



Statue of blues guitarist Stevie Ray Vaughan watches over Shari Forbes' Town Lake site. Read more in the Monitor Spotlight: on page seven.

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Aqua Vitae is a newsletter published by LCRA for Colorado River Watch Network volunteers, Clean Rivers Program steering committee members and citizens concerned with the environmental quality of the Colorado River and its tributaries. If you want to be added to our mailing list, or if you do not want to continue receiving this publication, please contact Robin Darrough Berry, editor, at 1-800-776-5272, Ext. 2416, or in Austin at 473-3333, Ext. 2416 (e-mail robin.berry@lcr.org). Visit LCRA's Web page at <http://www.lcra.org/water/crwn.html>.

Watershed studies identify sensitive areas

by Geoffrey Saunders, LCRA senior hydrologist

LCRA and Travis County staff agree that some of the most environmentally sensitive areas in the Texas Hill Country are recharge zones for the unique springs and grottos in the area. Levi Springs on Lick Creek, Westcave Preserve, Hamilton Pool, Milton Reimers Park and even Dead Man's Hole just across the Hays County line all have geologic similarities: open caves or grottos beneath the overhanging Cow Creek Limestone. The grottos contain springs that are recharged by infiltration of rainfall into the overlying Hensell Sand, all part of the Trinity aquifer system.

Understanding the hydrologic process of infiltration and recharge is important if these areas are to be protected. For example, Travis County acquired Hamilton Pool and Milton Reimer's property to make these features accessible to the public while protecting them. Westcave Preserve is attempting to acquire land upstream from the preserve for the same reason.

Sources of Impacts

LCRA Water Resource Protection has performed a series of watershed assessments over the past three years in western Travis County, evaluating the Lick Creek, Bee Creek, Rocky Creek and Hamilton Pool watersheds. We have identified how commercial/residential development, rangeland management, road construction, groundwater use and other issues in those regions may affect water quality.

To better understand groundwater recharge in the region, LCRA is currently collecting data for the Westcave Preserve (Heinz Branch) watershed, including information on geology and soils. Specifically, LCRA is using a spring-loaded penetrometer to measure soil compaction and a double-ring infiltrometer rig to measure infiltration under saturated conditions.

To view the posters showing the results of some of LCRA's watershed studies, please plan to attend the annual CRWN stewardship workshop June 16 at Lake Buchanan. You can also view the Bee Creek studies online at <http://waterquality.lcra.org/bee creek/>.

On your next visit to the Hill Country, check out the geology and think about hydrologic processes related to water quality. Look for the easily recognized red sediments of the Hensell Sand and the white, massive Cow Creek Limestone on these properties.

Hamilton Pool:

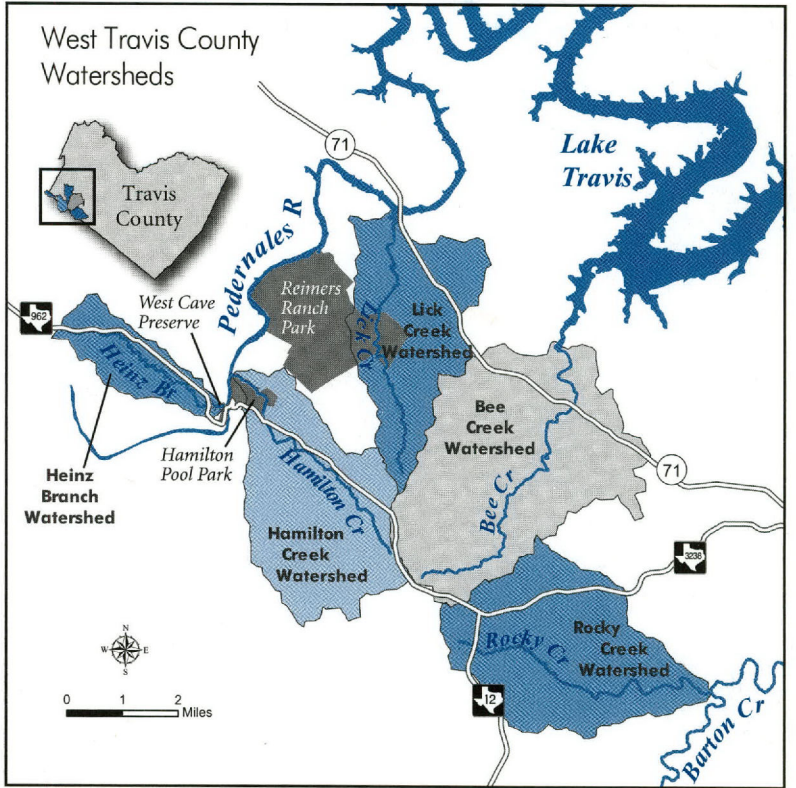
http://www.co.travis.tx.us/tmr/parks/hamilton_pool.asp

Reimers Park:

http://www.co.travis.tx.us/tmr/parks/reimers_ranch.asp

Westcave Preserve:

<http://www.westcave.org/>



These Texas Hill Country watersheds share similar geologic characteristics relevant to water quality protection.

