Securing Freshwater Inflows for Galveston Bay

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Freshwater Inflow Work Group, 6 April 2006
Case Study

Galveston Bay

TxBLEND Hydrodynamic Model Grid for Galveston Bay and the Trinity-San Jacinto Estuary.
The Process of Developing FWI Recommendations

Objectives & Constraints

- Fisheries Regression Analysis
- Nutrient Analysis
- Hydrographic Survey
- Sediment Analysis

Verification

- Fisheries Needs Analysis
- Hydrology
- Habitat Analysis

Optimization Model

TxEEMP

Hydrodynamic & Conservation Transport Model

TxBLEND

FWI Recommendations
TxEMP MinQ and MaxH Solutions

TPWD Recommendation
TxEmp Monthly Flow Distribution

TRINITY-SAN JACINTO ESTUARY
MONTHLY TxEmp SOLUTIONS

INFLOW (Million Acre-Feet)

MinQ-Sal  MinQ  MaxH
So you have an inflow recommendation

--- NOW WHAT?
THE RIO GRANDE GOING DRY FROM BOTH ENDS
Galveston Bay isn’t going dry –

WHY ARE WE WORRIED?

Two million, Four million, Eight million….
Water Development in Galveston Bay Watershed

1958 Trinity River Master Plan adopted by TRA includes Lake Livingston

1962 Congressional authorization of Dam and Saltwater Barrier with 19,700 acres reservoir at Wallisville, Texas in River and Harbor Act.

1966 Wallisville construction begins.
1967 Cooperative Bays and Estuaries study initiated by TWDB as input to the 1968-1969 Texas Water Plan.

1969 Lake Livingston begins operation.

1971 Lawsuit filed on Wallisville Project; injunction issued pending revised EIS. Freshwater inflows were a major concern of environmental groups.
1975 64th Legislature enacts SB-137 (Required comprehensive studies of the effects of freshwater inflows on bays and estuaries.)

1979 B&E studies for state’s seven major estuarine systems completed December 31 and published.
1980  Scientists, engineers, and legislators question adequacy of data bases supporting freshwater inflows analyses from the 1979 studies.

1984  Joint Interim Legislative Committee study proposed three additional years of data collection and legislative language to protect estuarine resources when considering water permits.
1981 Corps of Engineers issued Post Authorization Change Report (PACR) for Wallisville Project recommending a 5,600 acre reservoir with staged filling to 4 feet above msl.

1987 The injunction against the Wallisville Project was lifted.
Second Round of B&E Studies

1985  69th Texas Legislature enacts HB-2 authorizing the Bays and Estuaries Studies currently in use.

1987  70th Texas Legislature enacts SB-683 with clarifying amendments; reports due December 31, 1989. TPWD and TWC (now TCEQ) to review and determine freshwater inflows needed for water resources management. (TWC 11.1491, 11.147)
1987 Was a Very Good Year

- National Estuary Program was established by the Federal Water Quality Act of 1987.

- Galveston Bay Foundation (GBF) was incorporated in July 1987; Initial board meeting January 1988.
1988 Governor completes nomination of Galveston Bay for NEP in May.

1989 Five-year Management Conference for Galveston Bay National Estuary Program established.
<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<tbody>
<tr>
<td>1990</td>
<td>Endangered bald eagle sighted at Wallisville Project site; project limited to a 2-foot reservoir covering 3,800 acres.</td>
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<tr>
<td>1991</td>
<td>Construction of Wallisville Project resumed; only partial funding appropriated by Congress.</td>
</tr>
<tr>
<td>1993</td>
<td>Trans-Texas Water Program Southeast Area Study begins.</td>
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</table>
1994  Galveston Bay Plan published in October by GBNEP identifies Freshwater Inflows as a high priority action item.


1995  Galveston Bay Plan adopted by Governor and approved by Administrator of EPA in April.
1995 Draft Environmental Assessment of revised Wallisville Project issued in March.

