

I. Introduction

Introduction

Half the earth's population lives on just five percent of its land. Coastlines, out of all inhabited areas, have historically been among the most highly valued by humankind. Coasts have acted as magnets for varied human activities, uses of marine resources, and permanent human development. Cities have sprung up to take advantage of abundant seafood, natural water transportation, and aesthetic and recreational qualities offered by the boundary between land and sea. Along the Gulf Coast, the population density is five times greater in coastal counties than in inland counties; people seem naturally attracted to the edges of the land.

Natural bay systems have been the most attractive coastal areas of all. Here, where rivers meet the sea in natural semi-enclosed basins, seafood is most abundant. The geographic setting offers a potential to link inland domestic economies (via rivers) and global commerce (via the sea). Cities located on bays become transformation and processing points for products like petroleum and wheat. Ports become entry points for products ranging from bananas to automobiles. By locating near a bay, industry gains cheap access to both raw materials and markets for its final products. Refineries and manufacturing plants are built. People follow jobs.

For decades, human development around the nation's great bay systems occurred with little regard for effects on the marine systems themselves. Of all natural environments, bays seemed most able to absorb tremendous human activity without much reduction in the bay's productive value. Fish and shellfish numbers remained high, although contamination of some areas required harvest closures to protect the public from disease. Certainly the ships were not slowed down, even if the waters were becoming polluted and the wetlands which produced the bountiful seafood were being lost.

In recent years major economic and environmental events have raised concerns about the capacity of coastal environments to sustain further human activity without damage. Worldwide, for example, fish provide more than half of all animal protein consumed by people, but fish declines have occurred in 13 of the world's 17 principal fishing zones. In Chesapeake Bay, historically the nation's greatest seafood producer, oysters, striped bass, and crab populations crashed so quickly that a management plan could not be developed and put in place in time to forestall disaster. Similar events have occurred in Puget Sound, San Francisco Bay, and in a number of east coast bays. Clearly, the nation's coastal resources are at risk.

Galveston Bay ranks high among the most significant bay systems in the nation. This premier Texas coastal resource provides substantial economic benefits. Remarkably, these benefits are self-sustaining as long as the bay remains healthy and productive. However, Galveston Bay,

like many other U. S. bays, now faces significant problems related to habitat loss, water quality, and related species declines. Some of these problems are only in their early stages, providing us with advanced warning in time to prevent larger disasters already seen in most of the world's principal fishing zones. Other problems in Galveston Bay such as wetlands loss, already exceed many other bays in severity.

Galveston Bay - A Premier Texas Resource

Galveston Bay benefits the state's citizens in many ways. Any list of important uses of the bay would probably include the following:

- The bay is a great place to fish. Approximately one third of the state's commercial fishing income comes from the bay. Over half of the state's expenditures for recreation fishing are related to Galveston Bay.
- The bay is also an important transportation artery; the Port of Houston is the third largest port in the country and sixth largest in the world by tonnage. Many of the area's petrochemical and other industries rely on the Houston Ship Channel, Intracoastal Waterway, and other channels for transportation.
- The bay is the final recipient of treated wastewater from over 1400 industrial and municipal point source discharges. This amounts to over 60% of the wastewater (by volume) discharged in Texas. It also receives non-point source pollutants in storm water runoff generated by agricultural, urban, suburban, and rural land users of the watershed.
- Galveston Bay provides important natural habitats for many species of particular environmental interest to Texans such as colonial waterbirds, shorebirds, dolphins, sea turtles, alligators, and numerous other species.
- Other uses of the bay include: cooling water, sailing, motorboat cruising, sightseeing, and oil and gas production.
- Most importantly, perhaps, is the value of Galveston Bay as a general indicator of the health of the environment. Most people realize that the bay is an important local ecosystem, and they have a keen interest in protecting and maintaining the productivity of the bay for future generations.

For Galveston Bay, adoption of *The Galveston Bay Plan* is the next step to assure this resource remains healthy and productive for future generations. For five years, state, federal, and local governments have deliberated among themselves and with those who derive their livelihood from Galveston Bay – business and industry, recreational and commercial fishing, shipping, and environmental organizations. *The Galveston Bay Plan* identifies and describes the problems specific to this bay system, based on sound scientific research described in detail in a companion document entitled "The State of the Bay". Moreover, *The Plan* prescribes custom-

tailored management initiatives to solve these problems utilizing a comprehensive, ecosystem-based approach. The result, this document, can provide balanced but protective public policy to assure Galveston Bay continues to benefit future generations of Texans.

HOW VALUABLE IS GALVESTON BAY?

One measure of the importance of establishing comprehensive public policy for Galveston Bay is the value of the bay and its resources. Several major sectors of the regional economy depend upon Galveston Bay, for example commercial fishing, recreation (including fishing and boating), and tourism. These activities directly depend upon the health and productivity of the bay, and therefore also on maintaining these qualities with sound management. Other values are more difficult to measure, such as the value of the bay for assimilating wastewater, or aesthetic values that draw people to the area, adding property values and general quality of life. Shipping, industrial activities and production of oil and gas are also huge economic assets tied directly to the bay.

Commercial Fishing

Galveston Bay is Texas' leading bay fishery, yielding over eleven million pounds of fish and shellfish annually. From three to five thousand commercial licenses have been issued annually in Galveston Bay in recent years, resulting in a total economic impact to the state of about \$358 million per year. Besides benefits from the bay itself, Galveston Bay supports a substantial portion of the offshore fishery, since species like shrimp grow up in the bay and are harvested as adults in the Gulf. Oysters are the single most important bay commercial species, however about half of Galveston Bay is subject to shellfish harvest closures as a result of health risks to consumers resulting from contaminated rainfall runoff.

Recreation

Gross business resulting from tourism and recreational uses of the Galveston Bay complex amounted to \$425.2 million in 1986. In that year, about \$122 million was directly spent in the region by people engaging in these activities – more than half the dollars spent on these activities on the entire Texas coast. Some 30 percent of the region's residents participate in some form of bay-related recreation, in addition to an unknown number of visitors from outside the five-county area studied.

For every pound of finfish caught commercially in Galveston Bay, more than six pounds of finfish are caught by recreational anglers. For its nearly 300,000 licensed recreational anglers, Galveston Bay supports some two million hours of sport fishing annually, creating economic benefits estimated at \$364 million in 1986. However, a fishing success rate of more than two fish per hour caught in the mid-1970s declined to about one fish per hour a decade later. All told, about half the sport fishing expenditures in Texas are associated with the Galveston Bay complex.

More than a thousand commercial boats were registered in the bay area in 1992, while nearly 100,000 pleasure vessels were served by 38 marinas. Some 63 percent of the marina wet slips in the state are found in this region, many concentrated in the "Yacht Capital of Texas," as Clear Lake is known.

Tourism

Since 1975, tourism has grown substantially in the counties surrounding Galveston Bay. Activity in 1992 provided more than 80,000 jobs and nearly \$7.5 billion in travel and payroll dollars. The proportion of these expenditures directly related to Galveston Bay is substantial, but unknown. The fastest-growing segment of the tourism industry is *ecotourism*; that is, tourist activity related to the attractions of nature. The potential for expanded ecotourism related to Galveston Bay has barely been tapped; currently over 21 potential ecotourism sites are known around the bay, but few have been developed for this purpose. For example, bird-watching at High Island and other locations around the bay attracts visitors from all over the United States and many foreign countries.

Wastewater Discharge

Some 60 percent of all wastewater discharged in Texas flows to Galveston Bay, including the output from about 45 percent of all municipal sewage treatment plants that discharge to the Gulf of Mexico. As the final destination for these domestic and industrial wastes, the bay provides a valuable (and incalculable) service to society by naturally processing this wastewater. In the past, Galveston Bay was overburdened with these wastes, resulting in the upper Houston Ship Channel becoming, some 25 years ago, one of the most polluted bodies of water in the nation. More recently, since passage of the Water Quality Act, a substantial expenditure of effort and dollars has helped clean up the waters of the upper bay (described in more detail below). While this progress continues, the natural processes at work in the bay will continue to provide a valuable function to the region by assimilating wastes.