**Help
Wanted:**

Volunteers needed for the San Saba River near San Saba and the Colorado River at Wharton Riverfront Park. Must be willing to commit to monthly data submissions for a minimum of two years.

The River Watch Trains New Monitors

Please welcome these new volunteers who will be submitting data for water quality index sites:

- Shuni Routh Pedernales River at LBJ National Historical Park
- Cliff and Carolyn Strippling..... Lake LBJ at Sunset Point
- Irama Wessleman Colorado River at Wharton Riverfront Park
- Jayson May Llano River below Johnson Fork
- Jen Piland, Erin Barker and Derek Herzog..... Colorado River at Wilbarger Bend

CRWN also welcomes two teachers with The Outdoor School at Texas Tech, Junction:

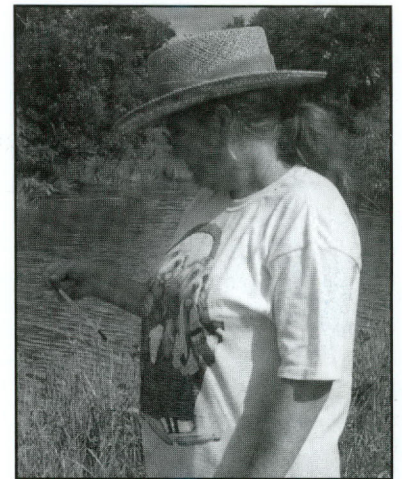
- Tiffany Bierschwale and Heather R. Creamer South Llano River at Flatrock Lane

The Austin watershed comprises the majority of the population and almost half of CRWN's active sites. Though the program is at capacity in the Austin area, the River Watch trains volunteer water quality monitors for strategic coverage throughout the entire basin.

Sites exist at public access locations from West Texas through the Chain of Lakes and all the way to the coast. Use our online map to see the locations of the San Saba and Wharton sites where additional volunteers are needed. <http://crwn.lcra.org/>

**Goodbye to retiring monitor
Mary Carrol Traylor Rocha**

The Colorado River Watch Network thanks Mary Carrol Traylor Rocha for 10 years of service as a volunteer water quality monitor on Cox's Creek, from March 1996 through September 2006. Mary Carrol got married in October and moved from Port Lavaca to Palacios. Thank you and congratulations, Mary Carrol!



Intern Action

RoxAnne Parker, CRWN's new intern, is assisting staff in the lab while attending classes at Texas State University. She plans to graduate in August 2007 with a bachelor's degree in resource and environmental studies and a minor in geology. RoxAnne is currently certified as a volunteer water quality monitor through Texas Watch but hopes to become a River Watch monitor.

"I have always felt it is important to protect the environment. This is why I have dedicated my career to help preserve our resources, like air and water," she said. "I'm honored to be able to help the staff at LCRA. I hope to continue to be part of the mission to keep the water clean in Texas."

CRWN's newest intern, RoxAnne Parker, is a Texas State University undergraduate pursuing a degree in resource and environmental studies.

THE WATER COLUMN

Hill Country streams impacted by flow and land use

by Bryan Cook, LCRA aquatic scientist

Water quality and aquatic life in Hill Country streams are shaped by a number of interrelated factors including climate, hydrology, geology and land-use. These factors create unique streams that range from small and intermittent to large and perennial. LCRA has studied the fish, benthic macroinvertebrates and water quality in a variety of stream types throughout this region.

Intermittent streams

Creeks in the smaller watershed tend to have intermittent flow. The fish community in these intermittent streams is typically comprised of just a few hardy species. These fish species are adapted to the harsh conditions associated with the flooding and drought cycle. Benthic macroinvertebrate communities in these streams vary, depending on flow conditions. Since the life cycle for most benthic macroinvertebrate species is relatively short, they can colonize these streams while they are flowing.

