Early Efforts, Challenges and Successes in Developing, Implementing and Adapting Freshwater Inflow Management Programs for Two Estuaries on the Central Texas Coast

Restore America’s Estuaries/The Coastal Society Conference
New Orleans, Louisiana
December 12, 2016

James A. Dodson
San Antonio Bay Partnership
www.sabaypartnership.org
Some quotes about water, in Texas, and many other places.

“Whiskey is for drinking, Water is for fighting”*

* Attributed to Mark Twain, but not verified

“Even the upper end of the river believes in the ocean.”
William Stafford, Poet

“You cannot control the ocean, but you can guide the rivers that feed it.”
Matshona Dhliwayo

Photo Credit://www.infodea.in/wp-content/uploads/2016/11/Water-Dispute.jpg
Major Points I’d Like to Make

• **Recognizing** Texas was facing water supply shortages occurred as a result of the “Great Drought of the 50”s”

• **Planning** for new water supplies for Texas, including water for Bay & Estuary (B&E) inflow needs, has taken place since the 1960’s

• **Pressuring** the State to require that water rights being issued for new reservoirs protect B&E inflows started with in the 1970’s, eventually resulting in B&E inflow operating plans for two reservoirs along the central Texas coast

• **Requiring** that water rights being issued for new reservoirs protect B&E inflows only started with HB 2 in the 1985

• **Developing and implementing** the B&E inflow operating plans for the two reservoirs along the middle Texas Coast didn’t begin until the 1990’s

• **Researching** and developing new management strategies for B&E inflows is currently underway

• **Adapting** B&E inflow management plans has been, and will be, ongoing

• **Supporting** efforts to develop and implement fresh water inflow operating plans for other Texas B&E’s is critical
Origins of Planning for B&E Inflows in 1968 Texas Water Plan
Origins of Planning for B&E Inflows in 1968 Texas Water Plan
1968 Texas Water Plan
Initiated Planning for Fresh Water Inflows to Texas Bays and Estuaries

The 1968 Texas Water Plan Clearly Identified and Prioritized Fresh Water Inflows to Protect Texas Bays and Estuaries:

**Goals:**
“The coastal bays and estuaries are of great importance to the State of Texas and to the Nation. Adequate fresh water inflows will be provided and other actions taken to preserve and enhance these resources. Comprehensive studies of all bays and estuaries are necessary to determine the proper actions.”

**Objectives:**
“Based on the best available estimates of need, provide regulated fresh water inflows to the bays and estuaries, and participate as justified in other measures such as structural modifications to obtain better tidal circulation, with the objective of maintaining suitable quality conditions for fish and shellfish.”

**Recommendations:**
- “Amend Article 7470 which lists the purposes for which water may be appropriated, by adding a provision to authorize the appropriation of water for other beneficial uses . . . to enable the Commission to consider the allocation of the waters of the State for . . . maintenance of fresh water inflows to the bays and estuaries . . .”
- “Provide adequate funds . . . to complete comprehensive studies of the bays and estuaries and to prepare recommendations for Legislative consideration for long-range conservation of these resources.”
- “Establish State policy as to the degree of State responsibility for the cost associated with providing fresh water inflow to the bays and estuaries to complement Federal policy when established; appropriate funds . . . for payment of those costs; and designate the responsible State agency for administering such funds.”
Origins of Planning for B&E Inflows in 1968 Texas Water Plan

B&E inflows to be delivered via the proposed Coastal Canal System, which would move water from Louisiana, via reservoirs in East Texas, down the Texas Coast.
An Element of the 1968 Texas Water Plan Gets Built: Palmetto Bend Project – Phase I (Lake Texana) & Public Pressure Results in a B&E Inflow Operating Plan

- Authorized by Congress in 1968
- Project Sponsors: U.S. Bureau of Reclamation (BOR) and the Lavaca-Navidad River Authority (LNRA)
- Located in the Lavaca-Navidad River Basin, in Jackson County, TX
- LNRA filed for the State Water Rights Permit
- BOR financed, constructed and owned the project facilities
- State water right issued in May, 1972
- Construction on Phase I (Lake Texana) took place between 1972 and 1980
- In 1973, Sierra Club filed suit over construction of Lake Texana;
- Federal judge denied injunctive relief in 1975
- LNRA, TWDB, and TPWD agreed to undertake studies on FWI needs for Lavaca Bay, and
- These entities, along with the Sierra Club, eventually reached agreement regarding a freshwater inflow operating regime for Lake Texana; later incorporated into an amended state water rights permit for Lake Texana.
The Lake Texana B&E Inflow Operating Plan

• Innovative “Pass-Thru Approach”

  The “Pass-Thru” operating plan attempts to mimic the natural variability in monthly streamflow amounts which would have entered Lavaca Bay if the Palmetto Bend Dam had not been built. The plan provides that:

  When Lake Texana capacity is $\geq 71.8\%$, the reservoir operators shall “Pass Thru” to Lavaca Bay all Navidad River flows up to:
  - November – March, & July: historical monthly median flows
  - Remaining months: the respective historical monthly mean flows