Shipping, Industry, and Petroleum

The major ports of Houston, Galveston, and Texas City have enjoyed considerable growth in the last 40 years, with shipping more than doubling between 1970 and 1989 to more than 175 million tons per year. The cargoes reflect the dominance of petroleum and related industries in the area, with petroleum products representing 37 percent, chemicals and plastics 21 percent, crude petroleum 13 percent, and wheat 13 percent of shipping. Growth of the largest petrochemical complex in the nation around Galveston Bay was fueled early in the area's history by the substantial oil and gas deposits found beneath this region, with substantial petroleum beneath the bay itself. In total these activities provide literally trillions of dollars in economic impact, much of which can be directly attributed to the geographic and transportation advantages provided by Galveston Bay.

THE HUMAN ROLE PAST AND PRESENT

Fourteen thousand years ago, Paleo-Indians hunted woolly mammoths, mastodons, and large bison in the area that was to become Galveston Bay. At that time, the bay's shoreline extended up to 100 miles further into the Gulf than today. For the next 13,000 years, humans used the bay as a food source, leaving only piles of discarded shells and pottery shards to tell of their presence.

When Spanish and French explorers arrived looking for gold, and had to settle instead for trade with the local natives, the bay became increasingly used as a conduit for colonization and settlement. By 1815, the harbor at Galveston Island attracted mercenaries, called filibusters, and privateersmen who claimed to be helping the Mexicans make their break with Spain. Then by 1822, Anglo-Americans began to establish permanent development, and to dream of an independent Texas.

In 1836, the Republic of Texas became a reality following a victory by the Texans over Mexico in the Battle of San Jacinto, fought on the shores of Galveston Bay. During the Republic's brief, ten-year history, Houston and Galveston were founded as private ventures. When Texas was annexed into the United States in 1845, yet another war was fought with the Mexicans. This time, one of the main results of war was the stimulation of business and commerce.

By 1850, shipping was beginning to dominate the economy. For the next 60 years, a bitter rivalry grew between Houston and Galveston, each vying for dominance as a port. About the end of that period, two events occurred that radically altered human interaction with Galveston Bay. First, around 1903, an inquisitive oil scout began the bay's petroleum industry, and the first well was drilled about four years later on the shore of Tabbs Bay. Second, the U.S. Army Corps of Engineers completed dredging of the Houston Ship Channel across the bay and up the lower reaches of the San Jacinto River and Buffalo Bayou to Houston in 1914. As oil production and shipping expanded, the stage was set for vast industrial, cultural, and environmental changes.

PROBLEMS

Galveston Bay is an *estuary*, defined by D. W. Pritchard in 1967 as "a semi-enclosed body of water having a free connection with the open sea and within which seawater is diluted measurably by freshwater from land drainage." With all the physical forces at work in an estuary (the flow of rivers; the deposition of sediments; the ebb and flow of tides) conditions are constantly changing. Living species that evolved in estuaries are therefore adapted to tremendous variability and extreme conditions in their environment; they are robust. In fact, because of the dominance of natural change in estuaries, the whole system can absorb surprising perturbations from human activities. Although some individual resources in an estuary can be quite sensitive to perturbation (for example sea grasses), estuaries in general are not good examples of the "delicate balance of nature."

Yet, in spite of their capacity to endure human impacts, even estuaries have their limits. For some Galveston Bay resources, these limits have been exceeded. Before reviewing the current problems facing the bay, however, consider another chapter from Galveston Bay's history: the story of water quality in the upper Houston Ship Channel. This episode clearly illustrates how a concerted effort by local stakeholders working in partnership with government can restore the bay.

A SUCCESS IN THE MAKING: POINT SOURCES OF POLLUTION AND THE UPPER HOUSTON SHIP CHANNEL

In the mid-1960s, the upper Houston Ship Channel received so much pollution from municipal and industrial wastes that its upper 16 miles had become devoid of oxygen and biologically sterile. Jokes circulated about the "octane rating" of the Channel and the danger of its catching fire. Massive fish kills occurred downstream in the bay itself, where the Channel intersects open water. Incredibly, close to half a million pounds of biochemical oxygen demand entered the channel daily (BOD is a measure of the oxygen-robbing properties of pollutants); (see Figure IN-1). A book published in 1972 by the Conservation Foundation, titled "The Decline of Galveston Bay" chronicled the extreme degradation of water quality in those years.

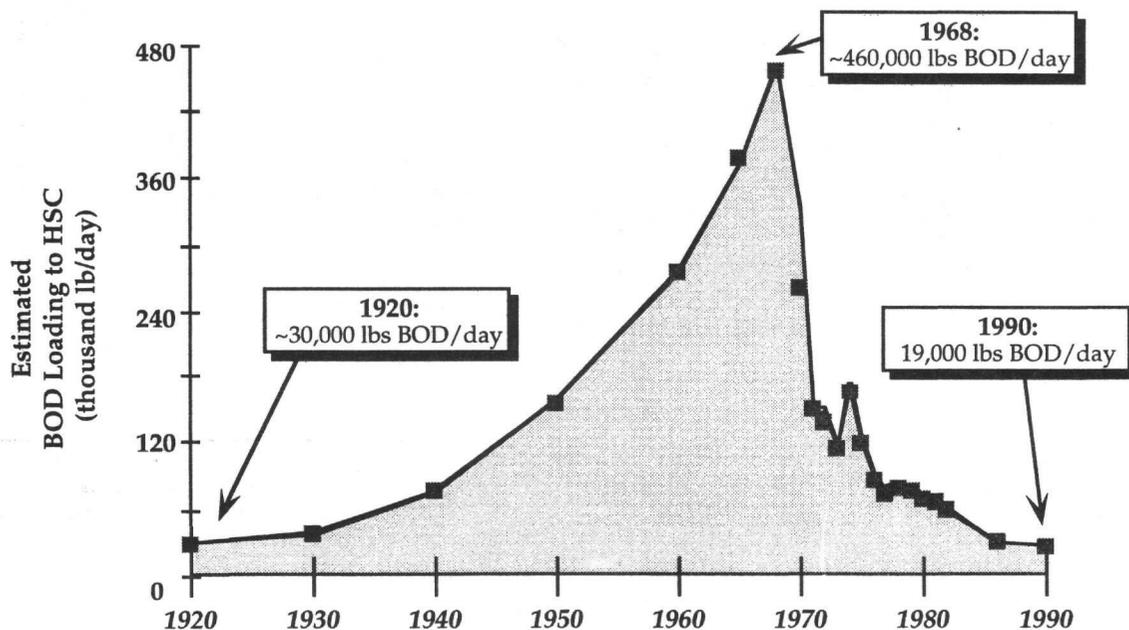


FIGURE IN-1. Changes Over Time in the Biochemical Oxygen Demand (BOD) Loadings to the Upper Houston Ship Channel (HSC) from Municipal and Industrial Point Sources

With the passage of the nation's first Water Quality Act in 1965, states were required to develop water quality standards for all navigable waters. This triggered a process of regulatory control of point source discharges under the National Pollutant Discharge Elimination System (NPDES), which optimistically put forth the goal of pollution elimination by 1984. After a somewhat confrontational beginning, industries and cities reached an

agreement with the newly-formed U.S. Environmental Protection Agency (EPA) and the State of Texas in 1971 on eleven specific cleanup measures, including limitation of BOD discharges to 35,000 pounds per day, dechlorination of all discharges, and performance of wasteload allocations bay-wide.

During the decade of the 1970s, industries along the upper Houston Ship Channel and the City of Houston poured a vast amount of human and financial resources into cleanup efforts. Since the initiation of NPDES point source controls, over \$1.1 billion from Texas Water Development Board (TWDB) loans and EPA construction grants have been spent on water and wastewater facilities in the five-county region surrounding Galveston Bay. The result of actions by cities and industry, working with state and federal resource agencies, is a continuing success story. By 1990, less than 19,000 pounds per day of BOD were being discharged, a whopping 95 percent reduction from mid-1960s levels – representing a return to levels of pollution discharge not known since the 1920s. Oxygen concentrations in channel waters increased and are continuing to improve today. Fish kills in the upper bay due to the influx of pollutants from the landlocked portion of the channel have stopped. Indeed, an increasing number of bay species have recolonized the upper channel itself, including shrimp, crabs, and a variety of fish species.

