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Galveston Bay

Government Publications  
Texas State Documents

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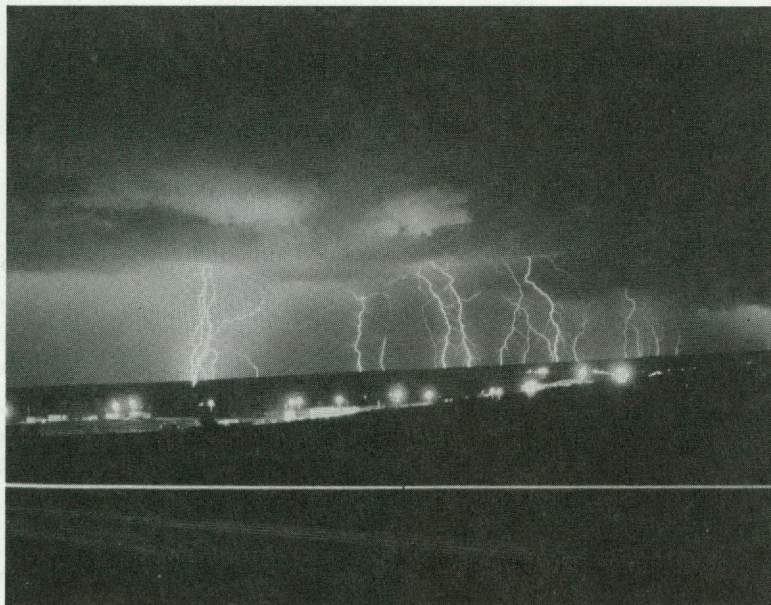
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Galveston Bay Library



## Texans Polluting Texas

Storm clouds build along the upper Texas coast, gathering moisture from the Gulf of Mexico. Thunderheads tower into the afternoon sky and darken beneath. The deepening gloom is rent by lightening and large drops begin to fall. They spatter on roofs and run through gutters and down spouts, where the water picks up zinc from the galvanized metal. Sheets of rain begin to fall on yards, washing away fertilizer and dog droppings, leaving the grass a little greener. Parking lots contribute engine drippings and paper and plastic trash to streams of runoff. Soil washes away from construction sites, and grass clippings and pesticides are washed from gardens and yards. The streams of runoff merge and grow, following gutters and storm sewers engineered to transport the runoff efficiently away from man's domain. Once in the storm sewer, the flow picks up the paints, solvents, spent motor oil and anti-freeze purposely dumped through the storm grate since the last rain. At the other end of the pipe, the flow joins



a bayou or Galveston Bay itself, creating a dark plume with a multi-colored sheen on its surface.

This scene is repeated multiple times each year, resulting in a burden of pollutants to Galveston Bay that can outweigh the *combined* contributions of contaminants from wastewater discharges and river flow. The pollution sources contributing to problems downstream are termed **nonpoint sources—now the single greatest challenge in improving the water quality of Galveston Bay.**

We now know that the influx of conventional pollutants from waste water discharges (that is, "point sources") peaked in the 1960s and has declined since. In contrast, all indications are that nonpoint sources of pollutants have steadily increased to the present day. Effects of these pollutants are seen in low dissolved oxygen in urban bayous and other

poorly flushed tributaries, possible toxic con-

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## Eco Gardening:

# Saving the Bay One Yard At a Time!

by John Teas, Vice President Teas Nursery Co., Inc.

Teas Nursery Company traces its history to 1843, when John C. Teas began selling apples out of his back yard in Indiana. In 1908, his son, horticulturist Edward Teas Sr., met developer W.W. Baldwin who was then planning the community of Westmoreland Farms and the Town of Bellaire in Southwest Harris County. Baldwin hired Teas to execute the planting designs for Bellaire Boulevard and adjacent streets. The business was expanded to provide landscaping services, and the company's early projects included the landscaping of Rice Institute (now Rice University) and the River Oaks Subdivision. By 1951, Teas Nursery had planted over one million trees in the Houston area.