1995 GBF opposes “appropriation of any additional federal or any local funds for the Wallisville project until meeting the freshwater inflow needs of Galveston Bay, as well as the long-term water supply needs of Houston, has been resolved.”
1995 Freshwater inflows were identified as a priority problem by the Galveston Bay Plan:

“Future demands for freshwater and alterations to circulation may seriously affect productivity and overall ecosystem health.”
Galveston Bay Plan:
By 1995, determine annual and seasonal inflow needs.

Action FW-1: Complete current studies to determine freshwater inflow needs for the bay.

Action FW-2: Expand streamflow, sediment loading, and rainfall monitoring.
Galveston Bay Plan:
By 2000, incorporate inflow needs in regulatory authority and planning processes.

Action FW-3: Establish management strategies for meeting freshwater inflow needs.

Action FW-4: Establish inflow regulations to protect ecological needs of the estuary.
Some Agreements are Reached

1996 GBF and City of Houston agree in writing that bay inflows should be considered and addressed as a water demand; GBF ceases opposition to Congressional funding for completion of redesigned Wallisville project.
Genesis of GBFIG, c. 1996

- Galveston Bay National Estuary Program (TCEQ, EPA and partners)
- B&E studies (TWDB, TPWD, TCEQ)
- Trans-Texas Water Program (TWDB and partners)
- Proposed Wallisville Reservoir (USACE, City of Houston, Trinity River Authority, GBF and environmental groups)
1996-1997 “Galveston Bay Freshwater Inflows Group” convenes and organizes to explore ways to address need for inflows; to coordinate with and report findings to Galveston Bay Estuary Program and SB-1 Regional Water Planning Group.

Chartering letter signed by Directors of TWDB, TPWD, TNRCC (now TCEQ) and TGLO.
GBFIG Members - Agencies

- Texas Commission on Environmental Quality (Austin & GBEP)
- Texas Parks and Wildlife Department
- Texas General Land Office
- Texas State Department of Health Services
- Texas Water Development Board

(No Federal Agency Members)
GBFIG Members – Water and Development

- Chambers-Liberty Counties Navigation District
- City of Dallas
- City of Houston, Public Works
- Greater Houston Partnership (Chamber of Commerce)
- North Texas Municipal Water Authority
- Port of Houston Authority
- San Jacinto River Authority
- Tarrant Regional Water District
- Texas Utilities
- Trinity River Authority
GBFIG Members – Environmental and Conservation

- Bayou Preservation Association
- Coastal Conservation Association
- Coastal Oyster Leaseholders Association
- Galveston Bay Foundation
- Houston Audubon Society
- Houston-Galveston Area Council (COG)
- PISCES
- Sierra Club (Lone Star and Houston)
- Texas RICE
GBFIG Operation

- Facilitated meetings with support staff

- Established ground rules:
  - Speak up
  - Respect others
  - Silence is consent…..

- Mission: to reach consensus on a process to secure freshwater inflows to Galveston Bay

- Developed (and later revised) Workplan to move from science to management
Revised GBFIG Workplan

Task I: Establish the Galveston Bay Freshwater Inflows Group (GBFIG)

Task II: Obtain Necessary Background Information

Task III: Conduct Analyses Required to Determine under what Hydrologic Conditions would Freshwater Inflows to Galveston Bay be Inadequate

Task IV: Assess Feasibility of Various Options for Addressing Freshwater Inflow Deficits

Task V: Develop Freshwater Inflow Management Recommendations for Galveston Bay
1998  Draft “Freshwater Inflow Recommendation for the Trinity-San Jacinto Estuary” presented to Senate Interim Committee on Water and to GBFIG by TPWD in January; document finalized in December 1998.

1998-1999  GBFIG agrees in June to begin initial work on developing management strategies.

1999  Region H Water Planning Group directs consultants to work with GBFIG to develop freshwater inflow needs.
Closure on Some Topics

1999  Legislature enacted SB-708 directing TNRCC and other state agencies to implement approved estuary management plans.