While some problems still plague the upper Houston Ship Channel (particularly related to toxic contaminants, sediment toxicity in some parts of the Upper Bay, produced water from petroleum production, and pollutants from non-point source runoff), the point source controls initiated 25 years ago are accomplishing their intended purpose. Because of this remarkable success, *The Galveston Bay Plan* does not establish a new emphasis on water quality permits and standards, which are already accomplishing beneficial water quality improvements.

WHAT PROBLEMS REMAIN?

Although an effective management program for point source discharges has been a major asset in maintaining the health of Galveston Bay, far less progress has been made for other problems which now threaten the future health and productivity of the estuary. These problems include the destruction of valuable habitat (which threatens fish and wildlife populations); the increasingly competitive uses and demands on the bay's resources; and degraded water and sediment quality in limited areas within Galveston Bay, particularly resulting from non-point sources of pollution. These issues are briefly described below.

Habitat Destruction and its Effect on Fish and Wildlife Populations

Problem

Habitat destruction has emerged as the single greatest environmental problem affecting the Galveston Bay system. Coastal wetlands and seagrass meadows are at highest risk. These valuable habitats are responsible for the great productivity of commercially and recreationally valuable fish and shellfish in Galveston Bay. Wetlands and seagrasses create productive nursery areas where the Gulf's abundant seafood species are nurtured. These habitats also

harbor a wide variety of plant and wildlife species, the diversity of which contributes to the bay's productivity.

Coastal wetlands serve many other important and beneficial functions. They stabilize shorelines, protecting property from the eroding forces of wind and waves. They protect upland areas from flooding by diverting and storing floodwaters. At the same time, they help purify these waters by removing sediment and contaminants from storm water runoff. Finally, wetlands help to recharge our groundwater supplies by storing surface water and allowing infiltration into underground recharge zones.

Fact: The Galveston Bay system has lost some 30,000 acres of wetland habitat (almost 20 percent) since the 1950s. This loss far exceeds the national average losses for estuarine wetlands. Furthermore, almost 90 per cent of the bay's sea grasses have been lost. Only a few hundred acres of seagrass meadow remain, mostly within Christmas Bay.

Fact: Ninety percent of the commercially and recreationally important fish and shellfish species in the Gulf of Mexico use coastal wetlands for one or more stages in their life cycle.

Proposed Solutions

The Galveston Bay Plan proposes nine specific actions for fish and wildlife habitat protection. The highest priority is to reverse the historical trend of wetland loss by restoring or creating 15,000 acres of wetlands. Dredged material from navigation channels will be used as a resource for habitat creation. Another priority is to rehabilitate existing wetlands that have been degraded by pollution, loss of circulation, or impacts from non-native species of plants (such as the Chinese tallow tree) and animals (such as grass carp and nutria). Other proposed actions include improvement of bird nesting sites, development of tax incentives to encourage habitat conservation, and acquisition of key habitats to ensure their long-term protection.

The Galveston Bay Plan proposes 10 related actions which target fish and wildlife protection. The major emphasis of these actions involves the strengthening of species management efforts to adequately protect commercially and recreationally important species as well as threatened and endangered ones. Other efforts will encourage the reduction of commercial fishing by-catch (incidental catch of non-target species in shrimp trawls) and the reduction of fish drawn into industrial cooling-water systems. Finally, other proposed actions will encourage catch and release programs for recreational fisheries and will develop strategies for controlling harmful exotic species that displace Galveston Bay's native fish and wildlife.

Competing Human Uses of the Bay: A Balance Between Needs and Available Resources

Problem

A wide variety of problems affecting Galveston Bay have one thing in common: they all reflect the way we choose to use the bay and how we compete for the bay's scarce resources to fulfill our needs. Problems of this type will continue to grow in the future as our population grows and as our needs for the bay's resources grow. Figure IN-2 shows population growth of about 3.3 million between 1850 and 1990 for the five county area

encompassing the majority of the lower Galveston Bay watershed. Our growing need for freshwater and negative shoreline impacts due to poorly planned development are examples of natural resource problems affecting the bay.

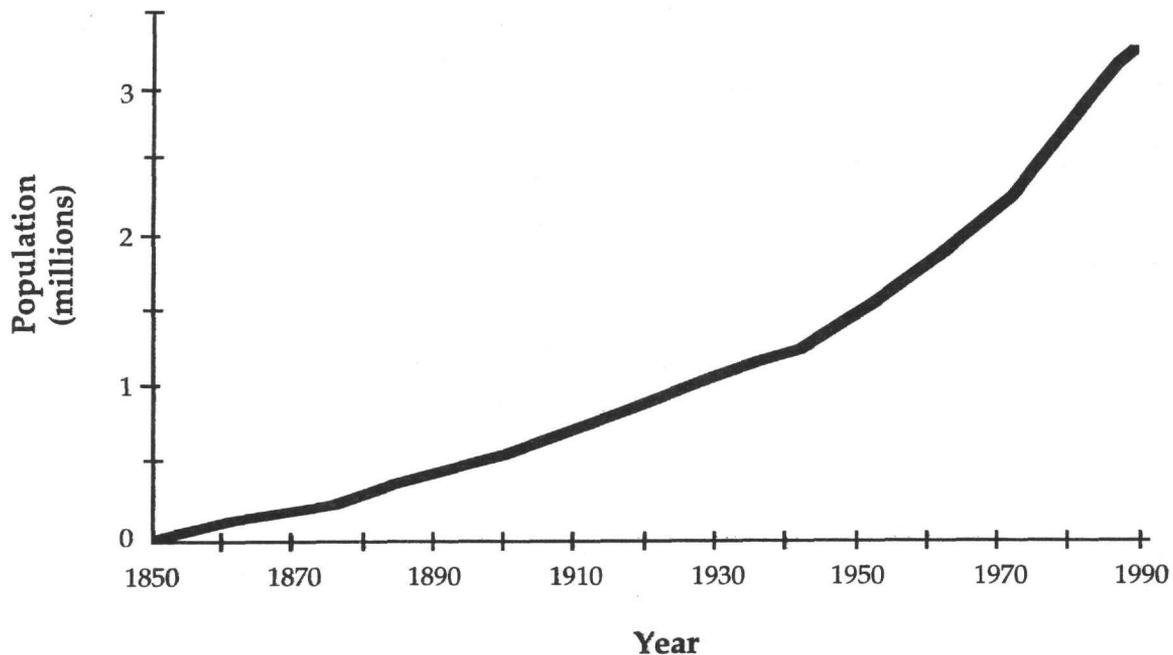


FIGURE IN-2. Population Growth from 1850 to 1990 in the Five-County Area (Brazoria, Chambers, Galveston, Harris, and Liberty)

Freshwater inflow is the life-blood of Galveston Bay. As freshwater from rivers mingles with saltwater from the sea, it forms a nurturing mixture that sustains the ecosystem and the organisms within it. The volume and timing of freshwater inflows are naturally dynamic, but sustained changes in these variables, or the location of inflow, will result in corresponding change to the ecosystem. As our population and need for freshwater continue to grow, diversions of freshwater could alter circulation and salinity patterns in the bay. These will in turn affect the abundance and distribution of fisheries species as well as alter coastal habitats.

Fact: Freshwater inflow alterations which impact bay salinity regimes and circulation patterns can negatively affect habitat such as wetlands and oyster reefs. Such alterations can also alter the distribution and abundance of fish and shellfish species that inhabit the bay.

Fact: Today, we use over 1.4 billion gallons of freshwater each day in the five counties bordering Galveston Bay.

Proposed Solutions

The Galveston Bay Plan proposes seven actions to address freshwater inflow and circulation issues in Galveston Bay. These measures include determining freshwater needs for Galveston Bay that would ensure its future ecological productivity. After the ecological needs of the estuary have been determined, strategies will be developed to assure that freshwater is available to sustain ecological productivity in balance with human uses. Promoting water conservation and more efficient water usage are some of the tools that can be used to achieve these goals.