Perennial streams

Perennial streams are typically found in larger watersheds and have continuous groundwater contribution. The base flow provided by groundwater tends to moderate stressful summertime conditions through cooler water temperatures and increased dissolved oxygen. These creeks typically have permanent fish and macroinvertebrate communities with higher diversity that includes pollution sensitive species.

Land-use changes

The land-use is rapidly changing along many streams in the Hill County. As these watersheds urbanize, a series of predictable changes occur. Stream flows become flashier with increased impervious cover and carry more sediment, nutrients and pollutants from the newly developed areas. Increased nutrients contribute to larger and more frequent algal blooms, while sediments clog important riffle habitats. Overall, urbanization results in lower species diversity, fewer sensitive species and degraded water quality.

For more information about the effects of urbanization: <http://www.epa.gov/owow/nps/urbanize/report.html>



UPCOMING EVENTS

March 31, 2007
Household Hazardous Waste Collection
Blanco County Fairgrounds, Johnson City

Blanco County residents: Take your leftover, old or unwanted paint, cleaner and solvent to the household hazardous waste collection event. Volunteer participants are also needed. Lunch will be provided. Please contact Simone Body at Ext. 3347 or by e-mail at simone.body@lcra.org to get your name on the volunteer roster. A detailed information package will be sent to you prior to the collection event.

April 14, 2007
Don't Mess with Texas Trash-Off

Anywhere you want to plan a cleanup, Texas

The Don't Mess with Texas Trash-Off is part of the Great American Cleanup. For information:



<http://www.ktb.org/programs/trashoff/index.html>
 email katie@ktb.org or call Keep Texas Beautiful at 1-800-CLEAN-TX

June 16, 2007
Annual CRWN Stewardship Workshop
Buchanan Dam, Texas

Save the date – Limited lodging will be available June 15 and 16. Watch for details in the coming months.

June 23 - July 15, 2007
Secchi dip-in

Your monitoring site, Texas

Please plan to submit transparency readings from your site to the Great North American Secchi Dip-In Web site. See page 5 for more details.

Discharge relocated away from Linville Bayou

by Natalie Bell, Clean Rivers Program Intern

Active involvement is one of the distinguishing characteristics of CRP steering committee members. At a recent steering committee meeting in the lower basin, several members expressed an interest in comparing water quality data before and after a local oil refining facility relocated its discharge point.

The ConocoPhillips plant in Sweeny, Texas, has been in operation since 1963. The treated effluent from the facility had historically been discharged into Linville Bayou, which flows into Caney Creek. Discharge to the creek averaged 5 million gallons per day, the majority of the flow of Linville Bayou.

High selenium levels found

In 2001, the ConocoPhillips plant began using Venezuelan crude exclusively at its facility. This type of crude oil is high in selenium, a metal commonly found in Venezuelan oil deposits. While selenium is essential to human health in small amounts, it can be toxic in large amounts. After the switch to Venezuelan crude, selenium concentrations in the refinery's

treated effluent climbed to levels exceeding state water quality standards for the Colorado River basin.

Discharge moved

Operational changes made by ConocoPhillips to reduce the amount of selenium coming from the plant proved unsuccessful. Consequently, ConocoPhillips relocated its discharge point to a tidal portion of the Brazos River basin via a newly constructed 26-mile pipeline. The Brazos River tidal is a larger water body and better able to assimilate the discharge.