Teas • 4400 Bellaire Boulevard • (713) 664-4400

**G**ardening should be a way to improve our lives without destroying wildlife in the process. Houstonians often do not realize the results of careless runoff into our storm drains. There is no processing plant to handle rain water runoff. Everything that goes in the drain winds up in Galveston Bay, sometimes in only a few hours after a strong rain. Think about what you are putting in your ecosystem. The following weeding and fertilizing practices, and pest management, composting and plant selection tips can help save the Bay.

### Weed Without Polluting

The use of physical barriers such as ground cloth or even wet newspapers under mulch stops weeds without applying dangerous herbicides that could run off into the Bay. Never use gasoline to kill weeds. Pulling weeds and composting them is the best possible way to make your garden neat and save the environment.

### Don't Overfertilize

A properly maintained lawn will last well on its own mulched clippings and be less susceptible to disease and frost damage than an overstimulated lawn. Mild applications of liquid fertilizer will give a quick greening with less waste to run down the sewer and pollute the Bay. Organic

fertilizers last longer and provide more vital trace elements with less run-off.

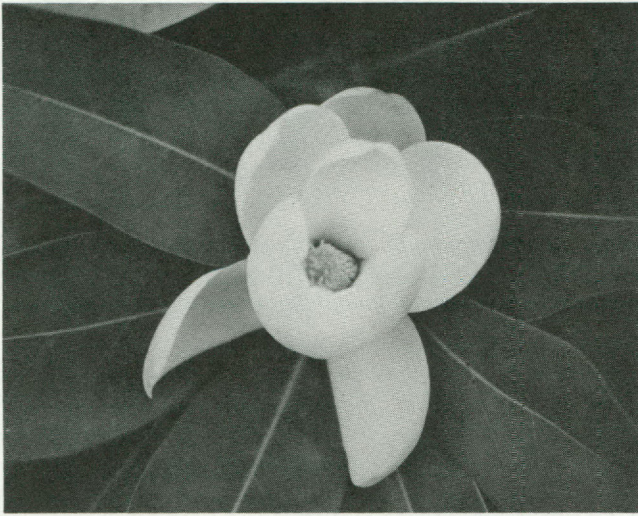
### Use Careful Pest Control Management

The modern generation of gardening insecticides, even the chemical ones, are designed to break down in the environment. Many biological controls are available to attack specific pests without harming other creatures. Beneficial insects should be encouraged. Lady bugs purchased from a nursery, although they are prone to fly away, do help the general environment.

### Compost Your Gardening Waste

We should never throw leaves and sweepings down our storm drains. These products contribute directly to pollution in the Bay. We also need to somehow keep our neighbor's drains clean, too. If you notice a lawn service dumping sweepings in the drain, inform the landowner. If you see the neighbor doing this, try to inform him of the danger this causes our valuable estuary. Compost garden clippings! Not only are the clippings kept out of the drain system, but composting has another benefit as well. By distributing compost in the garden, the need for strong chemical fertilizers that will run-off into the sewers has been eliminated. Fertilizers in the Bay increase the nitrogen content of the water causing algal blooms that deplete the oxygen in the water and lead to fish kills.





*Magnolias (left) and Ruellia (right) are two of the areas native plants.*

### Use Native Plants

Most Texas Native Plants are well adapted to Houston and will thrive indefinitely without a lot of time-consuming and expensive maintenance. Most are drought tolerant, too, thus helping to conserve our water supply. They will continue to grow and bloom with just the help that Mother Nature gives them because they thrive naturally in our climate. These plants have developed natural defenses against local pests and there-

fore require less use of pesticides. They grow vigorously which helps keep down weeds. Some of the many native plants recommended for Houston include: **Texas Mountain Laurel, Purple Sage, Salvias of many kinds, Coral Honey-suckle, Drummond Red Maple, Wax Myrtle, Scarlet Bouvardia, Hummingbird Bush (Anisacanthus or Hamelia), Turk's Cap, Butterfly Vine, Esperanza, Yucca, Mexican Buckeye, Ruellia, Magnolia and Oaks.**

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## Increasing Awareness in the Boating Community

*by Kathy Machac, Manager, Watergate Yachting Center*

**F**or several months, boat owners and marina operators on Clear Lake have been making strides toward further involvement in the care of the Galveston Bay/Clear Lake environment.