Shoreline development is another significant human activity affecting the bay. Some coastal activities have produced unintended results for Galveston Bay such as habitat alteration and destruction, pollution, and loss of fish and wildlife abundance and diversity. Steady population growth has intensified the competition for limited coastal resources. Planning for shoreline use and development is the only way to ensure that the many competing needs for our shorelines can coexist. A comprehensive planning program for shoreline development would include guidelines for residential, commercial, and industrial development that would minimize adverse impacts to the bay.

Fact: 3.3 million people live in the five counties bordering the Galveston Bay system. Twenty percent of that population (almost 650,000 people) live within two miles of the bay or its tidal tributaries.

Proposed Solutions

The Galveston Bay Plan proposes five shoreline management actions to ensure compatibility of shoreline uses. These actions include the establishment of a planning program for shoreline development which would produce guidelines for residential, commercial, and industrial development. Local governments along the bay's shoreline would have the opportunity to voluntarily coordinate with other shoreline communities in maintaining the shoreline values that draw people to the area and contribute to local economies. Other actions include minimizing negative effects of structures and dredging on publicly-owned lands and ensuring improved access to publicly-owned shorelines.

Water and Sediment Quality Problems

Despite the ongoing successes of point source regulations, there are still concerns over source areas – limited areas where more pollutants have entered the water than the system can adequately assimilate. These areas are primarily located around the western bayous that empty into the bay, the same bayous on which we have built the majority of our homes and businesses. For example, aging wastewater collection and treatment systems are failing, resulting in bypasses and overflows which allow raw sewage to escape into bay tributaries.

Non-point sources of pollution are receiving particular management emphasis to ensure continued water quality improvement in Galveston Bay. These pollutant sources are geographically diffuse and are associated with every-day human activities. As rain water drains across the surface of the land, it picks up a wide variety of pollutants and carries them to the bay. The types and amounts of pollutants vary depending upon the way we use our

land. They include pollutants from roads and parking lots, driveways and yards. An observation by D. R. Baugh concerning Chesapeake Bay applies equally well to Galveston Bay: “. . . in order to continue improvements in the bay’s water quality, the next phase of the campaign must be bolder, with deeper societal commitment. We have achieved what in many ways is the easiest part of the cleanup, regulating point source discharges. We must now look at changing the way we think and act.”

Fact: Over 50 percent of Galveston Bay is permanently or conditionally closed to oyster harvest due to fecal coliform bacteria contamination associated mainly with non-point source runoff. In addition, runoff of excess nutrients, pesticides, and heavy metals is responsible for water quality impairment in many local bayous and portions of Galveston Bay.

Proposed Solutions

The Galveston Bay Plan proposes sixteen specific actions to reduce water quality problems caused by non-point source runoff. These actions include the implementation of storm water management programs for local municipalities. Components of a storm water program would focus on load reductions from residential neighborhoods, septic tanks, new development and road construction, and from industrial and agricultural activities. Other actions would require treatment of wastes from boating and marina activities.

Some point source concerns also remain for Galveston Bay, despite the existing regulatory program for permitted discharges. Primarily, the concern is wastewater which never reaches treatment plants and is never part of the permitted flow. As cities in the Galveston Bay watershed have grown, their aging sewage collection systems have suffered from soil settlement, corrosion, and larger-than-design flows. As a result, leaks allow entry of storm water during wet periods, exceeding the capacity of lines, lift stations, and treatment plants. The ultimate result is sewage bypasses to the bay’s tributary waters. Sewage can also leak out of broken lines and flow to groundwater or the storm sewer system.

Fact: In 1986, almost 19,000 pounds of oxygen-consuming pollutants (BOD) entered the Houston Ship Channel from bypasses and overflows each day (eleven percent of the annual BOD load, seven percent of the annual suspended solid load, and seven percent of the annual ammonia load). Since then the amount of overflow has been reduced by 60-90 percent due to improvements in the City’s collection system.

Proposed Solutions

The Galveston Bay Plan proposes six specific actions that will improve water and sediment quality associated with traditional point sources of pollution. These actions will address bypass and overflow issues and improve monitoring and enforcement for permitted discharges to ensure that discharge permit allowances are not being exceeded. *The Galveston Bay Plan* also recommends regionalizing smaller, less effective wastewater treatment systems and advocates eliminating environmental harm associated with brine discharges from petroleum extraction.

In addition to point and non-point source controls, *The Galveston Bay Plan* contains seven other actions that would improve water and sediment quality in Galveston Bay through improved management by state agencies. These actions are designed to refine methods used by the state to determine allowable pollutant loadings for Galveston Bay and to ensure that pollutant discharges are regulated more effectively. Other actions encourage existing state programs that are effective in pollution reduction in Galveston Bay such as the *Clean Texas 2000 Pollution Prevention Program*. Each of these actions is designed to enhance ecological productivity of the Galveston Bay system.

TODAY'S PROBLEMS NEED A NEW KIND OF SOLUTION

The problems which currently plague Galveston Bay differ in fundamental respects from those of the past. The relatively simple (if expensive) solutions to end-of-the-pipe cleanups simply do not apply to problems like pervasive habitat loss, diffuse sources of non-point contamination, or freshwater inflow alteration. These are *ecosystem* problems, not limited to individual natural resources, nor circumscribed by political boundaries. These problems are complex and interrelated, involving the bay itself, its tributaries to some distance upstream, and the watersheds where humans carry on their daily activities. Their solution will require a fundamentally different approach in comparison to traditional bay management. Figure IN-3 compares the traditional approach to natural resource management in contrast to natural resource stewardship.

The traditional approach begins with a mandate from government, imposed on stakeholders through regulation and enforced compliance. Under this system, bay management has evolved into a collection of diverse and sometimes narrowly-defined initiatives, limited by the various state-wide and national mandates of the large number of agencies involved. The result of this system of governance is sub-optimal use of the bay's resources; and a lack of progress to solve issues which exceed the scope of traditional narrow jurisdictions.

In contrast, stewardship begins with those with the greatest interest in the bay – its citizen-owners. In this context, problems are agreed upon and ranked in importance early in the planning process, in close coordination with scientists. Communication and cooperation among regulators and local constituencies fosters an integration of government jurisdictions, each of which is unable to individually address system-wide problems. Adversarial relationships are replaced by an enhanced sense of responsibility for the bay's publicly-owned resources, at the grassroots level. The focus of this process is the ecosystem, rather than the individual natural resources it contains; the goal is agreement on a consensus plan for future comprehensive management. *The Galveston Bay Plan* is that plan.

THE NEXT STEP FOR A CLEAN AND HEALTHY BAY: *THE GALVESTON BAY PLAN*

To build on past successes in water quality improvement, today's problems require a regional partnership of stakeholders with a true voice in governance. Industries, fishing concerns, environmental organizations and private citizens with coastal interests and livelihoods can

become partners with the resource agencies, local governments, and environmental managers who care for the bay on behalf of the public. In developing *The Galveston Bay Plan*, the partnership approach has already proven effective. Continuing to work together during implementation offers the best hope for the future of this premier resource.