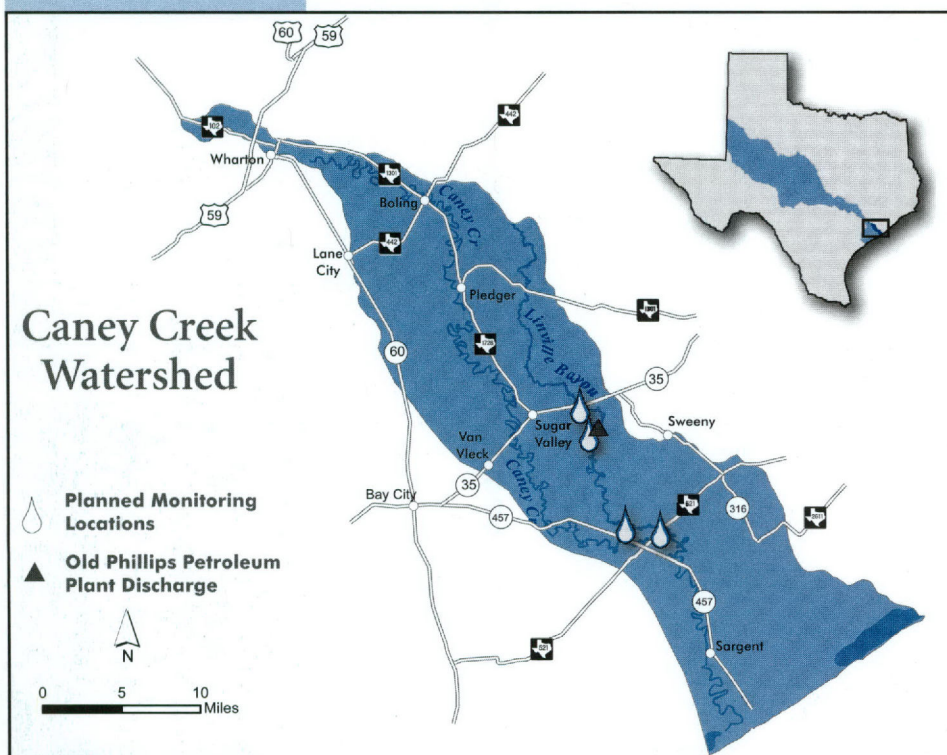
Declining conductivity levels

In response to the steering committee request, LCRA reviewed historical water quality data for Linville Bayou. Previously high levels of specific conductivity in the creek have shown a marked decrease, indicating a drop in total dissolved solids. The 15-year average for specific conductivity while the creek was still receiving discharge was 9,112 uS/cm. Nearly two years after the relocation, the average for specific conductivity has lowered to 859 uS/cm. If the trend continues, it will be interesting to see how the decrease in effluent-based flow will change the ecosystem of the stream.

Monitoring on Linville Bayou

Through the Clean Rivers Program, LCRA plans to establish a monitoring site for heavy metals and field parameters on Linville Bayou. Field parameters that will be monitored to determine changes over time include dissolved oxygen, conductivity, pH and temperature.

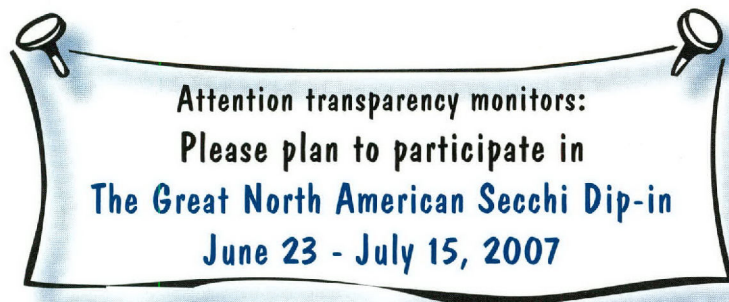
For more information on selenium, visit http://www.epa.gov/safewater/contaminants/dw_contamfs/selenium.html.



Selenium concentrations in ConocoPhillips' treated effluent exceeded state water quality standards for the Colorado River Basin. Now that the discharge point has been moved out of the Linville Bayou basin, monitoring stations will track changes in heavy metals and field parameters.

North American Transparency Monitoring

by Robin Berry, CRWN volunteer coordinator



The levels of turbidity in streams is extremely important as an indicator of the concentration of suspended sediments in the water. The greater the amount of total suspended solids in the water, the murkier it appears and the higher the measured turbidity. If the water is darkly stained from dissolved organic material this may also contribute to decreased clarity.

Number 1 pollutant

Sediments are a natural part of streams and other water bodies and even the most pristine streams in undeveloped watersheds will run muddy during high flows. However, excessive sedimentation in streams and rivers is considered the major cause of surface water pollution in the United States.