The agendas of meetings of the Clear Lake Marina Association are regularly centered on the water quality in Clear Lake and Galveston Bay, and speakers on the subject of water quality have been prevalent during the last year. Eric Hall, Senior Water Resources Engineer, George Guillen of the Texas Natural Resource Conservation Commission, Doug Myers of the General Land Office, and Barbara and Don Currie of Maritime Sanitation are to name a few. Representatives from the U.S. Coast Guard, Complete Environmental Services and the Alabaster Corporation

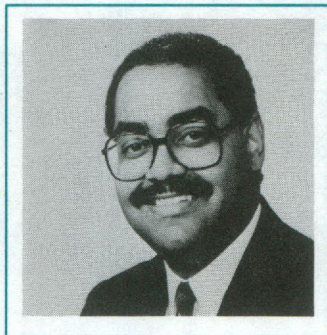
have instructed marina operators on oil spill prevention and clean-up procedure.

The Clear Lake Marina Association with the Marina Association of Texas outlined a project named "Nonpoint Source Pollution Abatement for Boating Facilities" and applied for an EPA grant to conduct studies and propose action pertaining to this issue. Though this proposal did not receive funding, grant money did find its way into the Galveston Bay Foundation Pilot Pump-out Program which is taking place on Clear Lake. This project began in October of 1993 and was detailed in the last issue of *Bayline*.

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# NOTES FROM THE CHAIRMAN



## *A Key Initiative:* Regionally-Based Management of Galveston Bay

**W**ho will implement the developing Galveston Bay Plan? This is a vital question to the many user groups, industries, agencies, cities, and environmental groups who share a concern for the Bay's future. Now, because of the importance of this issue to the Galveston Bay community, I am pleased to report that a major milestone has been achieved to assure a bright future for the Bay.

On October 1, the Policy Committee of the Galveston Bay National Estuary Program voted unanimously to seek the creation of a special regional authority that could implement all of the requirements for comprehensive estuary management. This was not just an initiative of the Policy Committee; the idea has emerged from the Galveston Bay community itself with an unprecedented level of support. In making the decision, the Policy Committee considered letters of unanimous endorsement from such diverse groups as the Greater Houston Partnership, the Galveston Bay Foundation, and both the Management and Citizens Advisory Steering Committees of the GBNEP.

This decision was made on the foundation of four years of hard work by the approximately one hundred members appointed by the Governor to the GBNEP Management Conference. We have come to recognize that the initiatives being developed in The Galveston Bay Plan to solve bay problems and assure a sound coastal economy can be fulfilled utilizing a regionally-based approach. Of course, much hard work remains, not the least of which is to establish and fund the new authority.

The completed Galveston Bay Plan will be submitted to Governor Richards and the United States Environmental Protection Agency for approval in the Fall of 1994. Our greatest challenge is to assure that the initiatives of the plan are not forgotten when the planning phase of our program concludes in a few short months. To meet this challenge, the regional approach identified by the community of bay users and organizations offers great promise. I pledge to do all within my power to assure the Bay's future, and I invite your support to achieve this important goal.

*Rodney Ellis*

**REPORT  
POLLUTION**  
**1-800-3  
OUR BAY**  
Brazoria, Chambers, Galveston, Harris, and Liberty Counties  
Galveston Bay National Estuary Program



# NOTES FROM THE DIRECTOR

by Frank Shipley

## Just the Facts, Please...

Consider these two contrasting (and all too common) complaints about managing the environment:

*What good is another study? We've studied everything to death — why don't we do something for a change?*

*Why do we waste so much money on actions that are based on opinions instead of facts — it's no wonder the problems never really get solved!*

Although these points of view are expressed in negative terms, they raise a valid issue. How much information do we need before we take action? How do we balance the need to *know* (stressed by scientists) and the need to *do* (the realm of managers).

As the GBNEP began its mission leading to comprehensive management of Galveston Bay, some observers thought we already knew enough to take action. Indeed, the success of some early actions (like establishing the Christmas Bay and Armand Bayou Coastal Preserves) seemed to bear this out. But the really gritty issues facing the bay seemed to involve complex ecosystem issues that had never been squarely addressed. To manage the important and varied estuarine resources, some fact-finding was clearly in order.

