

WILEY

Reversing Southern Louisiana's Coastal Erosion

Author(s): Kris Christen

Source: *Water Environment & Technology*, September 2004, Vol. 16, No. 9 (September 2004), pp. 49-50, 52-54

Published by: Wiley

Stable URL: <https://www.jstor.org/stable/43888962>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



JSTOR

Wiley is collaborating with JSTOR to digitize, preserve and extend access to *Water Environment & Technology*

them in real-world applications. To learn more about these methods, register for WEFTEC Preconference Workshop 117, "FISHing in Activated Sludge."

Daniel B. Oerther, Ph.D., is an assistant professor in the Department of Civil and Environmental Engineering at the University of Cincinnati (Ohio). **Sam Jeyenayagam**, Ph.D., P.E., DEE, is an associate in the Columbus, Ohio, office of Malcolm Pirnie Inc. (White Plains, N.Y.). **Joe Husband**, P.E., DEE is vice president and national wastewater treatment leader at Malcolm Pirnie Inc.

The authors are grateful for the assistance provided by Patrick T. Karney, director at the Metropolitan Sewer District of Greater Cincinnati; Joni Emrick at the City of Kalispell Advanced Wastewater Treatment Plant; Paul Bishop, associate dean, College of Engineering, University of Cincinnati; Ian Papautsky, assistant professor in the Department of Electrical and Computer Engineering and Computer Science, University of Cincinnati; and Brian Kinkle, professor in the Department of Biological Science, University of Cincinnati.



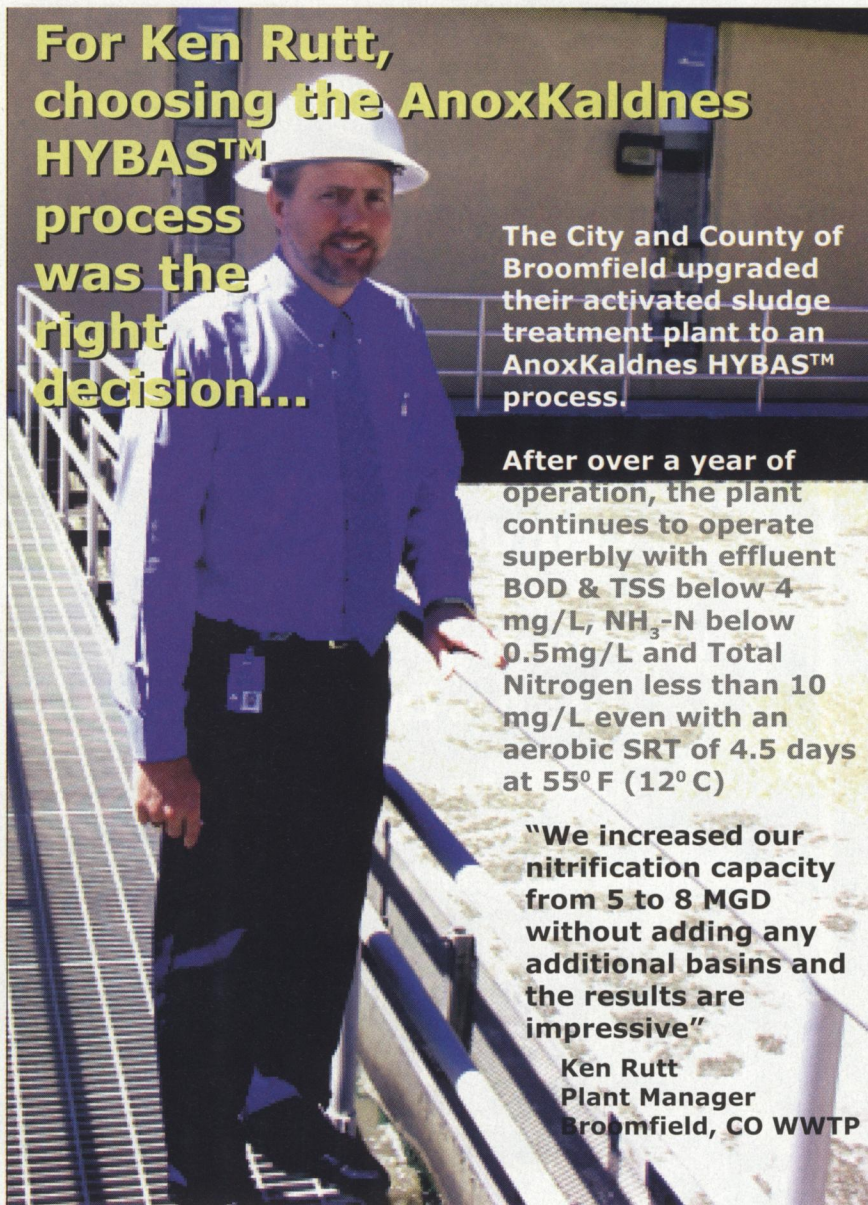
Water quality experts will be able to FISH and fish in New Orleans this October.

