

OKLAHOMA

water news

MONTHLY NEWSLETTER OF THE OKLAHOMA
WATER RESOURCES BOARD

Gerald E. Borelli, Chairman

Earl Walker • L.L. Males • John B. Jarboe • Tom L. Hamby • R.G. Johnson • Ralph G. McPherson • Boyd Steveson • Ernest R. Tucker

SATELLITE MONITORS LAKE WATER QUALITY

Landsat Makes Pass at Predicting Algae Content in Nine Oklahoma Reservoirs

The sky is no longer the limit for the Oklahoma Water Resources Board's efforts to improve the quality of water in state reservoirs. OWRB is employing the space technology of Landsat earth satellite to determine the amount of sediment in reservoirs throughout the state.

Natural erosion and sedimentation adversely affect the quality and quantity of water in the reservoirs and streams. Eroding soil is washed into lakes and streams causing a condition called "eutrophication," or nutrient enrichment of the water. Such high nutrient levels from fertilizers high in nitrogen and phosphorus result in accelerated growth of algae and other microscopic organisms, choking area lakes and decreasing their capacity to store water as well as degrading the quality of the water.

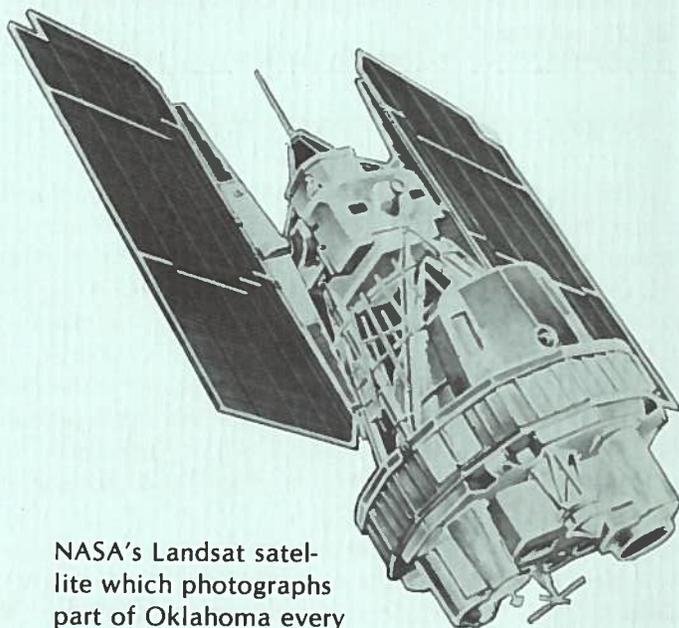
To look into the problem, OWRB received a grant in 1979 from the Environmental Protection Agency to rank the publicly owned reservoirs in the state according to their need to be cleaned up. This grant provided OWRB the opportunity to evaluate the suitability of satellite-based multispectral scanner data for use in a statewide reservoir water quality monitoring program.

The project was funded by both state and federal monies, totalling \$142,857. Ranking the reservoirs allowed the problem lakes to be prioritized and qualified the state for further EPA funding for research, diagnostic studies and restoration of problem lakes.

OWRB scientists participating in the project which began in February were Ken Morris, Project Leader; Dr. Jim Grimshaw, Principal Investigator; and Susan Meyer Torrans, Project Limnologist.

Nine reservoirs were picked as typical — Lakes Atoka, Oologah, Texoma, Foss, Thunderbird, Keystone, Mountain Park, Eufaula and Fort Cobb.

The study used satellite data taken at the same time water samples were collected so that they could be



NASA's Landsat satellite which photographs part of Oklahoma every nine days.

directly linked and the interpretations would be more accurate. Because sampling must occur on the same day as the satellite scanning, or "pass" was made, the crew had to sample on clear days so that the satellite pictures were not obscured by clouds.