Four years later, the fact-finding portion of the program is nearing completion, even as the findings are incorporated into the developing *Galveston Bay Plan*. And in retrospect, the unexpected nature of some of the findings clearly reveal the wisdom of establishing a factual basis for action.

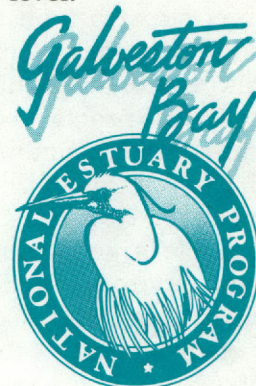
Soon, the GBNEP will publish a major volume entitled *The State of the Bay*. This work will be the culmination of dozens of separate projects guided by the Scientific/Technical Advisory

Committee of the GBNEP. Among the many unexpected findings revealed are:

- Population declines in certain bird species, crabs, and white shrimp
- A bay that is clearly decreasing in salinity
- An unexpected strong declining trend in the nutrient pollutants nitrogen and phosphorus
- Increasing water clarity
- A complex picture for toxic contamination indicating some possible risk to subsistence or recreational catch seafood consumers as a result of the potential presence of toxic chemicals

Good science often yields unexpected truths which turn out to be more interesting (and of a lot more use) than speculation. The findings to be published in *The State of the Bay* have led us to a productive re-definition of Galveston Bay's problems, challenging some long-held conventional wisdom. Clearly, expert opinion alone would have failed to serve us well in solving (or even perceiving) the problems at hand.

When *The Galveston Bay Plan* is released for public comment in the Spring of 1994, it will address seventeen bay problems which have been distilled from four years of effort. Above all, the interconnections and complexity revealed among the many components of the estuary point to the need for a new kind of approach to governance: one which is integrated at the ecosystem level.





# Coal Combustion By-Products Create Oyster Reef in Galveston Bay

A Report on the Galveston Bay National Estuary Program's 1992-93 Action Plan Demonstration Project

by Bill Baker, Houston Lighting & Power Company

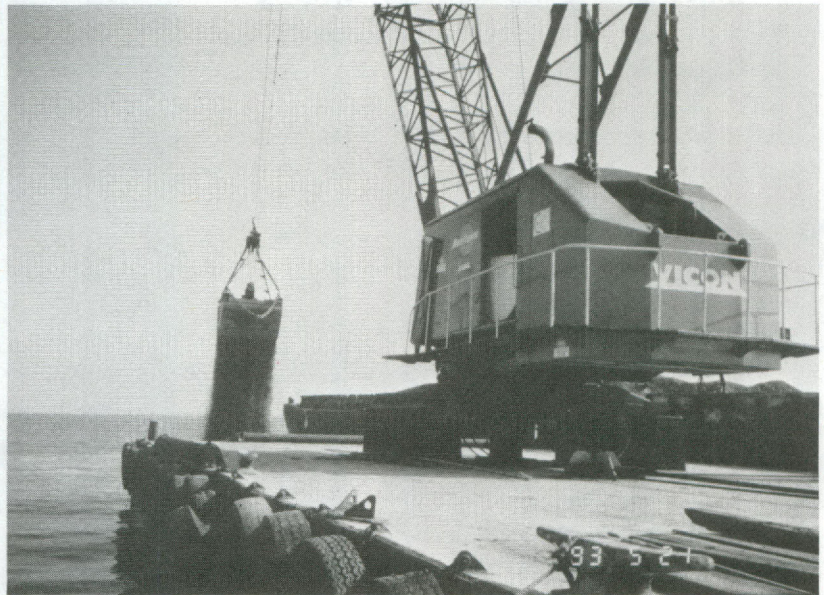
In May of this year, the first barge load of coal ash pellets was deployed in Galveston Bay, marking the construction phase of the Galveston Bay National Estuary Program's (GBNEP) latest Action Plan Demonstration Project (APDP). Within a few short weeks, the pellets were rapidly colonized by oysters, while a myriad of fish and invertebrates began taking up residence on the site. The last barge load of pellets arrived on-site August 20, culminating the transport and deployment of more than 12,000 cubic yards of material to the five-acre reef site.