Reversing Southern Louisiana's Coastal Erosion

Using an acre of land every 15 minutes, Louisiana and the U.S. Army Corps of Engineers are crafting the largest ecological restoration plan

in U.S. history in an effort to curb catastrophic erosion of the state's southern coast. Over the last century, roughly 4900 km² (1900 mi²) of Louisiana's coast

For Ken Rutt, choosing the AnoxKaldnes HYBAS™ process was the right decision...



The City and County of Broomfield upgraded their activated sludge treatment plant to an AnoxKaldnes HYBAS™ process.

After over a year of operation, the plant continues to operate superbly with effluent BOD & TSS below 4 mg/L, NH₃-N below 0.5mg/L and Total Nitrogen less than 10 mg/L even with an aerobic SRT of 4.5 days at 55° F (12° C)

"We increased our nitrification capacity from 5 to 8 MGD without adding any additional basins and the results are impressive"

Ken Rutt
Plant Manager
Broomfield, CO WWTP



AnoxKaldnes

formerly Kaldnes North America, Inc.

58 Weybosset Street 4th Floor Providence, RI 02903

usa@anoxkaldnes.com - www.anoxkaldnes.com

Ph: (401) 270-3898 Fax: (401) 270-3908

For More Information, Circle 7 on Reader Service Card
Visit our WEFTEC Booth 1650 Hall A

SEPTEMBER 2004 49

has vanished, according to various studies, and scientists project that an additional 1300 km² (500 mi²) will erode away by 2050 if a massive restoration program is not undertaken.

"We're dealing here with the largest ongoing ecological disaster in the coun-

try," said Jim Tripp, general counsel for Environmental Defense (New York), an environmental group.