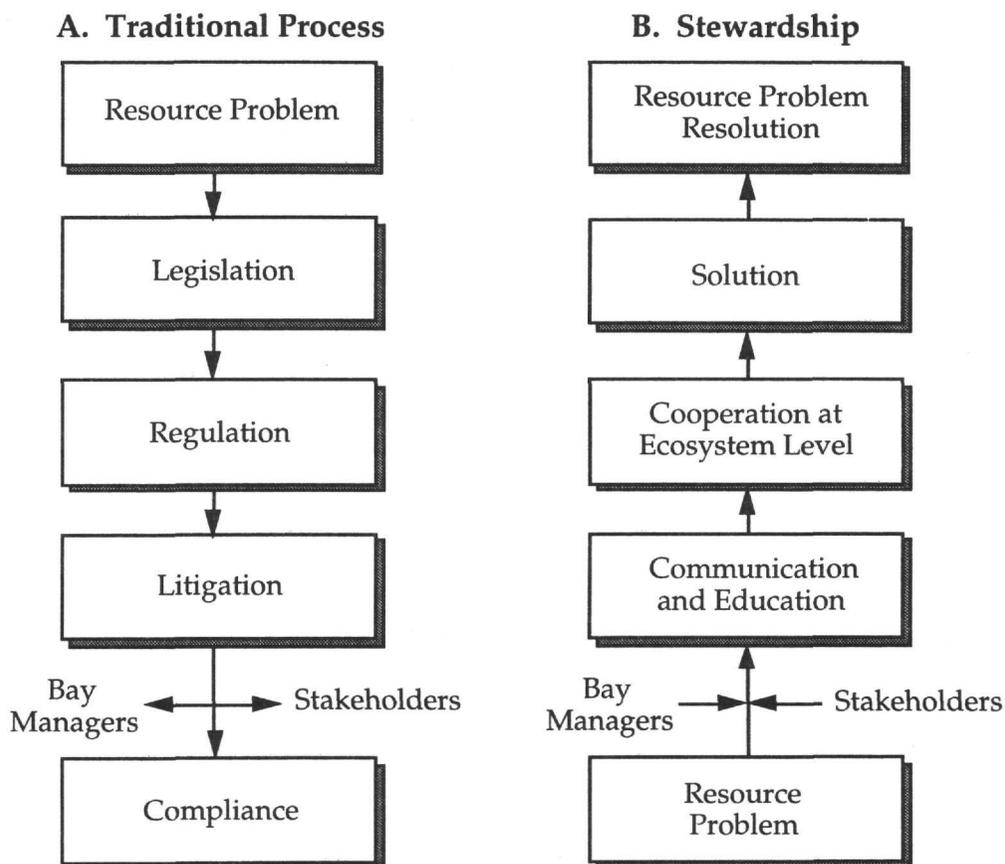


FIGURE IN-3: *Traditional natural resource management (a) contrasted with stewardship (b). Traditionally, individual problems prompted legislation and creation of a system of diverse regulatory mandates. Authority derived from a top-down, command-and-control approach, requiring continuous bureaucratic energy and resulting in a semi-adversarial relationship with stakeholders (quite effective for some problems). Stewardship, conversely, begins with stakeholders and resource managers agreeing upon the problems in the context of the entire ecosystem. Necessarily consensus-building takes longer and is more difficult than the traditional process, but helps stimulate a self-perpetuating sense of personal responsibility for public resources.*

A Bright Future

In the future, what would Galveston Bay be like under *The Galveston Bay Plan*? Consider just a few of the possibilities:

Habitats can be protected. The losses of wetlands would initially be stopped, then the trend of deterioration reversed by creation of new wetlands. For example, *The Plan* calls for use of material dredged from navigation channels and planting of marsh vegetation along currently barren, eroding shorelines. The necessary technology is already being developed in Galveston Bay through demonstration projects sponsored by partners of the Galveston Bay National Estuary Program.

Win-win partnerships can improve resource use. Currently competing uses can become complementary with some creative thinking. For example, fly ash byproducts from industry can be processed into pellets and placed in Galveston Bay to create new oyster reefs. The oysters then take over naturally and build their own permanent self-sustaining reef. This benefit to industry, commercial and recreational fishing, and the bay's overall ecological health has already been determined safe and effective in a Galveston Bay National Estuary Program demonstration project.

Non-point pollution can be cleaned up. Building on the point source cleanup of the last 25 years, non-point pollution can be reduced. Simple activities like the stenciling of storm drains by volunteers ("Please Don't Dump - Drains to Bay") can reduce the dumping of motor oil, antifreeze, paint solvents, and other harmful contaminants in neighborhoods. This program works, and is already catching on based on pilot projects started in Galveston Bay communities by the Galveston Bay National Estuary Program.

Seafood can be made safer. While the majority of seafood from Galveston Bay is safe to eat, curtailing sources of contamination under *The Plan* would further reduce the chances for seafood to become contaminated. Perhaps more importantly over the short run, seafood would be more routinely monitored for contamination (not currently occurring). Communicating the actual risks of seafood consumption to the public has been identified as a key element of *The Plan*.

Particularly sensitive areas can be protected forever. Christmas Bay, the pristine location of the last of the bay's seagrasses has already been designated a Texas Coastal Preserve. Similar action was taken for Armand Bayou; both projects were partnership actions by the Galveston Bay National Estuary Program, the Texas Parks and Wildlife Department, the Texas Natural Resource Conservation Commission, and the General Land Office.

The bay user community can know the results of their actions. A comprehensive monitoring program would (for the first time) routinely compile the information collected by numerous separate agencies, in an ongoing "State of the Bay" reporting process. The first State of the Bay report (already published) would be augmented with updates and periodic State of the Bay symposia, a forum for public agencies and stakeholders to recognize success and re-direct *Plan* activities where necessary. In addition, citizen monitoring programs could directly involve citizens of the bay community in assessing the health of Galveston Bay.

IMPLEMENTING THE GALVESTON BAY PLAN: THE TEXAS NATURAL RESOURCE CONSERVATION COMMISSION AND THE GALVESTON BAY COUNCIL

The TNRCC has been identified by the Management Conference as the lead implementing agency for *The Galveston Bay Plan*. Most initiatives in *The Plan* fall under the jurisdiction of the TNRCC. The Texas legislature has given the TNRCC a broad role for management of aquatic and marine ecosystems. As the state agency responsible for federal Water Quality Act programs, the TNRCC has sponsored the creation of *The Galveston Bay Plan* in partnership with EPA, and with the involvement of other agencies and stakeholders. Clearly, however, no single agency can tackle this formidable challenge by itself.

Unlike past management initiatives, *The Galveston Bay Plan* is a comprehensive plan. Diverse concerns for habitats and wildlife, competing resource uses, water quality, and human health cannot be adequately addressed without a true partnership. To achieve success, problems of a regional nature, those affecting the entire ecosystem, will require regionally coordinated actions among agencies. This need for cross-jurisdictional coordination was emphasized in a recent evaluation of current bay governance entitled *Framework for Action: Galveston Bay Management Evaluation*.

The need for partnership in implementing *The Galveston Bay Plan* is recognized in creation of the Galveston Bay Council. This Council will be composed of the agencies, industries, user groups, and public with interests in the bay. At every step of the way, the Council will advise the TNRCC concerning all activities related to *The Galveston Bay Plan*. This advisory role will be an strong active role that is not merely perfunctory. The Council will provide a forum for the many cross-jurisdictional management issues recognized for the bay.

This roundtable approach is precisely what created *The Galveston Bay Plan*. A strategic alliance of bay managers and stakeholders - the Management Conference - has already successfully undertaken many projects to benefit the bay and its related economies. One set of projects, the Action Plan Demonstration Projects funded by the EPA and others, has helped provide small-scale experience in implementation of actions that can be expanded for full-scale implementation under *The Plan*. These Action Plan Demonstration Projects included the following:

<u>Demonstration Project</u>	<u>Sponsoring Agency</u>	<u>Focus of the Project</u>
<i>Shoreline Erosion/Habitat Creation</i>	U.S. Soil Conservation Service	Creation of marshes using volunteers to plant cord grass.
<i>Houston Ship Channel Pollution Prevention</i>	Texas Natural Resource Conservation Commission	Pollution prevention assessments and training provided to Ship Channel industries for improved waste management and source reduction.
<i>Pump-out Facilities for Boaters</i>	Galveston Bay Foundation	Development and testing of facilities for sewage pump-out of recreational boaters. Education of local boaters regarding the use of pump-out facilities.

<u>Demonstration Project</u>	<u>Sponsoring Agency</u>	<u>Focus of the Project</u>
<i>Christmas Bay and Armand Bayou Coastal Preserves</i>	General Land Office Texas Parks and Wildlife Department	Compiled critical information for nomination of these areas as Coastal Preserves by the Texas School Land Board and Texas Parks and Wildlife Department
<i>Oyster Reef Creation</i>	Port of Houston, EPA	Evaluation of the use of coal combustion by-products in creation, placement, and restoration of oyster reefs in Galveston Bay.