*It sounds simple . . . make pellets, transport them to a dock, load them on barges, and then empty the barges at the selected site. Yes . . . "Build it and they will come!"*

*But wait! . . . It isn't quite that easy. First of all, who pays for all this? . . . and who selected the site and why? . . . and what about all the permits? . . . will the site be monitored? The questions seem endless, but let's journey back in history and examine the path this project has taken since the idea was first submitted and approved.*

Why use coal ash to build oyster reefs in the first place? The potential exists for a significant demand in oyster reef substrate on the upper Texas coast. In previous decades, shell dredged from coastal bays was used to build and enhance existing reefs. However, this practice is no longer allowed in Texas and is fast becoming obsolete in Louisiana as well. Elimination of this practice created an opportunity for Houston Lighting & Power Company to recycle large volumes of their coal ash material in an environmentally acceptable manner, which in turn, can significantly benefit the marine environment, water quality and local fishing interests.

As a result, in May of 1988, HL&P began investigating the suitability of coal combustion by-products as oyster reef substrate in reef enhancement and construction projects along the upper Texas coast. Extensive material tests were conducted to determine strengths and optimum mix designs of material. At the same time, these materials were also undergoing extensive environmental suitability tests to ensure that detrimental impacts would not occur.



Deployment of the Oyster Reef Material

Texas A&M University at Galveston conducted simultaneous tests to determine the biofouling potential of the coal ash material compared to natural oyster shell. They also conducted numerous bioaccumulation tests to determine if trace elements from the coal ash pellets were being taken up by oysters grown on the pellets.

Results of this five year research project demonstrated that coal ash materials are strong enough to withstand the rigors of the marine environment, and provide an excellent substrate for biofouling organisms such as oysters, barnacles, tube worms and algae. Also, these materials are



not an environmental or public health hazard.

The various research phases of this five-year project included the permitting and construction of numerous test reefs. Five small prototype reefs were built throughout a variety of salinity regimes in the Galveston Bay system, and a larger reef, (1.25 acres) was constructed with state funds at the northern end of April Fool Reef near San Leon. Results from these test sites proved to be very encouraging. Now what was needed was an opportunity to expand the project to include a larger scale reef.

The Galveston Bay National Estuary Program APDP offered that opportunity. A project proposal was prepared by Rusty Swafford of the National Marine Fisheries Service, with assistance from HL&P. The Port of Houston Authority agreed to provide significant funding for the project and to act as the project's agency sponsor. A proposal was submitted for review in the summer of 1992 and was approved by the GBNEP Management Committee that fall.

The ultimate goal of the project is to demonstrate the feasibility and cost effectiveness of using a mix of coal combustion by-products, in pellet form, in large-scale oyster reef construction.

Project preparation and planning began immediately upon approval. It required construction of a five-acre oyster reef in central Galveston Bay, using 12,000 cubic yards of coal ash pellets derived from HL&P's W. A. Parish coal-fired power station. The project was funded through an EPA grant of \$91,880 and significant matching funds were provided by the Port of Houston Authority and HL&P. JTM Industries and the National Marine Fisheries Service contributed in-kind services.

The project has been managed by representatives from the three major sponsors, Dick Gorini from the PHA, Bill Baker from HL&P and Rusty Swafford from NMFS, and they make up the Artificial Reef Management Committee. An Artificial Reef Management Steering Committee was also formed, comprised of representatives from State and federal agencies, local advocacy groups and higher education institutions. This commit-



*Barge Carrying Coal Ash Pellets*

tee advised project management on pertinent issues such as siting, permitting and monitoring the reefs. In addition, an independent review team of scientists was formed to advise the Steering Committee and the Management Committee of particular monitoring issues and to assist in the interpretation of results and historical data.

Early issues, such as reef configuration and site location, were quickly addressed by the Steering Committee. U. S. Army Corps of Engineers 404 Permit, Texas Natural Resource Conservation Commission 401 certification and General Land Office easement applications were quickly submitted, and JTM began producing the pellets in early 1993. Historical data from the previous five years of research was analyzed by the committees, resulting in some additional requirements that included additional chemical analysis of materials and an evaluation of bioaccumulation data by the Texas Department of Health. Transportation and deployment strategies were analyzed extensively by the Management Committee, setting a goal to begin deployment at the selected site just prior to the normal spring oyster spawn in Galveston Bay.

