

Oklahoma

Water  
News

MONTHLY NEWSLETTER OF THE OKLAHOMA WATER RESOURCES BOARD

## OKC Zoo Lake Anticipates New Fame and a New Neighbor

*With Remington Park moving to the area,  
the Zoo is making some impressive changes*

The Remington Park horse racing facility promises to bring more than prosperity and glitter to northeast Oklahoma City. It will provide the impetus for the return of a clean reservoir to citizens who nostalgically recall its former beauty. Although a target of the Environmental Protection Agency's Clean Lakes Program since 1979, trouble-ridden Northeast (Zoo) Lake is only now receiving its much-needed overhaul.

Northeast Lake was built in 1908 to provide metro residents with an area for fishing, boating and swimming. The early recreational success of the spring-fed lake attracted to its shores housing developments, a golf course and a zoo complex. But this growth also opened the gates to pollution of Northeast Lake; degraded water quality resulted in closure of the lake's swimming beach in 1945.

Zoo Lake is one of several Oklahoma reservoirs included in the ambitious Clean Lakes Program which sets its sights on restoring the recreational benefits of publicly owned lakes across the country. Phase I involves sampling studies of water, soil and fish and subsequent recommendations for pollution control; Phase II addresses restoration procedures and lake protection. Unfortunately, because the plan relies heavily on local cost-sharing, government budget cuts at state and local levels have delayed many lake cleanups. Luckily for Northeast Lake, construction of the multi-million dollar Remington Park has revitalized aesthetic and financial interest in the lake and adjacent zoo.

Northeast Lake is gearing up for the second phase of the Clean Lakes Program after nearly five years of funding woes. All levels of government and some private sector

*Continued on page 2*

From left: John Anglin, Purchasing Supervisor; Lea Ann Reed, PR Assistant; Dr. Connie McCoy, Administrative Services Manager.



Construction on the Zoo's new stormwater drain seems commonplace to this Pere David's Deer, a native of China now extinct in the wild.

*Zoo Lake, continued from page 1*

money are now coming together to cure what has ailed the reservoir – namely, animal waste from the Zoo, pesticides and herbicides from Lincoln Park Golf Course and human waste from faulty sewer lines. This witches' brew of man's development and activity added an untold amount of nutrients to Zoo Lake, giving birth to massive blooms of blue-green algae and choking lake water of life-sustaining oxygen.

"For all practical purposes, Zoo Lake was dead," said Dr. Jim Grimshaw, OWRB environmental specialist. "The lake smelled terrible and was covered inches thick with algal blooms. At times, you could see fish at the surface literally gasping for air."

According to Grimshaw, who is coordinating the clean-up effort, three main pollution sources were identified during Phase I of the project: stormwater runoff from city streets and the golf course; raw sewage from clogged and broken sewer lines in the watershed; and stormwater and fecal material runoff from the Zoo.

"One of the biggest problems was not direct pollution," he pointed out. "We had to figure out a way to reduce the amount of sediment that was being washed into the lake from the Zoo's animal pens – in particular, the hooved animal section."

As a result of Phase I recommendations, plans were devised for dredging the lake and construction of a \$900,000 diversion canal to channel sediment- and fecal-laden runoff into a disposal lagoon. Unfortunately, inadequate funding forced the diversion plan to be scrapped. In an effort to give Northeast Lake its due attention at a lower cost, Zoo officials have turned to more responsible land, animal and waste management practices and less expensive remedial procedures which focus on specific problem areas. EPA matching funds and in-kind services for the Zoo Lake project will come from Oklahoma County, Oklahoma City, the Zoo and the OWRB.

"Groundskeepers at Lincoln Park Golf Course are more aware now of application rates for pesticides, herbi-

cides and insecticides," Grimshaw pointed out. "Already, the Zoo has leveled off portions of the hooved animal area and construction is underway on an underground stormwater system there. These measures should significantly reduce sediment and animal waste inflow to the lake."

Connie McCoy, manager of administrative services for the Zoo, explained how the complex is now reducing its harmful contributions to Northeast Lake while improving habitat for the resident animals.

"Many of our hooved animal pens have been severely damaged in past years due to overgrazing, loosening of dirt by the hooves and then subsequent erosion which contributes sediment to the lake. In addition to leveling off the pens, we have added grass or gravel to hold the substrate better and also more closely match the animals' natural environment, whether it be rangeland or of a more rocky nature."