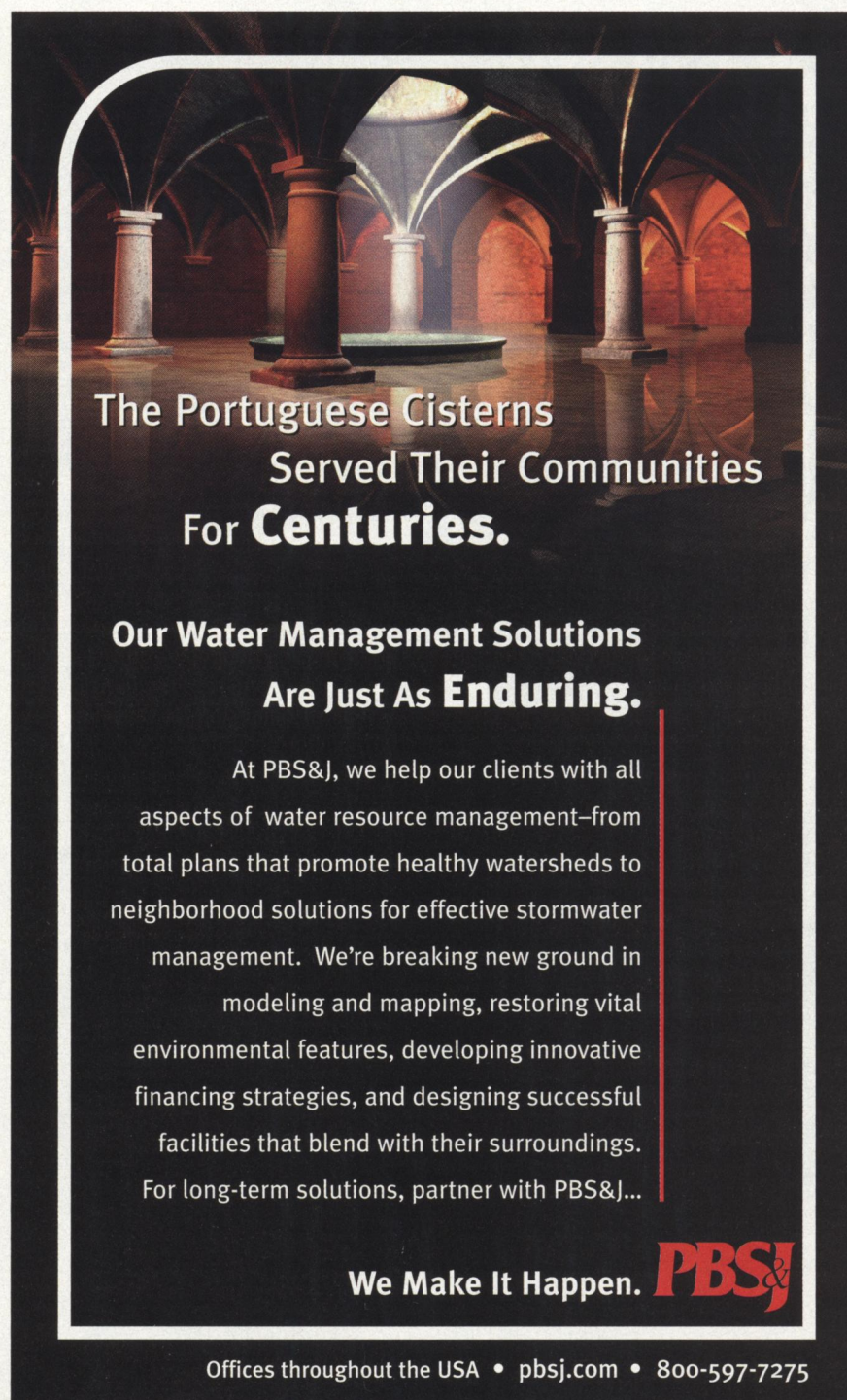
In fact, Louisiana is losing coastal shoreline, wetlands, and barrier islands at a faster rate than anywhere else in world, according to mapping invento-

ries by the U.S. Geological Survey's (USGS) National Wetlands Research Center (Lafayette, La.). Over the past 3 decades, the state has lost as much as 90 to 104 km² (35 to 40 mi²) of coastal wetlands annually.

Billions of dollars in seafood production, oil and gas revenues, and commercial shipping are at stake because the wetlands support these industries. In fact, more than 80% of the nation's offshore oil and gas is produced off Louisiana's coast, and 25% of the foreign and domestic oil supply enters the continental United States via pipelines passing through these coastal wetlands, according to statistics from a federal-state task force established under the 1990 Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). Also, five of the nation's largest ports are in southern Louisiana, and they handle 21% (by ton) of all waterborne commerce in the United States each year. Moreover, almost a third (by weight) of the fish harvested in the lower 48 states comes from Louisiana's coastal zone, CWPPRA documents show.

"We're really a working coastline," said Shea Penland, a geologist at the University of New Orleans. "The oil and gas industry is embedded in the coast, as is the largest fishery in the lower 48 states." As the protective wetlands and barrier islands disappear, the oil and gas infrastructure along the coast becomes more exposed to conditions in the Gulf of Mexico, and the potential for damaging spills increases, he pointed out. Likewise, ports, roads, levees, and communities become more vulnerable to flooding, particularly during severe storms and hurricanes.

From a biological standpoint too, "it's an unbelievably important ecosystem," Tripp said. Louisiana's coastal plain is the largest expanse of coastal wetlands in the contiguous United States, according to the CWPPRA task force. Built by the deltaic processes of the Mississippi River, they contain a wide diversity of habitats, ranging from narrow natural levee and beach ridges to expanses of forested swamps, and freshwater, brackish, and saltwater marshes. These habi-



**The Portuguese Cisterns
Served Their Communities
For Centuries.**

**Our Water Management Solutions
Are Just As Enduring.**

At PBS&J, we help our clients with all aspects of water resource management—from total plans that promote healthy watersheds to neighborhood solutions for effective stormwater management. We're breaking new ground in modeling and mapping, restoring vital environmental features, developing innovative financing strategies, and designing successful facilities that blend with their surroundings. For long-term solutions, partner with PBS&J...