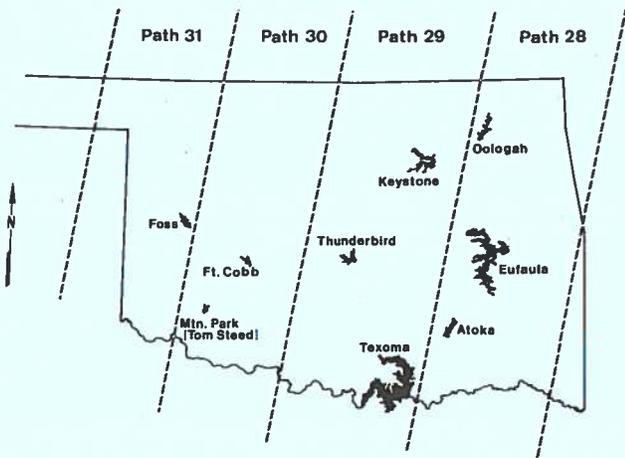
The nine lakes were tested monthly from June to October 1979. The data from the satellite, which shows the reflectivity of the water which is indicative of the amount of algae and sediment, were then compared to the water samples to develop a relationship between the aerial view and the lake sample.

Samples were taken at each lake and at various depths to determine average chlorophyll and sediment content, temperature, pH and chemical analysis.

With the satellite data plotted against the water sample data on a graph, a scientist could determine the algae content of a lake without ever going to the lake.

At the core of the project is NASA's Landsat, linked to a system developed to provide data about the earth's surface. The two Landsats repeat an orbit every 18 days,

Continued on page 2



The ground trace of Landsat as it scans the state on paths 28, 29, 30 and 31.

Landsat, continued from page 1

therefore, a part of Oklahoma is covered every nine days. Flyovers take pictures in a 115-mile-wide band that angles across the state. The information is transmitted back to earth and stored for sale.

Dr. Charles E. Barb and John Harrington of the University of Oklahoma geography department were contracted to interpret the reflectance values of the lakes then give the data to OWRB to compare with samples.

On the basis of the study, the algae and sediment problems of 80-some publicly owned lakes can be monitored. Upon completion of the study in June, the Board was awarded a \$400,000 EPA grant for the further study of four problem lakes — Northeast Lake at Oklahoma City's Lincoln Park and Lakes Atoka, Overholser and Carl Blackwell.

Water Plan Available in July

After six years and thousands of hours of research and compilation of data, the Oklahoma Comprehensive Water Plan is now ready for public distribution. The Plan, which was authorized in 1974 by the state legislature, was devised by the Oklahoma Water Resources Board in cooperation with the U.S. Army Corps of Engineers, the Water and Power Resources Service (formerly Bureau of Reclamation), the Soil Conservation Service and other federal, state and local agencies.

The report shows that Oklahoma has an abundance of water within its own boundaries, however it is unevenly distributed. The eastern part of the state possesses water in excess of needs and the western part exhibits a water deficit. The Plan addresses itself to the problems of eliminating the deficit by development of additional water supplies, including transfer of surplus water, and nonstructural means such as conservation, weather modification and artificial recharge of ground water aquifers. Also covered are problems associated with industrial and population growth such as pollution and increased water demand.

The Plan is based on 50-year projections of growth and water requirements for the state. The state was divided into eight planning regions on the basis of geography, hydrologic characteristics and water resource potential. Before the year 2040 (the last year of the Plan), five of the eight regions would show severe water deficits, even after the development of all potential water resources. On the other hand, the remaining three regions would have a surplus of water. The proposed water conveyance system would alleviate the water shortages predicted in the central and western regions.

The Southern Water Conveyance System would deliver a total of 1.3 million acre-feet of water per year; 487,000 acre-feet for municipal and industrial use in Central Oklahoma, and 823,000 acre-feet of irrigation water to southwestern Oklahoma. The southern system would

require seven terminal reservoirs, four of which already exist and three proposed. This system would pick up water in southeastern Oklahoma at Hugo and Clayton Lakes, as well as at the authorized Boswell and Tuskahoma Reservoirs.

The Northern Water Conveyance System would utilize existing reservoirs, since most of the suitable sites in east central Oklahoma have already been developed. The northern system calls for the capturing of flood flows, or "scalping," at Eufaula and Robert S. Kerr Reservoirs. These flood waters would then be diverted to a canal for ultimate delivery to northwestern Oklahoma. Regulating reservoirs Welty and Vian Creek are included in the system to collect and store water during rainy seasons for release during periods of low flow.