Better management practices which adopt grass and gravel surfaces for some hooved species and prescribe the rotation of animals will help avoid the destruction and erosion inflicted on older animal holding areas (bottom).

McCoy added that the Zoo is now rotating animals from pen to pen to equalize the toll taken on the soil – much like a farmer would rotate crops.

Another contributor to Northeast Lake's age-old problems is fecal matter from the Zoo's pachyderm area which houses elephants, rhinos and hippos. Historically, waste has been channeled from those large animal pens into Zoo Lake via a concrete canal. Plans are to dam a portion of the canal and install a lift station to pump the waste into the city sewer system. The county will supply 50 percent of the funds needed for the work; as with most other Clean Lakes Program work at the Zoo, remaining monies will come from EPA.

Dam failures in 1982 and 1984 created more delays for the Zoo Lake Project. Although a new dam was constructed last year, the previous "flushing out" of Zoo Lake



hampered remedial activities – especially dredging plans. But now, the reservoir is being drained to allow for widening of the dam road which will carry the expected influx of Remington Park traffic. When the lake bottom dries sufficiently to support bulldozers and backhoes, Oklahoma County will underwrite the removal of several feet of nutrient-rich matter which will be used as fill material around the mouth of the reservoir's tributary.

After the lake refills, the most innovative pollution remedy will be attempted for Zoo Lake: the introduction of tropical algae-eating fish. According to Grimshaw, preliminary plans have been made for the addition of nearly three-and-one-half tons of the species *Tilapia aurea*, an algae-loving fish native to hot, equatorial regions.

"Because *Tilapia* live in warm water, most or all will die during winter. But during spring, summer and much of the fall, they should live, eat and thrive. It's a pretty modernistic

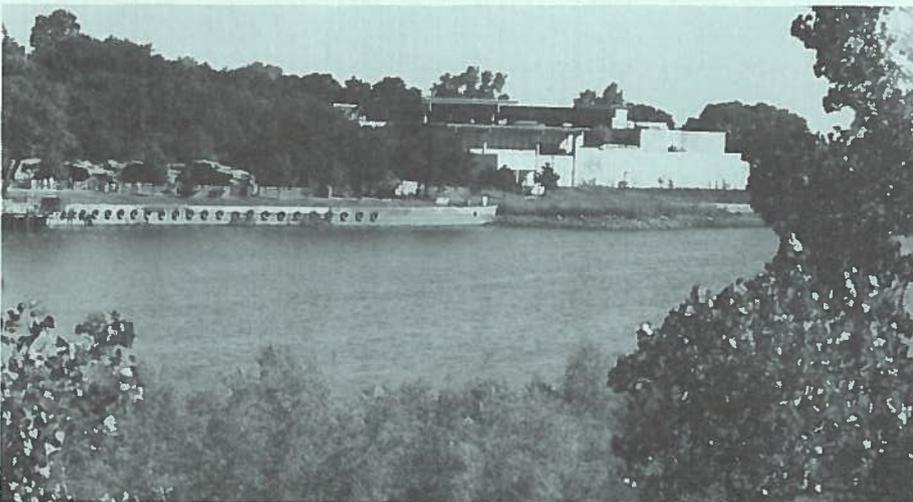
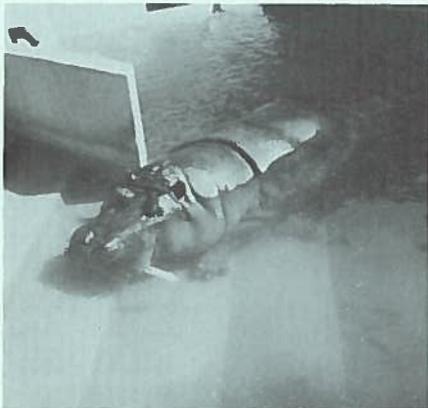
approach, but if it works we can change the lake's algal biomass to fish biomass – and do it cheaply," Grimshaw said.

Oklahoma City Zoo officials are pondering two options of replenishing the *Tilapia*. Either they will buy new fish stock each year or construct a temperature-controlled holding area to continuously breed the fish for introduction to the lake environment each March.

To measure the lake-cleaning ability of *Tilapia*, evaluations will be run at Northeast Lake using a structure called a "limnocorral." It consists of a series of flow-through columns six feet in diameter which stretch from lake surface to bottom. Algal growth will be monitored both in columns containing *Tilapia* and in those absent of the fish. In conjunction with this experiment, Grimshaw and his crew will conduct chlorophyll studies of lake water. Results should give OWRB water quality specialists an idea of the trophic condition of Northeast Lake and an overview of photosynthetic activity.

