Sabine Basin Currents

A Newsletter on Water Quality Issues - Summer 1996

1996 Regional Assessment of Water Quality Report

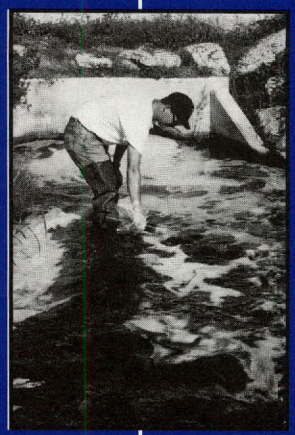
The Sabine River Authority (SRA) Development Branch and Environmental Services Division staff has just completed the 1996 Regional Assessment of Water Quality Report as required by the Texas Clean Rivers Program (TCRP). The purpose of this Assessment Report as defined by the TCRP is to identify significant issues affecting water quality in the Sabine Basin. This is the third such report produced on a biennial basis since the enactment of the TCRP in 1991.

Upon completion of the draft report in July, copies were sent to the Texas Natural Resource Conservation Commission (TNRCC) and Sabine Basin Steering Committee for review to allow for comment and questions. The Steering Committee is comprised of 66 members from industry, government, and civic organizations with interest in water quality issues in the Sabine Basin. The purpose of the Steering Committee is to assist in the coordination and development of the Assessment Report, and give input on the entire CRP planning effort, so that the needs of the stakeholders are met. During the two years leading up to the Assessment Report the SRA held periodic public meetings and Steering Committee meetings to allow a forum for input and discussion on the various phases of the assessment process. After all comments on the draft report were received from participants, the SRA submitted a final copy of the 1996 Regional Assessment of Water Quality Report to the Governor, TNRCC, and Texas Parks and Wildlife Department. This Assessment Report can be accessed and viewed by all interested parties on the World Wide Web at "http://www.sra.dst.tx.us/". ★

Sabine Basin Segment 0505 Waste Load Evaluation

The Sabine River Authority of Texas (SRA) has completed an intensive water quality study for Sabine River Segment 0505 (Sabine River and Tributaries from Highway 271 near Gladewater downstream to the headwaters of Toledo Bend Reservoir). This Waste Load Evaluation Investigation was conducted through the Texas Clean Rivers Program (TCRP) and was a cooperative effort of the Texas Natural Resource Conservation Commission (TNRCC), the SRA, the City of Longview, the City of Kilgore, the Texas Parks and Wildlife Department, and the U. S. Geological Survey. Other participants in the study included the Cities of Gladewater, Marshall, White Oak, and Hallsville along with Eastman Chemical and Strohs.

The investigation will provide information to further enhance the QUAL-TEX water quality model, establish aquatic life use designations for selected tributary streams through Receiving Water Assessments, and have more reliable estimates of the seven-day low flow with a recurrence interval of two years (7Q2 flow). With the accomplishment of this major water quality planning effort, the TNRCC will have better scientific information to utilize in the wastewater permitting process such that decisions will not be made on an assumed set of criteria.



Although this is a special water quality data collection effort of a large magnitude, SRA has been an active supporter of the TCRP and wants Sabine Basin residents to be aware that this is a continuing program and we would be happy to cooperate with any entity or company that may need a Receiving Water Assessment of the

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Ambient Biomonitoring

The SRA Texas Clean Rivers Program (TCRP) bioscreening approach includes ambient biomonitoring to identify toxicity concerns in the Sabine Basin. Freshwater organisms used in ambient biomonitoring include *Ceriodaphnia dubia*, a small crustacean and *Pimephales promelas*, the fathead minnow. The test animals are less than 24 hours old when the tests are started and the tests last for seven days. The test organisms are exposed in the laboratory to samples collected from various sites in the Sabine Basin.

