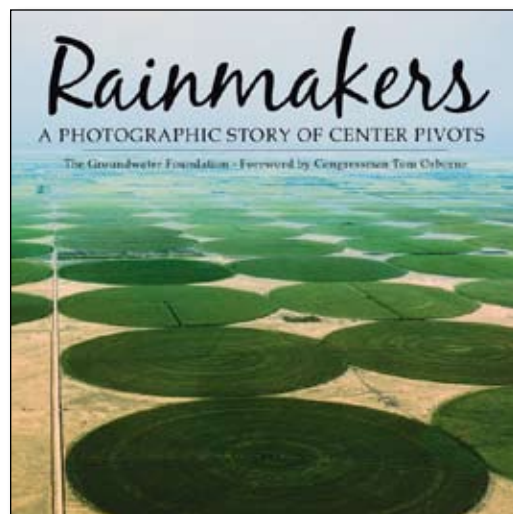
The Special Protection Area concept also allows for local input into the decisions regarding what special protection measures are necessary.

The NDEC has also been working with the sponsors of a number of other groundwater bills which directly address issues targeted in the groundwater protection strategy. These bills include chemigation (LB 284), underground storage tanks (LB 217), and well driller licensing and certification (LB 130).

  
**Nebraska  
Groundwater  
Foundation**

## Other Publications of Note

The Groundwater Foundation has published several manuals and activity guides, including *Making Waves*, *Making More Waves*, *Making a Bigger Splash*, *Making Discoveries*, and *Jump Into It*.



## Rainmakers

The Groundwater Foundation's first foray into books was *Rainmakers: A Photographic Story of Center Pivots*. It was published in 2005 and is available for purchase from the Groundwater Catalog.



## A Look Back in TIME Magazine

Susan Seacrest, President Emeritus and founder of The Groundwater Foundation, was named a Hero for the Planet by *Time* magazine in 1999.



# Outdoor Adventures in H<sub>2</sub>O

by Jennifer Wemhoff, The Groundwater Foundation

**D**uring the week of June 14-18, The Groundwater Foundation guided 23 fifth through seventh grade students through a week of learning, fun, and adventure in the Outdoor Adventures in H<sub>2</sub>O summer day camp.

Held once again in partnership with Bright Lights Summer Learning program ([www.brightlights.org](http://www.brightlights.org)), the Outdoor Adventures camp gives students the opportunity to interact with and explore nature through field trips, hands-on activities, and experiments to help them develop an increased appreciation for the environment and an understanding of the important role water plays in everyday life.

"Immersing kids in the environment they are learning about is really the best kind of classroom. Students walk away from this camp knowing more about water, not only why it is important but how they can help take care of it," said Groundwater Foundation Program Manager Jamie Oltman. Oltman and Groundwater Foundation staff members Jennifer Wemhoff and Brian Reetz led the camp.

The week began with students getting to know each other, camp teachers, and camp assistants Brenden Love, Eajen Hsu, Alex Copeland, and Jamie Fasnacht. A field trip to Schramm State Park and Aksarben Aquarium near Gretna, Nebraska included seeing fish native to Nebraska, learning about different types of turtles from Nebraska Game and Parks Commission's Greg Hartel, dip netting for water bugs, and a hike through the park.

On Tuesday, campers met at Lincoln's Holmes Lake where they learned groundwater basics by building different aquifer models. They also conducted experiments to measure the recharge and runoff rates of concrete, bare soil, and grass. Guest presenter Kyle Stroh with the City of Lincoln led campers on a lake cleanup, where interesting pieces of litter like hot dogs, cutting board, softballs, and golf balls were removed from the lake's shoreline. The students rounded out the day by working to build large aquifer models in groups.

The model-building continued on Wednesday, as students learned about

various groundwater concepts and potential sources of contamination by building models demonstrating a leaky underground storage tank, a sinkhole, an improperly lined landfill, over-fertilization, a leaking lake, an artesian well, and an improperly abandoned well. After creating mini center pivots with straws, students spent the afternoon at Spring Creek Prairie Audubon Center near Denton, Nebraska where they hiked through the tallgrass prairie, played in the pond, and dip-netted for macroinvertebrates.