A combination of production and permit delays caused the reef deployment to occur in two phases. The first 6,000 cubic yards of material were deployed in late May, while the remaining pellets were deployed in mid-August.

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## Coal Combustion

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Deployment was conducted by Parker Brothers Inc., incorporating large material barges and draglines. Material was deployed at depths of one to two feet, leaving a minimum of eight and one-half feet of clearance above the reef. The plot covers an area approximately 700 feet long and 300 feet wide and is located in central Galveston Bay, on State Tract #248, approximately 1.5 miles northeast of Houston Ship Channel marker #60. The location is marked with large round orange buoys.

Texas A&M University will monitor the site for the next four years. Monitoring programs include oyster community development on the pellets, the development of fish communities in the waters over the reef, and a recreational fishing survey from the immediate area. Periodically, oyster samples will be collected from the site and from an adjacent natural reef to evaluate the uptake of trace elements in the oysters. Water quality will be evaluated periodically, and pellets will also be analyzed for their durability in the marine environment.

The site will be off-limits for commercial oyster harvest for about five years. This will allow time for scientific investigations to be completed without disturbances of dredges and will allow oysters to become well established prior to public harvest.

Although the harvest of oysters from the site will be delayed, successful recreational fishing in the area is already occurring. Species such as speckled trout, black drum, sheepshead, flounder and croaker have all been caught with surprising frequency from the reef. If you are looking for a new place to fish, and you have a boat, I would strongly suggest you give the reef a try.

The Galveston Bay system now has an additional five acres of reef habitat provided by GBNEP's Action Plan Demonstration Project process, made possible through a cooperative effort and funding of regulatory agencies, advocacy groups and industry. Significant time and monies have been invested, but that's what it takes to make a positive investment in the future of Galveston Bay.

## Bay Saving Tips For Texans

### Litter

Put all litter (cigarette butts, fast food containers, etc.) into garbage cans.

***Never use storm drains for litter.***

### Pet Waste

Pet waste is raw sewage that releases bacteria and oxygen-consuming materials into our waterways. Keep pet waste from getting into the storm drain system.

***Bury pet waste or flush down the toilet.***

### Automobile By-products

Motor oil, gasoline, and anti-freeze can damage or kill aquatic vegetation and life. Anti-freeze is a highly toxic chemical with serious oxygen-depleting characteristics. Motor oil washed down storm drains contaminates valuable drinking water.

***Never wash automobile by-products down the storm drain system or dump products on land. Take to local service stations for recycling or disposal.***

### Household Hazardous Waste

Oven and drain cleaners, moth balls, paint and paint thinners, and many household products contain toxic materials.

***Use natural alternatives when possible. Do not pour down the drain or toilet. Do not discard with regular trash. Contact local hazardous waste collection companies.***



## Increasing continued from page 3

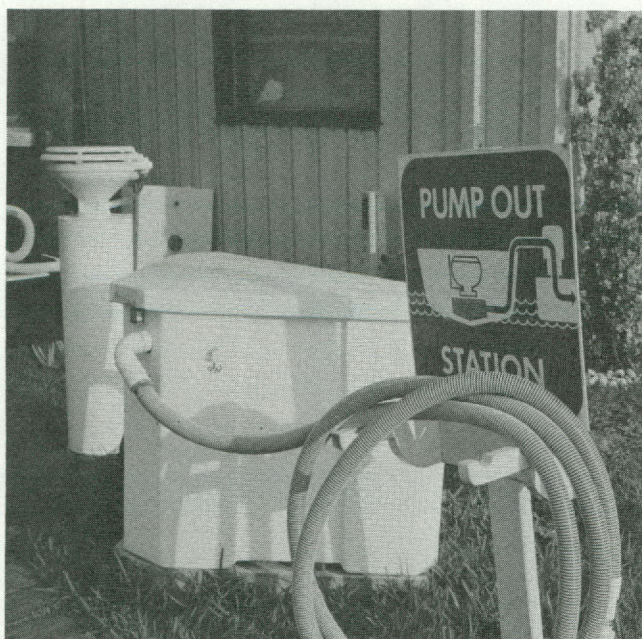
Through monthly newsletters and procedure classes marinas are educating boat owners to use the five (5) pumpout facilities and the pumpout boat on Clear Lake. And, the recently published "Don't Pollute" brochure is being distributed throughout marinas.