Six new reservoirs are proposed for terminal or storage use, while three existing lakes would tie into the system. The total amount of water transferred through the northern system would be 1.2 million acre-feet annually, approximately 88 percent of it for irrigation.

The cost of the southern and northern water conveyance systems is estimated to be \$2.5 billion and \$5.3 billion, respectively, at 1978 prices.

Construction of the Statewide Water Conveyance System would be staged over a 30-year period — the southern system completed in four steps, the northern system in three.

Two versions of the Oklahoma Comprehensive Water Plan are available — the complete 256-page Plan and a 24-page Synopsis. Copies of both publications are available without charge from the Oklahoma Water Resources Board, 1000 N.E. 10th St., P.O. Box 53585, Oklahoma City, Okla. 73152.

This Session's Water Legislation

Legislature OKs Floodplain Management Act

Gov. Nigh's signature on HB 1094 for the first time makes available at a reasonable cost flood insurance to

Continued on page 3

thousands of Oklahoma families formerly denied insurance at any cost. The Floodplain Management Act makes flood insurance available to residents in areas identified as flood prone by federal planners.

The act enables Oklahoma cities and towns which choose to adopt criteria set down by Federal Emergency Management Agency (FEMA) to qualify for the agency's national flood insurance program. In addition, the new legislation prohibits further development in identified flood prone areas and makes participating communities eligible for federal disaster assistance in the event of a declared flood disaster.

Financial Assistance Program Up for Review

A recent request for an Attorney General's opinion concerning the Oklahoma Water Resources Board's financial assistance program created by SB 215 of the First Session of the 37th Legislature has left the program and additions to it at least temporarily in limbo.

Senate Bill 215 allows OWRB to issue investment certificates or revenue bonds and establish a fund from the loan proceeds. From the fund OWRB could provide loans up to \$1.5 million per project to qualified cities, counties and rural water districts for water development projects partially backed by federal funds.

Continued on page 4

Write for High Plains Brochure

The heart of mid-America's vibrant agricultural economy is the Ogallala Aquifer, for over 40 years supplying irrigation water to the food and fiber crops of the High Plains Region. Today overpumping of this vast water resource, once estimated to store two billion acre-feet of water, threatens to exhaust water supplies and portends a disastrous return to dryland farming.

In 1976 Congress authorized the \$6 million Six-State High Plains-Ogallala Aquifer Area Study and assigned responsibility for its accomplishment to the Economic Development Administration of the U.S. Department of Commerce. Oklahoma, represented by the Oklahoma Water Resources Board, participates in the study.

More information on the High Plains Study is available without charge from the Oklahoma Water Resources Board. Please order with the coupon below.

CONSERVATION STORAGE IN SELECTED OKLAHOMA LAKES AS OF JUNE 10, 1980		
PLANNING REGION LAKE/RESERVOIR	CONSERVATION STORAGE (A/F)	PER CENT OF CONSERVATION STORAGE CAPACITY
SOUTHEAST		
Atoka	74,087	100.0 ³
Broken Bow	913,400	99.5
Pine Creek	77,400	99.6
Hugo	157,600	100.0
CENTRAL		
Thunderbird	118,255	98.9 ³
Hefner	75,000	100.0
Overholser	15,000	99.5
SOUTH CENTRAL		
Arbuckle	72,400	100.0 ³
Texoma	2,665,400	100.0
Waurika	108,000	53.2 ²
SOUTHWEST		
Altus	123,649	91.9 ³
Fort Cobb	76,957	96.2 ³
Foss	173,844	67.9 ^{1, 3}
Tom Steed	69,000	100.0 ³
EAST CENTRAL		
Eufaula	2,329,700	100.0
Tenkiller	648,000	99.1
Wister	27,100	100.0
NORTHEAST		
Grand	1,620,000	96.9
Fort Gibson	365,200	100.0
Oologah	553,400	100.0
Hulah	31,100	100.0
Heyburn	6,600	100.0
Birch	18,400	95.8
Hudson	194,000	96.9
NORTH CENTRAL		
Kaw	428,600	100.0
Keystone	618,000	100.0
NORTHWEST		
Canton	116,000	100.0
Optima	7,000	- ²
Fort Supply	13,900	100.0
Great Salt Plains	31,400	100.0
STATE TOTALS	11,748,392	97.4

1. Temporarily lowered for maintenance
2. In initial filling stage
3. Figures quoted as of June 1, 1980

Data courtesy of the U.S. Army Corps of Engineers, Water and Power Resources Service and Oklahoma City Water Resources Department.