On Thursday, students spent the day at Branched Oak Organic Farm near Raymond, Nebraska. Owner Krista Dittman showed campers how the cows are milked, what it means to be organic, how they make cheese, and the farm's watershed. At the farm's pond, students constructed filters to reduce the water's turbidity, and enjoyed some time splashing around. The day ended with students helping maintain the rain garden at Randolph Elementary School in Lincoln (which was installed by the 2009 Outdoor Adventures class) and making edible aquifers out of ice cream

and sprinkles.

The final day of camp began with a fishing clinic at Pfizer Inc. in Lincoln led by Andrea and Jason Faas with the Nebraska Game and Parks Commission. Campers learned how to cast, tie their own lines, and bait their hook, and each caught at least one fish. After returning to Randolph Elementary, students learned about water quality and performed tests for pH, turbidity, and nitrate on water samples collected at each field trip location. Camp concluded with Parent Showcase, which featured a musical slideshow with the week's highlights and students demonstrating their group aquifer models for parents and guests.

The Groundwater Foundation thanks Bright Lights, the Attorney General's Environmental Fines Fund, Nebraska Public Power District, Rogers Foundation, Cargill, and Valmont for their support of the 2010 Outdoor Adventures in H<sub>2</sub>O summer day camp. To see camp pictures, find us on Facebook at [www.facebook.com/groundwaterfoundation](http://www.facebook.com/groundwaterfoundation) or follow us on Twitter at [www.twitter.com/groundwaterfdn](http://www.twitter.com/groundwaterfdn). ♦

# A Timeline of Education

## A Visual History of The Groundwater Foundation's Youth Education Programs

During the fall of 1988 at The Groundwater Foundation's annual symposium, Marlene Rasmussen, a fifth grade teacher from Litchfield, Nebraska brought her students to participate in this grown-up conversation about groundwater issues in the state. By the end of the day it was clear that the long-term success of groundwater protection hinged upon educating and harnessing the energy of tomorrow's leaders. Thus, the Children's Groundwater Festival was born and the beginning of The Groundwater Foundation's commitment to educating youth. Since that time, The Groundwater Foundation has worked to develop many new and varied ways to educate youth about groundwater. As the stewards of the next generation, these young people need to understand groundwater, why it is important, and more importantly their role in protecting it for the future. ♦

**1996-1998**

Bringing the Festival Home



**2006-2007**

Test Your Well



**1989-2004**

Children's  
Groundwater Festival



**2004-2005**

Youth Groundwater  
Congress

**2005-2010**

Awesome Aquifers  
for Science  
Olympiad



**2010**

LEAP into Groundwater



**1994-2004**

Groundwater  
University



**1998-2002**

Awesome Aquifer Club



**2005-2007**

H<sub>2</sub>O on the Go



**2007-2010**

Water Ways



**1998**

International Youth Summit



**2006**

Hydro Heroes

# Let's Keep It Clean Project Update

Making a Splash in Public Libraries

**T**he Groundwater Foundation is currently working closely in three communities in the state of Nebraska as part of the Let's Keep It Clean! project to enhance local groundwater protection and education efforts. Staff from The Groundwater Foundation has been on the ground in Wayne, Crete and Minden helping to spread the word about what

Wayne Chicken Show on July 10, the Foundation had a booth in Bressler Park where they engaged attendees using water cycle bracelets and the groundwater flow model. Staff also took part in the Minden MAADays on July 31 where they hosted a booth that provided groundwater information and hands-on learning.



people can do to protect this important resource.

Groundwater Foundation Program Coordinator Brian Reetz has given presentations to each of the community's city councils and taken questions on specific information about their town. He also hosted programs with each of the local libraries' summer reading program to reach out to the youth in the community about the importance of clean water.

Staff from The Groundwater Foundation has also taken part in community events. At the

## Making a Splash with Freddie the Fish

With this year's summer reading program at Nebraska's public libraries themed "Make a Splash - Read!" The Groundwater Foundation took part in 12 library events in the cities of Wayne, Crete, Minden and Lincoln as part of the Let's Keep It Clean! project.