Good water quality is promoted by marina facilities by advocating the usage of restrooms, trash containers and oil receptacles conveniently located on marina premises. In addition, designated wetlands areas have been set aside by some marinas, further enhancing water quality.

Knowing that clean water is in everyone's best interest, the boating community will continue to encourage awareness and participation in protecting our Bay.



*Wetlands in a Clear Lake Marina*



*Pump-out Facilities - Clear Lake Marina*

*Oil Disposal for Boat Owners*





# Publication List

## of the Galveston Bay National Estuary Program

The following publications are available to the public at no charge. You may obtain these at one of the offices listed below.

### Galveston Bay National Estuary Program

Bay Plaza One  
711 West Bay Area Boulevard  
Suite 210  
Webster, Texas 77598  
Phone: 713-332-9937

### Galveston Bay Information Center

Texas A&M University, Galveston  
Jack K. Williams Library  
P.O. Box 1675  
Galveston, Texas 77553  
Phone: 409-740-4703

### Report Publication Series

Proceedings: Galveston Bay Characterization Workshop	Feb. 1991	GBNEP-6
Christmas Bay Environmental Inventory	Mar. 1991	GBNEP-7
Armand Bayou Environmental Inventory	Mar. 1991	GBNEP-8
Christmas Bay Regulatory Survey (out of print)	Mar. 1991	GBNEP-9
Armand Bayou Regulatory Survey (out of print)	Mar. 1991	GBNEP-10
Fiscal Year 1992 Work Plan	Aug. 1991	GBNEP-11
Shoreline Survey Unpermitted Discharges to Gal. Bay (out of print)	Aug. 1991	GBNEP-12
Armand Bayou Regulatory Effectiveness Study	Dec. 1991	GBNEP-13
Christmas Bay Regulatory Effectiveness Study	Dec. 1991	GBNEP-14
Characterization of Nonpoint Sources and Loadings	Jun. 1992	GBNEP-15
Wetland Plant Communities, Gal. Bay System	Mar. 1992	GBNEP-16
Fiscal Year 1993 Work Plan	Aug. 1992	GBNEP-17
Segmentation Development for Gal. Bay	May 1992	GBNEP-18
Characterization of Selected Living Resources in Gal. Bay	Jun. 1992	GBNEP-19
Toxic Contaminant Characterization of Aquatic Organisms in Gal. Bay	Jul. 1992	GBNEP-20
Characterization of Selected Public Health Issues in Gal. Bay	Aug. 1992	GBNEP-21
Ambient Water and Sediment Quality of Gal. Bay	Aug. 1992	GBNEP-22
Proceedings: The Second State of the Bay Symposium - Feb. 4-6, 1993	Feb. 1993	GBNEP-23
Environmental Management Inventory of Gal. Bay	Oct. 1992	GBNEP-24
Recreational Fishery By-Catch in the Gal. Bay System	Nov. 1992	GBNEP-25
Galveston Bay Bibliography	Apr. 1993	GBNEP-26
Framework for Action: Galveston Bay Management Evaluation	Jan. 1993	GBNEP-27
Dredge and Fill Activities in Galveston Bay	Apr. 1993	GBNEP-28
Non-Fishing Human Induced Mortality of Fisheries Resources in Gal. Bay	May 1993	GBNEP-29
Sediment Quality Assessment Survey of Galveston Bay	May 1993	GBNEP-30
Trends and Status of Wetland and Aquatic Habitats in the Gal. Bay System	Apr. 1993	GBNEP-31
Fiscal Year 1994 Work Plan	Aug. 1993	GBNEP-32
Probable Causes of Trends in Selected Living Resources	Sept. 1993	GBNEP-33
Trawling Bycatch in the Galveston Bay System	Aug. 1993	GBNEP-34
Sources & Distribution of Bay Debris in the Galveston Bay Estuary	Aug. 1993	GBNEP-35