However, the most important work is still in the future. Resource agencies and stakeholders alike have agreed on the need to continue to work collaboratively during the next, and even more important phase of the work: implementation of *The Galveston Bay Plan*.

In summary, *The Galveston Bay Plan* recommends implementation under a Galveston Bay Program of the Texas Natural Resource Conservation Commission (TNRCC). Because of the comprehensive nature of *The Plan*, a *Galveston Bay Council* will be created to advise the TNRCC during implementation. The Galveston Bay Program of the TNRCC will be carried out from a local Galveston Bay Office to be located in the bay area. The Galveston Bay Program will serve as the continuing focal point for implementation of *The Plan's* specific initiatives (see Chapter VIII for more detail). Figure IN-4 shows how *The Galveston Bay Plan* will help focus diverse environmental programs to benefit the bay.

What Will the Galveston Bay Program Do?

The overall goal of the Galveston Bay Program of the TNRCC will be to implement *The Galveston Bay Plan*. To accomplish this objective, activities carried out will include:

- Acquire, manage and disperse funds to implement *The Plan*
- Review federal, state, and local projects in an open process for consistency with *The Plan*
- Provide for coordination with the Texas Coastal Management Program (CMP) and the Coastal Coordination Council (CCC)
- Provide for coordination and communication among state and federal resource agencies for the many cross-jurisdictional issues
- Monitor implementation of specific actions by *The Plan's* partners
- Identify and communicate bay improvements to agencies, stakeholders, and the public, and redirect *The Galveston Bay Plan* where improvements lag
- Conduct public outreach and education to increase public awareness of Galveston Bay, and to advocate conservation of the estuary
- Evaluate the impacts of proposed actions on cultural resources and areas of historical significance

The Galveston Bay Plan

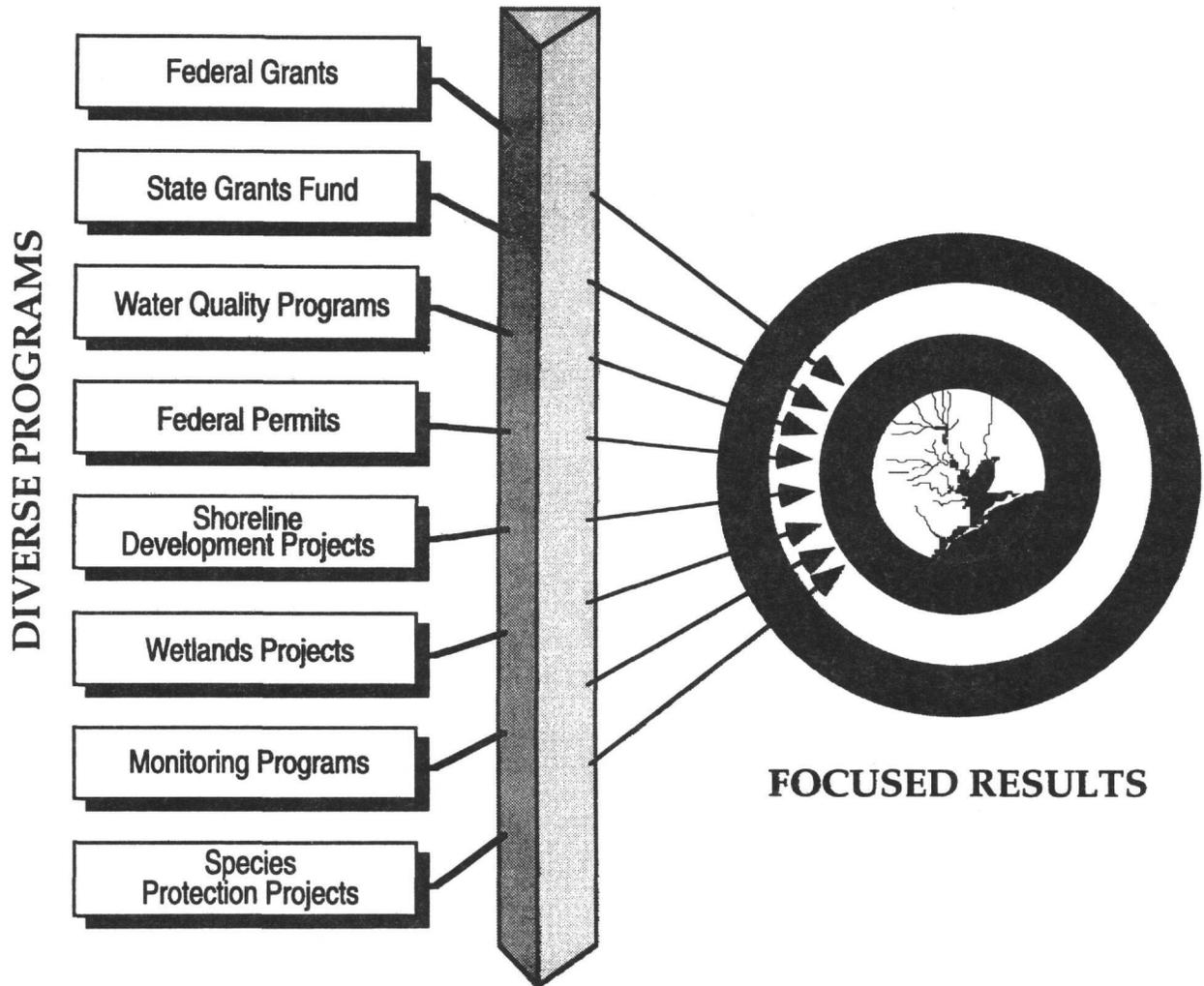


FIGURE IN-4. The Galveston Bay Plan Will Make Use of Many Existing Environmental Programs

The Galveston Bay Program will concern itself with five counties: Brazoria, Chambers, Galveston, Harris, and Liberty. However, county and watershed boundaries differ; the actual work initiatives in *The Galveston Bay Plan* will not be carried out in areas outside the watershed. Nor will the program be concerned with the upper watershed. While Galveston Bay's watershed extends north nearly to Oklahoma (including Dallas and Fort Worth), scientific work has shown that influences from the upper watershed are relatively less important in comparison to influences in the lower watershed downstream from Lake Livingston (on the Trinity River) and Lake Houston (on the San Jacinto River).

How Much Authority Will The Galveston Bay Program Have?

For the answer to this question, consider the various levels of authority which apply to coastal management (Figure IN-6). As shown in the figure, the Galveston Bay Program will have an intermediate level of authority not as strong as statutory programs like permitting, but not limited to just studying the problems. The Galveston Bay Program will serve as an open forum for consistency review of certain agency activities, to assure efficient, coordinated implementation of *Plan* actions.

Federal consistency review is prescribed for the National Estuary Programs under the Water Quality Act, and applies to federal assistance and federal development projects only. Ensuring the consistency of other types of federal actions (e.g., licenses and permits and direct activities) and of state actions (e.g., licenses, permits, leases, development projects) will depend on the relationship between *The Plan* and the Texas Coastal Management Program. For more information on the type of projects that will be subject to consistency review, see the Galveston Bay National Estuary Program Consistency Report.