At each location, Groundwater Foundation staff told the adventures of Freddie the Fish, which teaches the lessons of how important it is to keep rivers and lakes clean



and the effects on groundwater. Each of the kids made a water cycle bracelet to remind them how important each part of the cycle is to their lives, and some made edible aquifers or played the water cycle dice game. Over 1,000 kids attended the Freddie the Fish library events during the months of June and July.

"The kids were so excited to meet and learn about Freddie," said Brian Reetz, program coordinator at The Groundwater Foundation. "The hour-long presentations at the libraries were just the right conduit to helping kids understand what groundwater is and how to keep it clean."

## What's Next?

The response from the project communities has been

tremendous, as over 250 youth attended the library events in Crete, Wayne, and Minden, and protection efforts are underway through the use of the Groundwater Guardian Green Site programs in the communities.

The Groundwater Foundation will soon be distributing full toolkits in the communities for them to use in their protection efforts as well as meeting with local businesses to share what they can do too.

The Let's Keep It Clean! project is sponsored by the Nebraska Environmental Trust, the Nebraska Department of Environmental Quality, and the Water Systems Council. Visit [www.groundwater.org](http://www.groundwater.org) and click on the Let's Keep It Clean! button to learn more.💧

# Protection: A Story Without An End

## 25 Years of Nebraska Groundwater Protection

By Dennis Grams, Consultant and Former Director of the Nebraska Department of Environmental Control, and Marty Link, Associate Director for the Water Quality Division, Nebraska Department of Environmental Quality

**F**or the past 25 years, Nebraska has continued to be one of the nation's leaders in protecting groundwater and the environment.

In 1985, the Nebraska Department of Environmental Control (now the Department of Environmental Quality, or NDEQ) was putting the finishing touches on the Nebraska Groundwater Quality Protection Strategy. Specific state legislation came out of this strategy, including the Special Protection Area (now Groundwater Management Area, or GWMA) statute (parts of Neb. Rev. Stat. §46-656) which parallels the Natural Resources Districts' (NRDs) GWMA authority. This legislation specifically targeted nonpoint source pollution in groundwater, and set up procedures for NDEQ to study, draw boundaries, and implement GWMA's with NRDs' cooperation or independently.

To date, NDEQ has performed 20 GWMA studies, most of which have led to the implementation of rules and regulations by NRDs to address nonpoint source contamination of groundwater, via farm best management practices, soil and water testing for nutrients, and farm operator education and certification programs.

The 1985 strategy also identified chemigation, underground storage tanks (storing mainly petroleum), and well driller licensing and certification as issues needing attention.

In 1986, the Nebraska Chemigation Act (Neb. Rev. Stat. §46-1101 to 46-1148) was passed by the legislature, setting up chemigation applicator

education and certification requirements, chemigation safety-equipment standards, and permitting processes. NDEQ developed rules and regulations for this program (Title 198) and currently has more than 18,000 chemigation sites permitted and more than 4,200 certified chemigation applicators. The use of trained operators and functioning safety equipment has prevented countless incidents of ag chemicals from being sucked into irrigation wells and the aquifer.

Likewise, the passage of the Water Well Standards and Contractors' Licensing Act in 1986 (Neb. Rev. Stat. §46-1201 to 46-1241) (with additional legislation throughout the years), allows Nebraska Health and Human Services to train and license well drillers and people who take water samples directly from wells in practices proven to keep the aquifer and groundwater safe from introduced contamination. Proper well construction standards prevent pollution on the surface of the ground from running down a well or beside it, thereby protecting the underlying groundwater. There are currently 850 individuals certified or licensed to drill wells, install pumps, and/or take samples from wells. Approximately 5,000 wells are drilled per year in Nebraska.

As part of a banner year for groundwater quality protection legislation, the Petroleum Products and Hazardous Substances Storage and Handling Act (Neb. Rev. Stat. §81-15,117 to 81-15,127) was also enacted in 1986. This law contains requirements for installing, operating, and removing underground storage tanks (USTs) (State Fire

Marshal responsibility) and cleaning up leaks impacting soil and groundwater (NDEQ responsibility). Since 1986, approximately 14,500 USTs have been removed, over 6,100 leaks have been reported, and over 4,400 cleanups have been completed. Currently, about 6,800 USTs remain in service, and about 1,700 groundwater cleanups are continuing or pending. The legislation enacted more protective requirements to prevent leaks or to detect them early, thereby preventing additional soil and groundwater contamination.