JUNE CROP AND WEATHER SUMMARY

Crops of wheat, oats, barley, corn, sorghum, soybeans, peanuts, cotton and alfalfa were rated good, and pastures and ranges were in good condition statewide.

Mid-June topsoil moisture was adequate in 76 percent of the counties reporting, and subsoil moisture was adequate in 87 percent of the counties reporting.

Oklahoma Crop and Livestock Reporting Service

Oklahoma Water Resources Board
Post Office Box 53585
Oklahoma City, Oklahoma 73152

Please send me _____ (copies) of the brochure concerning the Six-State High Plains-Ogallala Aquifer Study.

Name _____
Address _____
City _____ State _____ Zip _____

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24

Legislation, continued from page 3

House Bill 1710, signed by the governor during the Second Session amended the law created by SB 215 by including sewage treatment facilities as eligible projects and removing the requirement for federal participation. It also established a framework for providing grants up to \$50,000 for water development and water and sewage treatment facilities.

Since the program's inception last fall, 13 applications have been received by OWRB, but all remain stalled pending clarification by the Attorney General.

Sediment Included in Quality Standards

Senate Bill 528 signed by the governor on May 21 expanded the authority of Oklahoma Water Resources Board by including sediment as a factor to be considered in setting water quality standards. Excepted are the impacts on sediment which may result from acceptable forestry, agricultural and petroleum operations.



J.D. Hall Accepts WAPA Post in Denver

J.D. (Joe) Hall, former Oklahoman and 18-year veteran of the Bureau of Reclamation, recently renamed the Water and Power Resources Service, has accepted a position with the Western Area Power Administration in Denver. Oklahomans should remember Hall for his assistance on behalf of the Bureau in the planning effort which preceded Phase I of the Oklahoma Comprehensive Water Plan.

Task Force Denies Higher PCB Levels

Refuting newspaper reports early in June that the concentration of polychlorinated biphenyls (PCBs) in fish from Fort Gibson Lake was higher now than originally found last summer, Gov. Nigh's task force said the level of contamination has not risen since earlier samplings. The task force concensus was that PCB levels had not risen, but rather, sampling variation that is expected

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when a relatively small number of fish are sampled from the entire lake population. Generally, the more fish collected for determining PCB level, the more indicative the levels found will be of levels actually occurring in the lake.

Arcadia Groundbreaking Set July 19

Groundbreaking, which will signal the beginning of construction of Arcadia Lake on Deep Fork River near Edmond, will be held July 19 at 10:30 A.M. with Sen. Henry Bellmon the featured speaker.

Ernest R. Tucker Appointed to Board

Ernest R. Tucker of Idabel has been appointed to the Oklahoma Water Resources Board following the resignation of Jewel B. Callaham, a member since 1977. Appointments to the 9-member board are made by the governor and confirmed by the Senate for 7-year terms.

OWRB Leads Tar Creek Investigation

OWRB was specified lead agency by Gov. Nigh last month to spearhead a 24-agency task force charged with solving the pollution of northeastern Oklahoma's Tar Creek. The contamination of area stream and ground water is traced to some 435 lead and zinc mines which have filled with water since mining operations ceased in 1970.

Corps Names New Division Engineer

Brig. Gen. Hugh G. Robinson will succeed Brig. Gen. James C. Donovan on August 1 as the U.S. Army Corps of Engineers' Southwestern Division Engineer in Dallas, Texas. Robinson is currently Deputy Director of Civil Works, Office of the Chief of Engineers, Washington, D.C. Donovan's retirement marks 30 years of service.

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Oklahoma Water Resources Board

Computers make mistakes too! The OWRB computer printed out more than one label for some subscribers last month, and we apologize. We're reworking its program, but until such time, please be patient.

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