  No releases required from reservoir storage if measured reservoir inflow is less than the monthly Pass-Thru requirement

  When Lake Texana capacity is less $< 71.8\%$, the reservoir operators shall “Pass Thru” to Lavaca Bay all Navidad River flows up to:
  - The annual median daily flow during the historical critical drought period from January, 1954, through December, 1956 (5.0 cfs)

  Again, no releases required from reservoir storage if measured reservoir inflow is less than the monthly Pass-Thru requirement

  This B&E Inflow operating plan significantly reduces the frequency and extent of high salinity episodes in Lavaca Bay that would occur without the plan;

  It also reduces the originally permitted **Firm Yield** of Lake Texana by about 5.7% (from 79,000 af/yr to 74,500 af/yr (but 4,500 af/yr can be used as “interruptible” water supply when Lake Texana is “spilling” amounts in excess of the Pass-Thru requirements).

  *Based on updated hydrological studies, a 2003 amendment to the Lake Texana water right provided access to another 7,500 af/yr of interruptible water supply if the lake level was above a target level.*
Choke Canyon Reservoir: Another BOR Project in South Texas
Public Pressure Results in a Required B&E Inflows

- In the early 1960’s, the City of Corpus Christi began efforts to develop additional water supply from water rights it owned in the Nueces River Basin.
- In the early 70’s, BOR offered to construct a new reservoir in the Nueces River Basin to provide additional water supply for the Corpus Christi area; in 1974, Congress authorized the BOR “Nueces River Project” to finance and construct Choke Canyon Reservoir (CCR) on the Frio River; in 1976, Corpus Christi and the Nueces River Authority (NRA) both applied for a state water rights permit for the project.
- As the water rights permit application was being considered, environmental groups raised the issue of the impact this new, large reservoir would have on B&E inflows the Nueces/Corpus Christi Bay and pressured the State to include a FWI requirement in the water rights permit.
- Although not required by state law (until the TX Legislature passed HB 2 in 1985) the City and NRA, by then the local co-sponsors of the project, agreed to include “Special Condition 5.B.” in the water rights permit; this required the delivery of 151,000 ac-ft/yr of fresh water to the Nueces Estuary.
- Implementation of Special Condition 5.B. was to take place after CCR was finished and filled for the first time.
- Choke Canyon Dam was constructed between 1977 and 1982, other facilities were finished by 1986, and CCR filled for the first time in 1987, triggering implementation of Special Condition 5.B. – however, the permit holders failed to develop and implement the B&E operating plan at that time.
Developing and Implementing the B&E Inflow Operating Plan for the Choke Canyon Reservoir/Lake Corpus Christi Reservoir System:

- The state water rights permit for CCR required it to be operated in conjunction with Corpus Christi's downstream reservoir, Lake Corpus Christi (LCC), in order to produce the optimal firm annual yield for municipal and industrial water supply.
- Special Condition 5.B. freshwater inflow operating plan for CCR therefore included LCC, particularly since LCC controls 98% of the total area within the Nueces River watershed and can regulate the amount of water delivered to the Nueces Estuary under the FWI plan.
- While CCR filled for the first time in 1987, in 1989, an environmental organization, “Coalition About Restoration of the Estuaries (CARE),” filed a complaint with the state’s water rights agency that the CCR water rights permit holders (City of CC and NRA) had not developed and implemented the required FWI operating plan for the CCR/LCC reservoir system.
- In 1990, the Texas Water Commission (TWC), which administers water rights in Texas, issued an Interim Order to the permit holders, requiring that they begin implementing a series of monthly “releases” of water from the CCR/LCC Reservoir System for B&E inflows to the Nueces Estuary which totaled the 151,000 ac-ft/yr contained in Special Condition 5.B, and establishing a process to develop a permanent FWI operating plan for the CCR/LCC reservoir system.
Developing and Implementing the B&E Inflow Operating Plan for the Choke Canyon Reservoir/Lake Corpus Christi Reservoir System: Adaptive Management through a Series of “Agreed Orders”

1992 Agreed Order

- Initially, local water supply interests fought the imposition of the TWC order and the issue was scheduled for a contested case hearing before TWC;
- However, parties in that hearing, including environmental groups, state environmental agencies, water users and the permit holders, eventually reached a settlement which resulted in TWC approving, in 1992, an “Agreed Order” which provided for, among other things:
  - Delivery of 97,000 af/yr of FWI’s to Nueces Bay from the CCR/LCC Reservoir System,
  - Credit for “Return Flows” of treated effluent being discharged into Nueces and Corpus Christi Bays,
  - Creation of the Nueces Estuary Advisory Council (NEAC) – a stakeholder group to consider “additional information and related Issues and to formulate recommendations for the Commission’s review and actions, and
  - Monitoring and research designed to assess the effectiveness of the FWI operating plan and to support “adaptive management.”
Developing and Implementing the B&E Inflow Operating Plan for the Choke Canyon Reservoir/Lake Corpus Christi Reservoir System: *Adaptive Management through a Series of “Agreed Orders”*