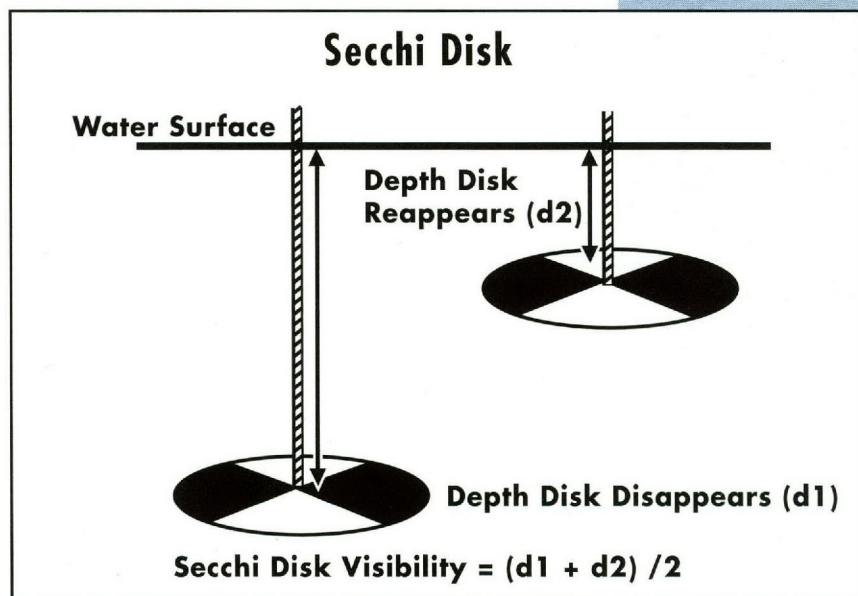
Studies suggest a strong correlation between a water sample's total suspended solids (TSS) and turbidity measurements. Data also suggest that there is a significant correlation between inverse transparency and TSS concentration and the amount of suspended sediment. (Watershed Institute 2002).

Secchi disk or transparency tube

The secchi disk, used in slow flowing rivers or lakes/reservoirs, and the transparency tube, more appropriate for slow flowing rivers or shallow streams, are widely used to measure transparency by volunteer water quality monitors. If you typically include transparency measurements in your monitoring events, please consider participating in the Great North American Secchi Dip-In between June 23 and July 15, 2007.

Since the Dip-In began in 1994 in six Midwestern states it has expanded to include participation by

more than 375 programs and 6,000 volunteers in the United States, Canada and several other countries. The Dip-In has generated more than 30,000 water transparency records that are used to map regional transparency differences and to detect trends in transparency.

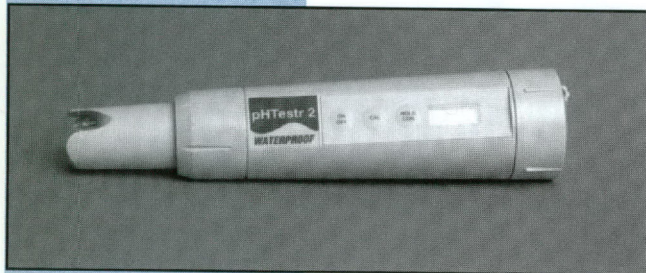


Participate

Before you monitor, log in at the Kent State site <http://dipin.kent.edu/> and print out the instructions and data entry questionnaire. Your monitoring program's identification code for the waterbody is the segment ID from CRWN's water quality data table, such as Pedernales River = 1414, Llano River = 1415. The program ID for the River Watch is 209.

In an area shielded from direct sunlight, lower the secchi disk into the water until it just disappears (d1). Drop it a few centimeters further and draw it up again until it becomes just barely visible (d2). The average of d1 and d2 is recorded in meters. Transparency tube readings may also be recorded...for instance, > 1.2 meters or = 0.82 meters.

Q and A: pH Tester Care



Many monitors now utilize a color comparator to measure pH. Other CRWN volunteers use this pocket tester.

Q: Why does my pH tester take so long to get a stable reading?

A: The pocket tester 2, used by some monitors to measure pH, sometimes frustrates users with a fluctuating reading. One possible reason the meter reading will not stabilize is that the electrode is dry.

The measuring part of the electrode, the glass bulb on the bottom, contains a hydrated gel. The metal cations (Na^+) in the hydrated gel diffuse out of the glass and into solution while H^+ from solution can diffuse into the hydrated gel. It is the hydrated gel that makes the pH electrode an ion selective electrode.

To keep the probe hydrated:

1. If possible, keep a small piece of paper or sponge in the electrode cap — moistened with clean tap water (NOT distilled water) — and close the cap over the electrode.
2. Soak probe in beaker half-filled with tap water overnight or for at least 30 minutes before calibration.

TECHNICAL CORNER

Data detail Sample depth and total depth

Now that many monitors are entering their data online, these details have become required information. Before online data entry, it was easy to just skip over these important water quality determinants. Now to submit data, sample depth and total depth entries are required fields.

Sample depth is the depth at which the sample of water was collected, how far down you reached to fill the sample bottle or bucket. This is important because the physical and chemical attributes in a water column change with depth. Temperature and dissolved oxygen for instance, are affected by the amount of insolation (penetration of sunlight) and mixing at the air/surface interface (by either flow or wind). In most cases, the sample depth is up to the sampler's elbow, or a foot, about 0.3 meters. If you are sampling in a stream that is only 1 foot (0.3 meters) deep, the depth at which the sample should be collected is in the middle of the water column. In this case, 0.15 meters.