The results of the tests can indicate sublethal effects, lethality, or no toxicity. Sublethal effects include statistically significant diminished reproduction in the *Ceriodaphnia* test or statistically significant diminished weight gain in the *Pimephales* test. Sublethal effects can but do not necessarily indicate the presence of toxic substances. These effects can be due to natural

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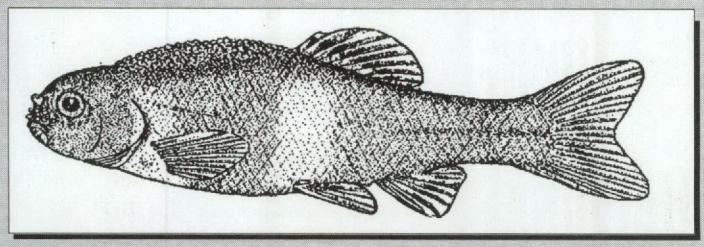
Ceriodaphnia dubia, *Shown 10 times actual size*
(Adult - actual size approximately 1 to 2 mm)

Ceriodaphnia dubia, *Shown 3 times actual size*
(Size used in toxicity tests approximately 0.1 mm)



Pimephales promelas, *Shown actual size*
(Adult male - actual size approximately 8 to 10 cm)

Pimephales promelas, *Shown actual size*
(Larval stage used in toxicity test approximately 1 cm)

TESTING CORNER

Acidity, Alkalinity, & Hardness

The interaction of acidity, alkalinity, and hardness play an important role in water quality and can have a major impact on everyday water use in the home as well as in industry.

Acidity in surface water is due primarily to carbon dioxide that enters the water by absorption from the atmosphere. Carbon dioxide is also produced from the oxidation of organic material by plants and animals. Other mineral acids can also add to the acidity of water. These acids usually contribute only a very small part to the acidity due to the small amounts which naturally occur. Large amounts of mineral acids can come from industrial wastes which are not properly neutralized.

Alkalinity refers to the ability of water to absorb and neutralize acids. This buffering capacity comes primarily from bicarbonates and to a lesser extent from carbonates and hydroxides. Bicarbonate is a compound made up of carbon, oxygen, and hydrogen. Carbonate is a compound of carbon and oxygen. Hydroxide is a compound of oxygen and hydrogen. Alkalinity is measured as calcium carbonate in milligrams per liter (parts per million).

Bicarbonates contribute to the largest proportion of alkalinity due to the abundance of calcium and magnesium in the earth's surface. These metals react with the carbon dioxide in water to form bicarbonate salts. Carbonates and hydroxides exist in natural waters as a byproduct of algae using carbon dioxide.

"Hard" water is a term often used to describe how well soap will lather. The term actually describes the amount of calcium and magnesium in the water. These metallic ions cause soap to precipitate from water and therefore make it "harder" to produce lather. Total hardness is defined as the sum of calcium and magnesium concentrations and is expressed as calcium carbonate in milligrams per liter (mg/L). Hardness can range from zero to hundreds of milligrams per liter. Generally water with less than 100 mg/L of hardness are considered soft and any water with more than 100 mg/L is considered hard.

Hardness and alkalinity play an important role when treating water and wastewater because they effect the way other chemicals react in the treatment process. These components can also cause lime deposits or "scale" in home water systems which can cause stains and clog pipes and water heaters. ✯

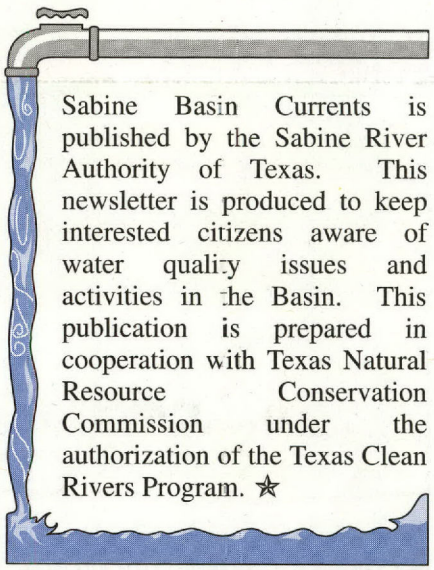
Ambient Biomonitoring *Continued from page 2*

conditions that are not conducive to the life cycle of the test organisms. Other factors and tests must be examined to determine if the sublethal effects were due to pollutants.

Lethality usually indicates the presence of toxic substances, but even lethality can sometimes be due to natural conditions. These can include high dissolved solids or suspended solids. Additional tests must be conducted to determine the cause of toxicity. The first step is to repeat the test using a fresh sample. Persistent toxicity can then be analyzed further using Toxicity Identification Evaluations (TIE). This procedure divides the sample into several components to isolate the toxic substance(s). The substances causing toxicity can be present in very small quantities which may not be detectable without intensely concentrating the sample.