We Make It Happen. 

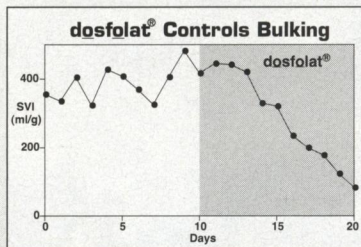
Offices throughout the USA • pbsj.com • 800-597-7275

For More Information, Circle 73 on Reader Service Card

dosfolat® stops bulking

Independent research confirms dosfolat®:

- Controls filamentous bulking
- Is an effective, reliable and safe alternative to chlorination
- Decreases waste sludge yield
- Reduces consumption of oxygen, nitrogen and phosphorous



Source: Université du Québec à Trois-Rivières

dosfolat® stopped filamentous bulking at Keene, New Hampshire municipal plant:

"After 21 days, the SVI improved dramatically — it had dropped to less than 200 from greater than 570. One clarifier was removed from service because of improved settling.... Looking beyond typical treatments for settling and filament problems, Keene was able to find a remedy for this chronic ailment while maintaining effluent quality."

Operations Forum Magazine

dosfolat®, a B vitamin micro-nutrient, is required by all living things. dosfolat® has been in use in over 100 municipal and industrial wastewater treatment plants throughout Europe and the United States to increase the variety, activity and growth rate of secondary treatment biomass. It's the natural way to improve plant efficiency, resilience and stability.

For information and research reports, call 800-366-9141.

BIOPRIME

Environmental Technologies from Europe

85 N. Main St. • Suite 245
White River Jct., VT 05001
(802) 291-6123 • Fax (802) 291-6124
www.bioprime.com • info@bioprime.com

For More Information, Circle 11 on Reader Service Card

WEFTEC®.04

The Water Quality Event

PREVIEW

tats are some of the most productive and important natural assets in the country, according to the task force.

To save them, the Corps and state coastal scientists have developed a long-range, 30-year, \$14 billion coastal rehabilitation plan, for which they are seeking funding under the 2005 Water Resources Development Act currently being considered in Congress.

Understanding the Problem

To get to this stage though, scientists have been trying to better understand how the ecosystem works — "essentially how we've damaged the system, and what we need to know to bring it back," said Robert Twilley, director of the Wetland Biogeochemistry Institute at Louisiana State University (Baton Rouge).

They've found a litany of causes behind the catastrophic land loss rates, but primary among them is the fact that "this is a delta, and deltas need rivers to function properly," Twilley noted. But because of the way the Mississippi River has been managed over the last century, the river has been effectively isolated from the delta by a levee system built to retain high floodwaters. Also, channels were cut and deepened for navigation, and canals were constructed through the wetlands to make way for oil and gas pipelines, as well as barges to transport equipment to construct offshore oil and gas rigs and tap reserves under marshes.

"It's a very dynamic river system that's used to shifting courses, and stabilizing it really altered the hydrology and set the stage for coastal shoreline loss," Penland explained. "In a healthy deltaic system, you lose land, but you gain it back in another area at the rate you lost it, so you have a steady state or equilibrium."

Scientists have found that Louisiana's coastal land sinks naturally about 1 cm/yr as the water-saturated deltaic sediments compact and settle. Annual spring floods would replenish these sediments, building the land up again. But as the river effectively became encased in levees, the fresh water and sediments that used to flow out through floods and crevasses to keep the delta alive now go jetting miles into the gulf, where

they're dumped off the continental shelf, studies have shown.

Over time, the resulting subsidence deficit has grown larger and larger, said Robert Stewart, director of USGS' Wetlands Research Center. This sinking, together with a global rise in sea levels, has converted huge areas from wetlands to open water, with waves and water currents impinging even farther against the land.

In more recent years, the oil and gas industry has aggravated the subsidence problem by altering the system's hydrology even further, Stewart pointed out. More than 13,000 to 16,000 linear km (8000 to 10,000 linear mi) of pipeline have been put down in the marshes, affecting the surface, while the withdrawal of oil and gas deposits in those same marshes may have activated some subsurface faults, leading to even greater subsidence rates.