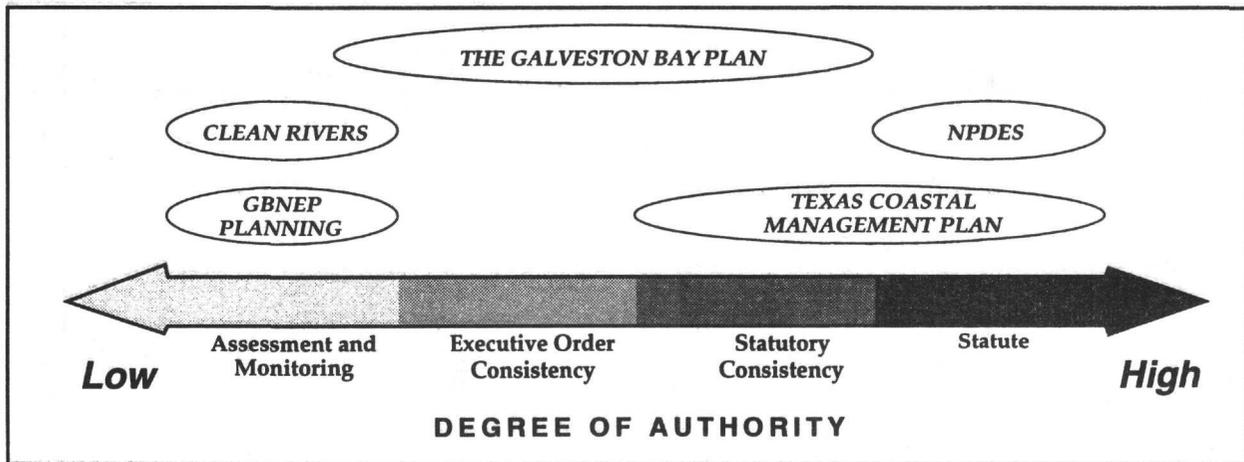


FIGURE IN-6. Levels of Authority Which Apply to Coastal Management

A Question of Consistency: *The Galveston Bay Plan* and the Texas Coastal Management Program

The Galveston Bay Program (GBP) may also provide input to the Coastal Coordination Council (CCC) in determining consistency of certain state and local projects on the Texas Coastal Management Program (CMP). The CCC has adopted rules that would allow it to adopt all or portions of the enforceable policies of *The Plan* as a Special Area Management Plan (SAMP) within the CMP. If enforceable policies are adopted as a SAMP, applicable state actions will also be reviewed for consistency with the provisions of *The Plan*. The GBP could participate in the CMP state consistency review process by providing comments to the CCC on actions subject to the CMP that occur within the Program's geographic coverage. With this relationship to the Texas Coastal Management Program, state consistency would occur under the ultimate authority of the Coastal Coordination Council, as already defined by law and

rules for all coastal activity. Note that the success of *The Galveston Bay Plan* does not rely on the use of a Special Area Management Plan approach, since it will be implemented regardless of the CMP process. Additional details concerning the consistency review process can be found in Section VIII of this document.

How The Galveston Bay Plan Was Created

The approach taken by the Management Conference to develop *The Galveston Bay Plan* was one of consensus-building among all Galveston Bay user groups, government agencies, and the public. This approach is based on a philosophy that the best governance for Galveston Bay can only be established by strong and direct involvement of the people who live and work in the Galveston Bay region. No environmental program in the history of the state has involved citizens and stakeholders more actively in environmental problem-solving. Working in a collaborative fashion, over 220 individuals helped to create *The Galveston Bay Plan* in three phases over a five-year period:

Phase One: Agreement on bay problems. A *Priority Problems List* was established by consensus of the Management Conference. This list provided guidance for the next step.

Phase Two: Scientific characterization of the problems. Over a four-year period, numerous scientific studies were carried out to determine the status, trends, and probable causes of the problems. This effort culminated in publication of a book entitled: *The State of the Bay: A Characterization of the Galveston Bay Ecosystem*. This step resulted in substantial re-definition of the bay's problems, providing a strong factual foundation for management planning. The Action Plan Demonstration Project program of the EPA has been helpful in providing funds for early implementation of critical actions, and other actions have been taken using other means. This "Action-now" approach has helped provide experience in implementation of work that can be expanded for full-scale bay management under *The Galveston Bay Plan*.

Phase Three: Development of solutions. *The Galveston Bay Plan* links a set of specific initiatives to the identified problems in Galveston Bay. These solutions were developed over three years by sixteen task forces established by the Management Committee of the GBNEP. In all, several hundred meetings were convened as *The Galveston Bay Plan* evolved through six complete revisions.

COSTS AND FUNDING FOR THE GALVESTON BAY PLAN

Costs

Costs for implementing *The Galveston Bay Plan* are of two types as shown in Table IN-1. First is the cost of the Galveston Bay Program itself, which will accomplish implementation of the

various initiatives in *The Plan*. Second are costs specifically associated with individual initiatives in *The Plan*.

TABLE IN-1. Costs and Financing for Implementation of The Galveston Bay Plan

Costs	Financing
<p>Galveston Bay Program</p> <p>Base Program:\$ 1.0 million Match Funding:\$ 1.0 million Total:<u>\$ 2.0 million</u></p>	<p>Texas General Revenue TNRCC \$ 1.5 million Federal Revenue <u>\$ 0.5 million</u> Total:<u>\$ 2.0 million</u></p>
<p>Galveston Bay Plan Initiatives</p> <p>Habitat/Living Resources\$ 15.6 million Balanced Human Uses:.....\$ 6.0 million Water/Sediment Quality\$ 11.1 million Support Tasks <u>\$ 3.8 million</u> Total:<u>\$ 36.5 million</u></p>	<p>Possible Revenue Sources:</p> <p>Grants..... Dedicated Revenue (other agencies) Contract Operations State Appropriations Private/Non-Profit Sources Total:..... <u>\$ 36.5 million</u></p>

The estimated annual cost for the Galveston Bay Program is \$1.0 million, to be used to establish a program office and staff to implement *The Galveston Bay Plan* and support the work of the Galveston Bay Program and its various committees. Added to this is another estimated \$1.0 million, to be used for matching funds to attract revenue from outside the region to implement specific initiatives. A review of possible grant programs to fund *Plan* initiatives has already been carried out. Funding from these programs is generally granted in amounts of three to twenty times the match amount provided by the local program.

The estimated annual cost for new *Galveston Bay Plan* initiatives is \$36.5 million, which compares well to the economic benefits that the Bay currently provides: \$358 million in fisheries, \$122 million in tourism, and \$364 million in sport fishery revenue. These expenditures would in some cases occur directly through entities carrying out the work (natural resource agencies, local governments etc.), and in some cases would occur through the Galveston Bay Program.

Funding the Galveston Bay Program

Section 320 of the Water Quality Act of 1987 authorizes the use of federal funds for a five-year planning process leading to completion of a Comprehensive Conservation and Management

Plan (CCMP), here *The Galveston Bay Plan*. These funds are limited to 75 percent of costs; in Texas, the 25 percent required match was supplied as Texas general revenue, appropriated to the TNRCC and expended through that agency to match Section 320 federal funds to carry out Management Conference activities resulting in this document. Upon completion of a CCMP, the Water Quality Act calls for implementation to be funded by states, but intends for existing federal programs (for example under other sections of the Water Quality Act) to be adopted for coordinated actions under the CCMP.

Funding the Galveston Bay Program is therefore to occur primarily with state funds. Of the \$2.0 million annually required for the Galveston Bay Program (\$1.0 million for the Program itself and \$1.0 million seed money to leverage grants and other sources), funding is to consist of \$1.5 million state funds and \$0.5 million federal funds. State funds are to be appropriated by the Texas Legislature to the TNRCC for establishment of the Galveston Bay Program to implement *The Plan*. Federal funds will be sought as a line item in the federal budget. Alternatively, federal funds could be derived from re-authorization of the Water Quality Act (which could provide for some limited implementation funds) or through an existing federal program such as watershed management activities under Section 104 of the Water Quality Act.

The state-federal funding partnership proved to be advantageous during creation of *The Plan* due to the involvement of programs at many levels of government. The continued partnership of both TNRCC and EPA is equally vital during the coming implementation phase of the program. The continued participation of EPA in the Galveston Bay Program is critical since numerous initiatives in *The Plan* involve federal actions under EPA jurisdiction.

Funding Galveston Bay Plan Actions

The available funding options for implementation of new actions recommended by *The Plan* include federal, state, and private grants and assistance programs. Many of these programs already provide assistance to natural resource agencies in the Galveston Bay region. The Galveston Bay Program will seek funds from a variety of sources to avoid creating a disproportionate financial burden on any one group. Potential sources of revenue for implementation of new actions recommended by *The Plan* are described below. A detailed financial report providing specific options for funding the new actions described in *The Galveston Bay Plan* has been developed in a separate publication, the Galveston Bay National Estuary Program Funding Strategy.