### Videos

<i>Balancing Act</i> (Armand Bayou and Christmas Bay)	Oct. 1990
<i>Oyster Harvesting and Conservation in Galveston Bay</i>	Oct. 1991
<i>Conflicting Uses of Galveston Bay</i>	Oct. 1991
<i>The Galveston Bay Ecosystem</i>	May 1992

### Special Publications

#### Galveston Bay Area Residents' Handbook

*a guide to responsible lawn care, household cleaning, automobile and boat care, and proper maintenance of septic systems and other issues to be considered by residents living in the 5 county area.*

#### Hazardous Waste Wheels

*an easy to use "wheel" with helpful information about less toxic alternatives to some of the products you may use around the house or in the garage, that may be hazardous to the environment.*



## Publication Series Distribution

**These libraries should have complete sets on file:**

Bureau of Economic Geology Library,  
The University of Texas at Austin

College of the Mainland Library  
Texas City, Texas

The Fondren Library  
Rice University, Houston, Texas

Texas & Local History Department  
Houston Public Library

Life Sciences Library  
The University of Texas at Austin

Marine Science Institute Library  
The University of Texas at Austin

M.D. Anderson Library  
The University of Houston Libraries

Medical Sciences Library  
NASA-Johnson Space Center

Moody Medical Library  
University of Texas Medical Branch, Galveston

Neumann Library  
University of Houston—Clear Lake

Pasadena Public Library  
Pasadena, Texas

Rosenberg Library  
Galveston, Texas

Sterling C. Evans Library  
Texas A&M University, College Station, Texas

Sterling Municipal Library  
Baytown, Texas

School of Public Health Library  
University of Texas Health Science Center, Houston

Jack K. Williams Library  
Texas A&M University, Galveston, Texas

**The following libraries began receiving GBNEP publications in January, 1993, and may not have complete sets. They will receive all future publications.**

Brazoria County Library System libraries:  
Main Library, Angleton, Texas  
Alvin, Texas Branch Library  
Pearland Branch Library

Brazosport College Library  
Lake Jackson, Texas

Chambers County Library System, Main Library  
Anahuac, Texas

Juanita Hargraves Memorial Branch Library  
Winnie, Texas

West Chambers County Branch Library  
Mont Belvieu, Texas

## GET INVOLVED

***Yes! I would like to be involved in the Galveston Bay National Estuary Program.***

- Please put me on the mailing list for the Galveston Bay National Estuary Program Information Letter "Bay Line" and other Galveston Bay information

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zip \_\_\_\_\_

Daytime Phone Number \_\_\_\_\_ Evening Phone Number \_\_\_\_\_

I would like to help with special projects: \_\_\_\_\_

I am currently a member of these environmental, civic, or business organizations: \_\_\_\_\_

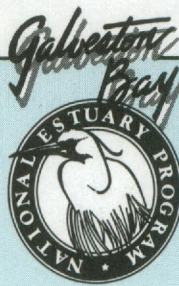


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tamination from metals or trace organic compounds, and closures of half the bay's oyster reefs to harvest, due to elevated bacteria levels. The Houston Ship Channel remains a significant region of concern, due in large part to runoff from the greater Houston area.

Resilience has been the key to Galveston Bay's survival throughout the last century of human influence. Unfortunately, even the resilient nature of the bay is being taxed by overwhelming urban growth and the environmental demands that go with it. Torrential assaults on this valuable natural resource can be countered with the active participation of the individuals living in the bay's watershed.

Individual responsibility must be at the heart of nonpoint source pollution control measures. This fact is recognized in the developing *Galveston Bay Plan*, which emphasizes residential control measures by education and involvement of individuals. Now that we know the nature of the problem, **we can take action.**



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**Bay Line** is a quarterly publication of the Galveston Bay National Estuary Program (GBNEP). The Texas Water Commission and the Texas Air Control Board have combined as of Sept. 1, 1993 to form the Texas Natural Resource Conservation Commission (TNRCC).

**Editor - Melinda Walton**  
**Assistant Editor - Marie Nelson**  
**Design and Printing - TNRCC**

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Articles appearing in *Bay Line* do not necessarily represent the view of the Management Conference.

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