"When you pump out oil and gas, a lot of brine water comes out too," explained Bob Morton, a USGS research geologist. Subsurface pressures, which actually helped to maintain surface elevations, have been drastically reduced as a result. His research shows, though, that rates of wetland loss have slowed since the 1970s, which coincides with the peak of oil and gas production in Louisiana.

Balancing Rehabilitation with Development

Because this area is such an economic engine for the entire country, the key is finding a new way of managing the river to build land and restore equilibrium, while still supporting all the current flood protection, navigation, and oil and gas needs.

"We have a pretty good idea of what causes a lot of this erosion and subsidence, and, therefore, we have a pretty good idea of what the options are to try and rehabilitate this system," Twilley said. Basically, he said, they have to get as much river water — and especially sediments and their nutrients — back into marshes and swamps as possible before it escapes into the gulf.

The researchers have a decade of experience with small-scale projects thanks to CWPRRA, which provides about \$50 million in funding annually for restoration projects in southern Louisiana. From 1990

to 2002, 64 projects were constructed under the program, benefiting roughly 26,000 ha (66,000 ac) of wetlands.

"What we've learned, though, is that the magnitude of the problem is so large that these small projects are really pretty ineffective, and so we've kept increasing the scale and size of the projects through time," Penland said. Now they want to go from site-specific restoration projects to implementing regional projects affecting thousands of acres — "a scale that nobody has ever tried in our country before," he added.

The strategies for doing so are laid out in the Louisiana Coastal Area (LCA) Comprehensive Coastwise Ecosystem Restoration Study developed jointly by the Corps and the state. Their stated goal is to reestablish degraded wetlands and restore natural processes where possible. The plan covers 52,000 km² (20,000 mi²) of the Louisiana coast from Texas to Mississippi and carries an estimated price tag in excess of \$14 billion, an order of magnitude larger than the ongoing Everglades, CALFED Bay-Delta, or Chesapeake Bay restoration programs.

Included in the LCA plan are five major strategies: sediment and freshwater diversions, canal restoration, barrier island stabilization, and shoreline protection. Overall, "we're trying to put the river back in and rebuild the land, so we have to get the sediment and salinity right, as well as the water," Twilley said.

The science is built on using natural processes to restore the area, Twilley said, but so much land has been lost that "we have to help nature jumpstart the system." Part of this strategy involves getting sediments back into the system via a pipeline conveyance from the river to restore geomorphic features. Freshwater diversions are then expected to sustain the system over the long term in what could be a win-win outcome.

"If we pulse the system with these diversions, then we're only adding the river back during certain periods of year, and other stakeholders can use the resource at other times," said Len Bahr, director of the state governor's Applied Coastal Science Program. The scientific theory is that these smaller diversions would pulse

**LOOKING FOR HIGH QUALITY
SEWAGE & SOLIDS HANDLING
SUBMERSIBLE PUMPS AT
A MODEST PRICE?**

Since 1983

SK-SHREDDER

SV-VORTEX

G-GRINDER

if so ... CONTACT
BJM PUMPS
www.bjmcop.com

SLIDE RAILS AVAILABLE!

BJM Corp
123 Spencer Plains Road • Old Saybrook, CT 06475
Phone: (800) 442-2562 • Fax: (860) 399-7784 • E-mail: sales@bjmcop.com

For More Information, Circle 14 on Reader Service Card
Visit our WEFTEC Booth 3620 Hall C

Go Wild over your DPD Test!

**Dip Strip & Use
with Any
DPD-Based
Photometer or
Chlorine Test Kit**

**US EPA
Compliant**

- Compatible with Your Current Chlorine Meter
- Also Available: DPD-4 Total Chlorine ReagentStrip™ (484104)
- No Powders, Tablets, Liquids, or Glass to Handle
- No MSDS

Special Price:

\$14.99 / 100 Tests

DPD-1 Free Chlorine ReagentStrip™, Order # 484101

CALL TODAY FOR YOUR FREE SAMPLE! 1-800-861-9712

Industrial Test Systems, Inc.