Total depth is the total depth of the water at the location where you sample. In the above example of a typical Hill Country stream, the total depth would be 0.3 meters. For many lake/reservoir monitors, the secchi disk can be used to measure the total depth where you sample. In a faster flowing river, a stick/tree branch can be used to measure the total depth. Both measurements are to be recorded in meters.

Monitoring in the shadow of Stevie Ray Vaughan

by Amanda Ross, CRWN volunteer monitor

Shari Forbes and her dog Miles sometimes share their monitoring site with wedding gown-clad women and rock'n'roll aficionados. Shari affectionately refers to her monitoring location as the Stevie Ray Vaughan site because of its proximity to the statue honoring the famous blues guitarist. We at the River Watch just call it SRV.

Centrally located in a public park on Town Lake in Austin, this site serves as CRWN's water quality monitoring demonstration venue. Many new and potential monitors have met Shari as she assists with those demonstrations.

While a student at Texas State University, Shari attended a daylong water quality monitoring training held by Texas Watch, CRWN's sister volunteer monitor program. She did not have time for volunteer work though, until she completed her master's degree in geography and began her career as a GIS analyst and environmental consultant for Chiang, Patel & Yerby, Inc.

Shari has submitted data to the River Watch since February 2004. She also volunteers with Central Texas Trail Tamers and for the past two years, she has chaired the hydrology training section of the Capital Area Master Naturalists.

In reviewing her data and averaging and graphing her results for water, air, specific conductance and dissolved oxygen on a yearly basis, she has discovered interesting patterns including seasonal variation and the effects of rainfall. "I get excited if there is a rainfall event because that means my data will reflect the changes caused by the rain."

"People drive across the country to visit this location.

A couple even got married while I was testing water quality!"

MONITOR SPOTLIGHT



Volunteer monitor Shari Forbes and her dog Miles assist with water quality demonstrations at Town Lake in Austin.

A soulful site

Shari points out that many people consider Barton Springs the soul of the city of Austin, but to her it is Town Lake. Each time she monitors, visitors to the park's hike-and-bike trail stop and ask, "How's the water?" or "Is it OK for my dog to swim in the water?" Shari takes this time to remind passers-by that, "The water quality is good as long as we protect it" and "Please pick-up after your dog!" How can monitoring in the shadow of the Stevie Ray Vaughan statue be anything but soulful?



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MONITOR ACTIVITY REPORT

Between November 16, 2006 and February 15, 2007, the River Watch recorded 170 data points from 93 monitors. Thank you to these volunteers who submitted data during the quarter:

John Ahrns
Ronnie Aschenbeck
Erin Barker
Jeff Bauknecht
David Bennett
Landon Bippert
Larry Bippert
Lenny Blumberg
Donna Blumberg
Steve Box
Rusty Brandon
Peggy Breshers
William Brock
Jay Bullington
Alison Bullington
Greg Busselman
Valerie Busselman
Dave Buzan
Glen Clark

Ann Clift
Melissa Cole
Nicholas Cowey
Sam Crowther
Douglas DeVidal
Dub Dietrich
Mary Eastberg
Shari Forbes
Meggan Georgas
Laura Grulke
Sherry Head
Jeff Helser
Michal Hubbard
Brett Hulboy
Vera Janes
Anne Keddy-Hector
Laura Kelly
Mike Kersey
Sue Kersey

Roger Kew
Susan Kleinman
Linda Lowenthal
Russell Lueders
Jayson May
Kathleen McCormack
Judy McCoy
Joe Monahan
Gary Montgomery
Rode Mora
Casey Mulcihy
Phyllis Muska
Diane Nousanen
Charles O'Dell
Dan Opdyke
Kristina Owen
Chris Pasch
Jen Piland
Heather Podlipny

Jennifer Prihoda
Jennifer Prihoda
Robert Quarles
Heather Rein
Betty Rodgers
Jon Rodgers
Shuni Routh
Timothy Ryan
Diane Saltus
Wendy Schrieber
Winston Schroeder
Geraldine Schwartz
Chris Schwarz
Charlene Sefcik
Warren Sefcik
Sandy Shaw
Sandy Shaw
Leo Slaton
Heidi Sosinski

Joanie Steinhaus
Jennifer Threatt
Amy Tschoerner
Janet Uecker
Debbie Van Ryn
Laura Varney
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Elisabeth Welsh
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Robert Yantis
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