1999  Wallisville Saltwater Barrier Project dedicated on 1 November.

2001  GBFIG recommendation on freshwater inflow targets included in Region H Water Plan.
### Implementation of Environmental Flow Needs in Regional Water Planning and Future State Water Permitting

<table>
<thead>
<tr>
<th>Condition</th>
<th>Target Amount</th>
<th>Historical Frequency (Exceedence)</th>
<th>Target Frequency** (Exceedence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above Normal Conditions</td>
<td>[MaxH = 5.2 M Ac-Ft/Yr]</td>
<td>~66%</td>
<td>&gt;50%</td>
</tr>
<tr>
<td>Below Normal Conditions</td>
<td>[MinQ = 4.2 M Ac-Ft/Yr]</td>
<td>~70%</td>
<td>&gt;60%</td>
</tr>
<tr>
<td>Dry Conditions</td>
<td>[MinQ-Sal = 2.5 M Ac-Ft/Yr]</td>
<td>~82%</td>
<td>&gt;75%</td>
</tr>
<tr>
<td>Drought-of-Record</td>
<td>[Min Historic = 1.8 M Ac-Ft/Yr]</td>
<td>~98%</td>
<td>&gt;90%</td>
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</table>

*Flows from Texas Water Development Board and Texas Parks & Wildlife;  
**Target Frequencies from Galveston Bay Freshwater Inflow Group (Region H)
So you have an inflow recommendation

--- NOW WHAT?
Water Rights

- Applications filed for environmental flow permits were denied by TCEQ in 2003. (Appeals Court opinion in early 2006 may change that.)

- SB-1639 set a 2-year moratorium on any permits for environmental flows (but not for other uses). (Subsequent legislation changed law.)

- Following completion of the WAMs, a number of permit applications were filed for water that is unappropriated.

- Applications also were filed for indirect reuse of wastewater.
Water Rights (continued)

- Applications filed for unappropriated flows and for indirect reuse of wastewater flows were submitted by SJRA and the City of Houston in the San Jacinto basin in 2003/2004.

- These were new water rights applications and were not part of the 2001 Region H Water Plan, so there was a question of “consistency” with the regional plan.

- An amendment to the 2001 Region H Water Plan was proposed by the RHWPG and was adopted in November 2005.

- These applications were discussed in the GBFIG forum because of their potential impacts on freshwater inflows to Galveston Bay.
Where We Are Today

- GBFIG met in November 2005 and members reconfirmed their intent to continue working to secure freshwater inflows to Galveston Bay.

- Will consider scenarios for management strategies, e.g. how reservoirs will be refilled after Hurricane Rita damage is repaired and how one species responds to changes in freshwater inflows.

- Target inflows remain in the 2006 Region H Water Plan, but no mechanism to ensure them is included.

- GBEP has a 10-year assessment in progress and is reviewing its action plans.
So what is the GBFIG Approach?

- Science and management can’t be divorced
- “Sound science” should inform management decisions
- Stakeholders must be involved in discussion of science and in management decisions
- Adaptive management and precautionary principle in practice
Science and Environmental Flows in the Future

Science must continue to develop in the presence of all interested parties if consensus is to be built and bloodshed is to be avoided

- Define critical elements (low flow, annual / seasonal flow profile, flushing flows, etc.?)
- Define what is an unacceptable consequence for the ecosystem

Adequate funding for monitoring, data collection and scientific analyses in the resource agencies is essential
Science and Flows
Management in the Future

- Need to design acceptable management structures that accommodate adaptive management and incorporate best available scientific knowledge
  - Water planning
  - Flow requirements
  - Permits
  - Watermasters
Science and Flows
Management in the Future

- Not a quick process – need interim strategies that continue stakeholder efforts to use science associated with:
  - National Estuary Programs
  - Local/regional FWI groups, e.g. GBFIG
  - Regional Water Planning
  - State B&E and Instream Flow studies
In the end…

we want water for both people and the environment