1875 Langston Street, Rock Hill, SC 29730, Phone: (800) 861-9712, (803) 329-9712, Fax: (803) 329-9743
eMail: its@cetlink.net, Order online @ www.SENSESAFE.com

©2004

Special thanks to Metrolina Wildlife Park & Lilly, a Siberian Tiger (pictured above & seen at the 2004 AWWA Show) - visit them online at www.metrolinawildlifepark.com

For More Information, Circle 47 on Reader Service Card
Visit our WEFTEC Booth 1537 Hall A

more like the natural processes that the river followed years ago.

Another expected benefit of these fresh-water diversions is that the marshes will grab some of the nutrients in river waters before they reach the Gulf of Mexico, thereby reducing the area of the hypoxic zone, currently the world's largest. "The excess nitrogen levels causing the algal bloom in the gulf could make the marshes and cypress trees grow faster and actually do some good, because right now those marshes are dying and sinking because they're not healthy," Bahr noted.

Rebuilding the barrier island system is another priority, because "if you don't have those, then the energy that comes from the gulf is going to erode whatever you try to replace," Twilley said. And that part, noted Penland, will be the easy part of the program.

"We know how to build barrier islands; all we need is the right kind of sediment

material, and we're finalizing which will be the most cost-effective source to use," Penland said. Instead, he predicted that the biggest challenge will lie with the interior wetlands, which are much more complex and laced with socio-economic issues.

Uncertain Outcome

The LCA plan suffered a setback earlier this year when it was sent to the White House Office of Management and Budget for authorization under the WRDA bill, however.

"They told us we had to scale it back to address only the most critical needs in the first 5- to 10-year phase," said Sidney Coffee, the governor's executive assistant for coastal activities.

The state and Corps did so and released a new \$1.2 billion plan for public review in July. Proposed are two barrier shoreline projects and two wetlands projects for immediate implementation.

Another 12 projects are proposed for development, as well as a number of demonstration projects of new technologies and long-term planning "to guide us a decade from now," Penland said.

Underlying all the projects is the concept of adaptive management. Noting that restoration science is a new field, Bahr noted that "we have to treat the whole thing as experimental and be flexible enough to change course when we realize that something isn't working or is working."

Regardless of what happens in this administration and Congress though, "we're not giving up," Bahr added. "We don't have a choice. This coast has been so productive, and it's poised to collapse if we don't do something about it."

For more information, attend Technical Session 50 at WEFTEC.04.

—Kris Christen, WE&T



In-Situ Inc.
Cordially invites you to attend our
WEFTEC 2004
EXHIBIT SPACE #1963
Come meet the
Doctor for your **D.O.** troubles
Presenting the NEW RDO!



See the technology:
Personally tour new products
Get answers to product questions
See the new Rugged D.O. sensor

Meet with:
Bob Blythe, President and CEO
Scott Bennett, VP of Sales and Marketing
Ken Stutzman, Director of R&D

Where?
Hall A,
Ernest N. Morial Convention Center
Come take the DO Challenge
Get a Starbucks Gift

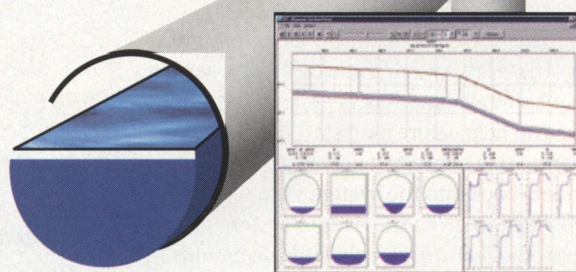
VISIT WWW.IN-SITU.COM

For More Information, Circle 51 on Reader Service Card
Visit our WEFTEC Booth 1963 Hall B

XP-SWMM & XP-Storm

Hydrodynamic Modeling

- Graphics-based stormwater & wastewater decision support system (single solution)
- FEMA approved, ETV verified
- Imports/Exports existing GIS data
- Over a dozen hydrologic methods



Experience the confidence that comes from basing design decisions on a true understanding of your network's performance.

1.888.554.5022
U.S. and Canada

www.xpsoftware.com

XP SOFTWARE

For More Information, Circle 110 on Reader Service Card
Visit our WEFTEC Booth 4965 Hall E