The Integrated Waste Management Act, originally passed in 1992, was developed to help manage landfills and solid waste to help protect the health of the public and the environment. New landfills must have liners to protect groundwater (or show a liner is not needed through extensive geologic work) and often must monitor groundwater, to show continued protection.

The Nebraska Environmental Trust Act was also passed in 1992. It uses state lottery funds to protect Nebraska's air, land, and water through grants given to entities to implement on-the-ground practices or improvements.

The Wellhead Protection Area Act was passed in 1998. It sets up an open process for municipalities and public water systems to use while developing

and approving a plan to protect the groundwater wells used for public drinking water supplies.

In 2003, the legislature passed the Private Onsite Wastewater Treatment System Contractors Certification and System Registration Act. NDEQ now requires those installing or working on onsite wastewater systems such as septic tanks and domestic wastewater lagoons to be certified and that new systems are constructed and installed to protect groundwater.

As the legislature and state agencies go forward in the groundwater protection realm, the state's 23 NRDs continue to protect or improve groundwater quality through their implementation of GWMA's. Also working to protect our groundwater are many other entities, such as Nebraska Rural Water Association, the Midwest Assistance Program, local county zoning administrators, and The Groundwater Foundation. These dedicated groups continue the huge groundwater protection and education endeavors this state has become famous for.

Here's to another 25 years of protecting groundwater in Nebraska, for Nebraskans. ♦

*Editor's note: An article titled "Nebraska Groundwater Protection Strategy Summary and Status Report" by Dennis Grams appeared in the first issue of The Aquifer.*





2003 Nebraska  
Children's  
Groundwater  
Festival

2007 Cooperative Conservation Award  
from Department of Interior



1995-1996 Groundwater Guardian  
Management Team

2004 10 Year Groundwater Guardians



1998 International Youth Summit

2008 "Celebrate" Event



2007 Groundwater Guardian Green Sites

2005 Mid-High Plains Education Initiative



2004 Awesome Aquifers for Science Olympiad

To see more photos from  
The Groundwater Foundation's  
25 years, please visit  
[www.groundwater.org](http://www.groundwater.org) and click  
on the 25th Anniversary logo.



# United States Department of the Interior

U.S. GEOLOGICAL SURVEY  
Office of the Director  
Reston, Virginia 20192

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AUG -9 2010

President Jane Griffin  
The Groundwater Foundation  
P.O. Box 22558  
Lincoln, Nebraska 68542-2558

Dear President Griffin:

In 1985, when The Groundwater Foundation was founded in Lincoln, Nebraska, the U.S. Geological Survey (USGS) was there to assist by helping the Foundation spread its valuable message. The USGS supported The Groundwater Foundation as presenters at conferences, as participants in conservation programs, and as volunteers at outreach events. The partnership that began 25 years ago has benefited The Groundwater Foundation, the USGS, and the Nation.

The Groundwater Foundation and the USGS have grown together and supported each other during these many years. Our role, as a Government agency, has been to produce a sound foundation of accurate, widely available hydrologic information for local, State, tribal, and other Federal agencies, as well as for scholars, and the public. The Groundwater Foundation staff and program participants have used this information for educational and outreach projects to promote groundwater protection and conservation, and to teach generations of children to appreciate and understand the importance of groundwater. The Groundwater Foundation has been a leader in creating such programs as the Groundwater Guardian and Groundwater Guardian Green Sites that encourage entire organizations -- including the USGS Headquarters in Reston and the USGS Northern Prairie Wildlife Research Center -- to minimize the impact they have on groundwater. The Groundwater Foundation's dedicated staff, and program participants' vision for the future have served communities in Nebraska and around the world.

The Groundwater Foundation and the USGS have worked cordially and effectively together for 25 years to advance the science and knowledge about groundwater and its important role as a vital natural resource. On behalf of the USGS, I salute The Groundwater Foundation on its 25th anniversary, and extend best wishes for a continued partnership in communicating the importance of groundwater.

Sincerely,

Marcia McNutt  
Director



*The Groundwater Foundation received this letter of congratulations from Marcia McNutt, Director of the U.S. Geological Survey.*



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