Freshwater Inflows
IMPLEMENTATION OF A FRESHWATER INFLOW RECOMMENDATION FOR
THE TRINITY - SAN JACINTO ESTUARY (Galveston Bay)

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Freshwater inflows (FWI) from rivers, streams, and local runoff maintain the salinity gradients, nutrient loadings, and sediment inputs that in combination produce an "ecologically sound and healthy estuary." This report summarizes TPWD studies of the FWI needed to maintain the unique biological communities and ecosystems characteristic of a "healthy" Trinity-San Jacinto Estuary. Methods for determination of the quantity and quality of freshwater inflows needed to maintain our coastal margins have been developed by the State Bays and Estuaries Research Program [consisting of the Texas Water Development Board (TWDB) and Texas Parks and Wildlife Department (TPWD) as mandated by the Texas Water Code. In this report, the effectiveness of different computed inflow regimes (MinQ and MaxH) predicted by optimization modeling are critically evaluated. This analysis uses fisheries survey results from the TPWD Coastal Fisheries Resource Monitoring Database to validate the computer simulations. Observed abundances of estuarine fishery species are empirically evaluated against FWI regimes proposed from the theoretical models. Comparison of modeling results with observed fisheries survey data results in a FWI recommendation that will realistically maintain the "biological health and productivity" of the Trinity – San Jacinto Estuary. The Texas Parks and Wildlife Department, along with the Texas Water Development Board and the Texas Natural Resource Conservation Commission, continues to promote efforts to implement freshwater inflow needs, most notably through participation in the Galveston Bay Freshwater Inflows Group and Senate Bill 1 Regional Water Planning.
The Galveston Bay Freshwater Inflows Group (GBFIG) was created in December 1996 to address (preferably in a civilized way) the sometimes apparently conflicting goals of providing water for a large and growing human population and ensuring adequate inflows of freshwater to an estuarine system of regional, state and national importance. In spite of the reputation water issues have earned of being physically contentious (whiskey is for drinkin', water is for fightin') and under the remembered shadow of the proposed Wallisville reservoir (now the Wallisville Saltwater Barrier), GBFIG has built an almost collegial approach, using facilitated discussions, to work its way through the scientific and political questions that must be answered before agreement on how to ensure freshwater inflows to Galveston Bay can be achieved.

GBFIG continues its work and reports its findings through the established processes of the Galveston Bay Estuary Program (part of the National Estuary Program and a program of the Texas Natural Resource Conservation Commission) and the 15-county Region H Water Planning Group (RHWPG). The RHWPG was established by the Texas Water Development Board under legislative directive (Senate Bill 1) to prepare a Regional Water Plan as part of the next Texas Water Plan. Environmental water needs (both instream and freshwater inflows to bays and estuaries) are to be addressed under Senate Bill 1 water planning. While scientific work continues on the amount and location of monthly inflows needed, GBFIG has recommended to the RHWPG target levels of annual freshwater inflows to the bay system. The GBFIG recommendation was adopted and is included in the draft Region H Water Plan.
The watershed of Galveston Bay includes both the Houston area and Dallas-Fort Worth metropolitan areas, comprising about half of the population of the entire state of Texas and all the water related consequences that go with it. Water supplies for the Houston area for many years were entirely obtained from groundwater, but resulting ground subsidence has required a gradual conversion to surface water supplies. Current surface water sources include two major lakes in the San Jacinto river basin and one on the lower Trinity river. The Dallas-Fort Worth area had only limited available groundwater and began developing surface water supplies over a century ago. It has subsequently developed almost all feasible major lakes in the upper Trinity watershed and has since 1960 developed several major lakes in other river basins to the east and north. Future new water sources for both metropolitan areas will come mostly from two types of sources: Surface water supplies from outside the Galveston Bay watershed; and reclaimed water.

The water supply agencies of the Galveston Bay watershed are predominantly involved in supplying water for municipal uses. Their interest and responsibility is to have adequate quantities of safe, potable water for the wide range of uses which occur in municipal systems. The necessary facilities are very large and take many years to bring into operation. In the Galveston Bay watershed there are 33 major lakes built and committed to municipal water supplies. Each one is permitted by the state for a certain amount of water use, and all other facilities and plans are based on those amounts. It is essential for water supply agencies to retain the ability to use those permitted amounts. Reductions in those amounts would cause major disruptions in water supply planning and operations.

Another major consequence of the development in the Galveston Bay watershed is the generation of large amounts of wastewater, which is treated to a very high quality – not quite potable, but better in many respects than untreated runoff. The quantity of wastewater is large and constant, a combination rarely found in the natural waters of Texas. Good quality, large quantities, and constant flow mean good water supplies. Lake Livingston on the Trinity river was planned and permitted from the start with the knowledge that a significant portion of its water would be treated wastewater from upstream. Treated wastewater will be reclaimed more and more in lieu of developing more expensive, distant, or environmentally disruptive sources. Additional reclamation of treated wastewater does not cause the total disappearance of that water from the watershed. The majority of it returns again and passes on downstream. In addition, the importation of supplies from other basins results in flows over and above the natural runoff of the watershed.
Freshwater inflow needs for Galveston Bay should consider several sources of information. First, the productivity model prepared by the Texas Water Development Board and the Texas Parks and Wildlife Department predicts productivity based on freshwater inflow and other inputs. Second, the Texas Parks and Wildlife Department has made certain recommendations based on that modeling. Third, freshwater inflow is constrained by the amount of water actually available in the watershed, as affected by weather from year to year, month to month. Relevant information in this regard includes streamflow and reservoir content monitoring, mostly by the US Geological Survey, naturalized flow calculations, yield models, and water availability models. And fourth, continuing monitoring and analyses of the bay will enable refinement of the model and improved understanding of the effects of freshwater inflows.

Water supply agencies will continue to participate in cooperative efforts, including the Galveston Bay Freshwater Inflows Group and various technical studies related to inflow needs. They will endeavor to maintain and protect all of their existing supply sources. They will reclaim and reuse significant quantities of treated wastewater. And they will participate in activities of the state agencies to develop policies regarding estuarine inflow.