Grants

Grants will be sought from major federal assistance programs administered by the National Oceanic and Atmospheric Administration (NOAA), the Environmental Protection Agency (EPA), the U.S. Geological Survey (USGS), the U.S. Fish and Wildlife Service (USFWS), the U.S. Department of Agriculture (USDA), and the U.S. Army Corps of Engineers. The Galveston Bay Program will also "pass through" grant funds to entities responsible for implementing *The Plan's* actions. A survey of grant programs has been completed, indicating this approach is feasible. Generally, these grant programs call for a local funding match ranging from five to 25 percent of the total. The seed money to be allocated for grant matching will allow the Galveston Bay Program to leverage these funds.

Contract Operations

The Galveston Bay Program may conduct activities under interlocal contract with other units of government. Contract services for non-profit and private sector entities may be provided by the Program if the activities are identified in or consistent with *The Plan*. This will allow the Program to adopt existing agency programs to accomplish the initiatives in *The Plan*.

Donations of Property

The Galveston Bay Program may receive donated property from public and private sources for the purposes of habitat preservation, providing public access, or implementing other programs of *The Plan*. The Program may also transfer such property to appropriate management entities (e.g., state or federal natural resource agencies).

Private and Non-Profit Sources

Revenue from non-profit foundations that support projects related to environmental conservation may be obtained by the Galveston Bay Program.

THE GALVESTON BAY PLAN IN THE CONTEXT OF OTHER COASTAL PROGRAMS

As *The Galveston Bay Plan* moves toward finalization, questions have arisen regarding how this program and a number of other existing coastal management programs "fit together." Many of these programs were created to address a particular concern and were not necessarily designed to "fit" others. The programs are the result of a variety of state and federal laws with different purposes and goals, are funded from numerous sources, are progressing along individual timelines, are working toward specific objectives, and are overseen by separate state and federal agencies. Most agencies and program managers recognize the need to develop partnerships with other programs and are cognizant of opportunities for coordination. The *Environmental Management Inventory of Galveston Bay* (GBNEP-24) catalogued numerous existing programs that may interact with *The Galveston Bay Plan*. Table IN-2 highlights potential areas of overlap and conflicts between the following key programs:

- Gulf of Mexico Program
- Texas Coastal Management Program
- The Galveston Bay National Estuary Program
- Texas Clean Rivers Program

All of these programs involve some degree of scientific assessment to guide eventual policy recommendations and management plans. The Gulf of Mexico Program attempts to identify priority problems that will require cooperation across state and national boundaries. The Texas Coastal Management Program attempts to promote greater cooperation among management agencies active in the Texas coastal region. The Galveston Bay National Estuary Program brings this focus down to the level of a single bay system. The Texas Clean Rivers Program moves this process inland by focusing on potential pollutant concerns upstream of coastal waters within individual river basins, some of which may carry drainage from across Texas.

TABLE IN-2. Comparison of CCMP and Other Assessment and Management Programs

Texas Coastal Management Plan	Texas Clean Rivers Program	Gulf of Mexico Program
<ul style="list-style-type: none"> • Bay may be special Management area under CMP • Both emphasize wetlands/habitat • Both require consistency review • Both build primarily on existing regulatory programs 	<ul style="list-style-type: none"> • River/coastal basins are key areas within Bay watershed • Both focus on watersheds • Both require regional watershed-based monitoring plans • Overlapping public outreach needs • Interim pilot projects under both • TCRP seen as avenue for ongoing study of Bay Issues 	<ul style="list-style-type: none"> • Key estuary along Gulf shoreline • Both emphasize wetlands/habitat • Both focus on watersheds • Both involve extensive research • Overlapping public outreach needs
<p>Texas Coastal Management Plan</p>	<ul style="list-style-type: none"> • River/coastal basins are key areas in coastal management process • Both emphasize Geographic Information System (GIS) development • Overlapping public outreach needs 	<ul style="list-style-type: none"> • Key state coastline along Gulf • Both emphasize wetlands/habitat • Overlapping public outreach
	<p>Texas Clean Rivers Program</p>	<ul style="list-style-type: none"> • Key watersheds draining into Gulf • Overlapping WQ assessment needs • Both focus on watersheds • Overlapping public outreach needs

Adapted from H-GAC

A NOTE ON ORGANIZATION

The following three sections of this document (Sections II, III, and IV) present action plans to solve bay problems. Section V describes research and public participation activities to support these actions. Section VI describes a regional monitoring plan to measure the effectiveness of actions taken to help redirect future activity. Section VII describes the significant role of the public in creation of this *Plan*, while the last section in the document deals with implementation, that is how the actions are to be implemented and funded through a comprehensive regional approach to problem-solving.

The action plans themselves – the heart of this document – are presented as follows:

Section II. Habitat and Living Resource Protection

- Habitat Protection
- Species Population Protection

Section III. Balanced Human Uses

- Public Health Protection
- Freshwater Inflow and Bay Circulation
- Spills/Dumping
- Shoreline Management

Section IV. Water and Sediment Quality Improvement

- Water and Sediment Quality
- Non-Point Sources of Pollution
- Point Sources of Pollution

In each of the action plans listed above, the content and format follows a standard format.

The Issues Brief description of the particular issue(s) addressed by the action plan.

Environmental Status Description of what we currently know about the issues being addressed, based upon scientific work carried out by the GBNEP. This information generally includes status, trends, and probable causes of problems. A companion to *The Galveston Bay Plan* entitled *The State of the Bay: A Characterization of the Galveston Bay Ecosystem* provides substantially more detailed information.

Management Status Description of regulatory and management programs related to current governance of the estuary, including agency jurisdictions and identified problems and needs. Information is based upon management reviews conducted specifically by the GBNEP. A companion report summarizing much of this information is entitled *Framework for Action: Galveston Bay Management Evaluation*.

Action Plan Purpose Brief statement describing the intended outcome of the action plan. Sets the overall direction for more specific goals; not necessarily in quantifiable terms.

Overview Ties the actions to specific priority problems, and objectives. This section includes a flow diagram to relate the following elements to one another.

Priority Problem Concise statement of the environmental problem to be addressed. May or may not be quantifiable. There may be more than one priority problem per action plan.

Goal(s) The broad, long-term solution to the problem; a single general statement (not necessarily quantified). There may be more than one goal per problem.

Objective(s) Environmental target toward which future progress toward the goal can be measured, often in quantifiable terms. More specific and short-term than the goal. May range from technically derived with high confidence, to best professional judgment. There may be more than one objective per goal.

Actions A specific action to be taken to reach the objective. There may be more than one action per objective. Each action includes the following information.

What: Concise description of the action.

How: The process involved in taking action, described in the form of consecutive steps involving specific entities.

When: Time line keyed to the steps under "How," indicating the schedule for the action.

Where: Where action will be accomplished and portion of estuary it is expected to affect.

Who: Agencies/institutions who will act, pay, and enforce; description of their commitments. Lead entity(s) are designated here.

Public Costs:

Table presenting estimated five-year costs of action for new initiatives.

Regulatory Issues :

Statement of any need(s) for legislation or regulation associated with the action.

The final level in this hierarchy, that of the individual action, is the core of *The Galveston Bay Plan*. Throughout, each action is presented utilizing a single page of concise information, with related actions cross-referenced in a footnote at the bottom.

The Support Action Plans (Section V) also utilize this format to describe research and public participation activities necessary to support the initiatives of *The Galveston Bay Plan*. The remainder of this document, chapters describing implementation, monitoring, and public involvement in creation of *The Plan*, follow a simple descriptive format.

Section VIII in particular, "Implementing and Funding *The Galveston Bay Plan*," contains several significant public policy recommendations. This section recommends that the Texas Natural Resource Conservation Commission create a new regional Galveston Bay Program to be located in the bay area, for implementation of *The Plan*. Cost and funding issues are addressed, as is enforcement of *The Plan* via consistency review of future actions which affect the bay. This section also defines the relationship between the Galveston Bay Program and the Coastal Coordination Council.

Within *The Plan* individual actions have been assigned a priority rank of "High," "Medium," or "Low" based on deliberation by the Management Conference. In assigning these ranks, the Management Conference considered both the costs and probable outcomes of the actions, and made judgments about which were most significant in relation to the bay's documented

problems. The assigned rankings will provide a guideline for expenditure of funds during implementation of *The Plan*.