The current monitoring program includes 15 sites throughout the basin that are analyzed quarterly. Any site showing lethality for either organism is retested each month until lethal conditions subside. The first quarter test results indicated no toxicity for any of the 15 sites. The second quarter test results indicated inadequate survival (lethality) for *Ceriodaphnia dubia* at 4 sites. These 4 sites were resampled and analyzed in May 1996. One site showed no toxicity; one site showed poor reproduction (sublethal effects); and two sites showed lethality. Samples from the two sites showing lethality were fractionated to attempt to isolate the toxic component(s). This process includes filtration, organic extraction, and metals chelation (removal). The results from this procedure indicated the toxicity was due to organic compounds. In June 1996, the two sites showing lethality in May were resampled. Results again indicated lethality for *Ceriodaphnia* and again the toxicity was shown to be due to organic compounds. The samples from the May and June tests were analyzed for organic priority pollutants, but all of the results were less than the detection level for all parameters tested. This indicates that these organisms are much more sensitive than our most sophisticated water chemistry testing equipment.

Third quarter testing began in July 1996. Results indicated no toxicity for any of the 15 sites sampled. The *Ceriodaphnia* test is usually more sensitive to very small amounts of toxins than the fathead test and the fish tests are generally 100 times more sensitive to toxins than are humans. Although the threat to human health can not be directly correlated to the test results, the risk would appear to be quite low and exemplifies the importance of using fish and aquatic macroinvertebrates as environmental barometers in our biological screening program. ★



Sabine Basin Currents is published by the Sabine River Authority of Texas. This newsletter is produced to keep interested citizens aware of water quality issues and activities in the Basin. This publication is prepared in cooperation with Texas Natural Resource Conservation Commission under the authorization of the Texas Clean Rivers Program. ★

River Facts

Fall brings about significant changes to a reservoir which many folks refer to as "the lakes' turning over."

There are fifteen major (greater than 5,000 acre-feet content) reservoirs in the Sabine River Basin. One of the most outstanding and biologically significant phenomena of these reservoirs is about to occur. As we go from our Texas summer into fall, the seasonal changes will cause our reservoirs to experience what many folks refer to as "the lakes' turning over."

The relationship between water and temperature through the seasonal changes is very unique. During the summer, our reservoirs are stratified into three distinct layers: The upper layer of warm oxygenated water which is termed the epilimnion; the layer below the epilimnion where there is a rapid drop in temperature, which is a thin layer called the thermocline; and finaly, the bottom layer which becomes devoid of dissolved oxygen as summer progresses and is referred to as the hypolimnion.

As our days become shorter and the temperatures begin to get cooler, our reservoirs will begin to lose heat faster than it is absorbed and the density differences of summer stratification become less. Finally, we will see wind action overcoming the thermal resistance to mixing until the lake is completely mixed from the surface to the bottom or as some folks refer to this phenomena — "the lakes' turning over." ★

Water Questions? Ask The. . .

Q Dear Mr. Wizard,

I have a place on the lake. With the drought, the lake level has gone way down and all kinds of grass and weeds are now growing where the water used to be. What kind of water quality problem is this going to cause when the lake fills again? Sincerely, Weed Hopper

A Dear Mr. Weed Hopper,

We certainly appreciate your interest in water quality! You have raised a very good question.

Fishery biologists and lake managers compare these conditions to those where a reservoir first fills. They know as a new lake covers such vegetation that the first few years are very productive and beneficial to the newly established fishery. Likewise, the inundation of this new vegetation should give a fresh jump-start to the older established fishery in your lake when it fills again.

If you have a question about water; water quality in some nearby stream or lake; drinking water; groundwater; water quality testing; or about aquatic life such as fish, turtles, snakes, insects, etc. in your local waterways, Mr. Wizard can help. Write to Mr. Wizard, Sabine River Authority of Texas, P.O. Box 579, Orange, Texas 77630. ✯

Waste Load Evaluation *Continued from page 1*

stream that receives their permitted wastewater discharge to ensure the stream has an aquatic life use designation which is based on site-specific information.

Also as part of the TCRP, the SRA has an approved Quality Assurance Project Plan for the Sabine Basin which means that data and information produced under this plan will be utilized by the TNRCC in its management functions such as establishment and revision of stream standards, wastewater permitting, etc. Those entities or companies collecting water quality information which they would like included under the umbrella of the SRA's Quality Assurance Project Plan need to contact us and we will make arrangements to begin this process. ✯

SABINE RIVER AUTHORITY OF TEXAS
P. O. Box 579
Orange, Texas 77631-0579
(409) 746-2192

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