**1995 Agreed Order**

- Adopted the “*Pass-Thru Approach,*” based, in part, on the Lake Texana FWI operating plan
  - Monthly “release” requirements in the 1992 Agreed Order became monthly “targets” for FWI Pass-Thrus;
  - No more “hard-and-fast” monthly “releases” required;
  - Mimics natural variability in historical inflow amounts;
  - Increased CCR/LCC Reservoir System firm yield by 30% compared to 1992 Order
- Actually increased Pass-Thru targets in some months when the CCR/LCC Reservoir System storage was above 70%
- Provided for “Salinity Credits”: monthly inflow requirements reduced or suspended in periods when the salinity in Nueces Bay fell within a “desirable” range
- Provided credits for excess Pass-Thrus in one month; credits applied to required Pass-Thrus in the next month
  - [Note: Credits can be generated and used under *either* the Salinity Credit provision or the Excess Pass-Thru Credit provision, but not both, in any month]
- Reduced monthly Pass-Thru targets during severe drought when regional water providers enacted drought contingency plans to reduce water use
Developing and Implementing the B&E Inflow Operating Plan for the Choke Canyon Reservoir/Lake Corpus Christi Reservoir System: *Adaptive Management through a Series of “Agreed Orders”*

**2001 Agreed Order**

- More directly linked reductions in monthly Pass-Thru targets during severe drought to when regional water providers enacted drought contingency plans to reduce water use; established 4 levels of Estuary Inflow Targets:

  - In “Average Times” -- Base Estuary Inflow Monthly Targets
  - In “Good Times” -- Higher Estuary Inflow Targets
  - In “Drought Times” – Targets Reduced to Historical Drought Period Median Monthly Inflow Amounts

*Graph Courtesy of Rocky Freund, Nueces River Authority*
Developing and Implementing the B&E Inflow Operating Plan for the Choke Canyon Reservoir/Lake Corpus Christi Reservoir System: *Adaptive Management through a Series of “Agreed Orders”*

### 2001 Agreed Order

- In exchange for the Drought Period reductions in the monthly Pass-Thru targets, the City of CC was required to:
  - 1) Re-open the connection between the Nueces River tidal reach below the Calallen Dam and Rincon Bayou to promote the diversion of Pass-Thru flows into the Nueces Delta, and
  - 2) To construct and operate a pump station and pipeline from the Calallen Pool to Rincon Bayou to directly deliver Pass-Thru amounts up to 3,000 af/mo into the Nueces Delta
Developing and Implementing the B&E Inflow Operating Plan for the Choke Canyon Reservoir/Lake Corpus Christi Reservoir System:

**Studies to Support Adaptive Management**

- Since the first Agreed Order was approved in 1992, federal, state, and local agencies have supported extensive monitoring, research studies and pilot programs designed to assist in the adaptive management efforts related to the FWI operating plan for the Nueces Estuary. These programs have been important in the ongoing effort to provide adequate water for both human and ecological needs.
- Studies have included:
  - Salinity, tide, and meteorological data collection (ongoing since 1992)
  - Studies to evaluate the effectiveness of the monthly targets
  - Studies on the effectiveness of diversions of flows into Rincon Bayou:
    - Hydrodynamic modeling
    - Biological response

Photos Courtesy of Coastal Bend Bays & Estuaries Program
B&E Inflow Operating Plans for Lake Texana and the Choke Canyon Reservoir/Lake Corpus Christi Reservoir System:

LESSONS LEARNED:

• Both B&E Inflow Operating Plans were applied to a reservoir, or reservoir system in the lower river basin, which could serve as a “control point” for required Pass-Thrus.

• The nature of the watershed (i.e., wetter/drier), and the ratio between total annual streamflow amount and reservoir capacity, has a large impact on how B&E inflow plans affect the water supply yields, and the degree of continued adaptive management needed to refine the balance between the two.

• Continued scientific monitoring and research, and stakeholder involvement, is critical to successful adaptive management programs for B&E inflow issues.
Next Focus for B&E Inflow Management for the Middle Texas Coast: Watershed-Scale Planning and Management

“I like geography best, he said, because your mountains & rivers know the secret. Pay no attention to boundaries.”
— Brian Andreas, Story People: Selected Stories & Drawings of Brian Andreas
Next Focus for B&E Inflow Management for the Middle Texas Coast: Watershed-Scale Planning and Management

- The “SB3” Environmental Flows Planning Program for Texas River Basins and Estuaries
  - Established both Science and Stakeholder advisory groups for each river basin and associated estuaries
  - These regional groups researched the issues and provided recommendations to the Texas Commission on Environmental Quality (TCEQ), to be considered in their rulemaking process
  - However, TCEQ’s new rules on environmental flow requirements for state water rights permits only apply to new or amended water rights (very few)
- New issues regarding instream flow and B&E inflow needs have arisen (i.e. FW mussels being listed as Endangered Species)
- Other means of managing Texas River Basins for must be developed
- Voluntary, stakeholder driven programs would appear to be the best path forward