Whether or not Northeast Lake returns to its former beauty is largely up to the success of the unique pollution remedies now being tried. But cooperation between city, county and state governments and the private sector already has marked the Zoo Lake project as a "first" all Oklahomans can be proud of.

Daily draining of the hippo pool into Zoo Lake contributes pollution; nourishes aquatic vegetation that invades the shallow lake.



## Board, Corps to Share Study

At the July 14 meeting of the OWRB, officials of the Corps of Engineers and the Board signed an unprecedented cost-sharing agreement which clears the way for a \$2 million study of the Arkansas River Basin.

Col. Frank Patete, Tulsa District Engineer, said the cooperative three-year study which focuses on flood control, "is one of the first agreements of this kind," in explaining that parts of it provide for equal funding between state and federal sources. Because a portion of the Arkansas River Basin lies in both Arkansas and Oklahoma, the partnership is shared by both states as well as the Tulsa and Little Rock Corps Districts. The navigation portion of the study will be funded entirely by the federal government.

"We have a tremendous opportunity to make necessary improvements to flood control, water supply, navigation, water quality, recreation and fish and wildlife enhancement along the Arkansas River. But we must first study the river basin to create a good roadmap of where to go in the future in developing these water resources," Patete pointed out.

"This study will substantially increase Oklahoma's role in the Arkansas River Basin project, as well as heighten involvement between the state and federal governments," said OWRB Executive Director James Barnett.



Col. Patete, Board Chairman Borelli

### NFIP Workshops in August

Three August dates have been set for National Flood Insurance Program workshops, according to Harold Springer, OWRB Engineering Division Chief.

The meetings are scheduled in Bartlesville, August 18 at the Park

Inn International; Enid, August 19 at the Holiday Inn; and Lawton, August 20 at the Holiday Inn.

"The morning sessions will deal with basic information on the NFIP; the afternoon sessions will focus on technical aspects," said Springer.

He added that he is evaluating

interest in the formation of a state floodplain managers association for public officials charged with duties such as floodplain zoning and emergency planning.

Those interested are asked to call Springer at (405) 271-2530 by August 10.

#### ACTIVE CONSERVATION STORAGE IN SELECTED OKLAHOMA LAKES AND RESERVOIRS AS OF JULY 23, 1987

PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (AF)	PERCENT OF CAPACITY	PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (AF)	PERCENT OF CAPACITY
<b>SOUTHEAST</b>			<b>NORTHEAST</b>		
Atoka	122,894	99.0	Eucha	79,567	100.0
Broken Bow	871,190	95.0	Grand	1,362,960	91.0
Pine Creek	77,700	100.0	Oologah	544,240	100.0
Hugo	157,600	100.0	Hulah	30,594	100.0
<b>CENTRAL</b>			Fort Gibson	346,500	95.0
Thunderbird	105,925	100.0	Heyburn	6,600	100.0
Hefner	75,355	100.0	Birch	19,200	100.0
Overholser	15,782	99.3	Hudson	200,300	100.0
Draper	78,158	78.2	Spavinaw	29,000	97.0
<b>SOUTH CENTRAL</b>			Copan	43,400	100.0
Arbuckle	62,571	100.0	Skiatook	295,900	100.0
Texoma	2,637,700	100.0	<b>NORTH CENTRAL</b>		
Waurika	203,100	100.0	Kaw	428,600	100.0
<b>SOUTHWEST</b>			Keystone	616,000	100.0
Altus	132,886	100.0	<b>NORTHWEST</b>		
Fort Cobb	78,423	100.0	Canton	96,230	99.0
Foss	194,892	80.0 <sup>2</sup>	Optima	3,000	100.0 <sup>1</sup>
Tom Steed	88,205	99.0	Fort Supply	13,900	100.0
<b>EAST CENTRAL</b>			Great Salt Plains	31,400	100.0
Eufaula	2,329,700	100.0			
Tenkiller	620,164	99.0			
Wister	27,100	100.0			
Sardis	301,697	99.7			
			<b>STATE TOTALS</b>	<b>12,325,433</b>	<b>95.4<sup>3</sup></b>

1. In initial filling stage
2. Temporarily lowered for maintenance
3. Conservation storage for Lake Optima not included in state total

Data courtesy of U.S. Army Corps of Engineers, Bureau of Reclamation, Oklahoma City Water Resources Department, and City of Tulsa Water Superintendent's Office.

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