



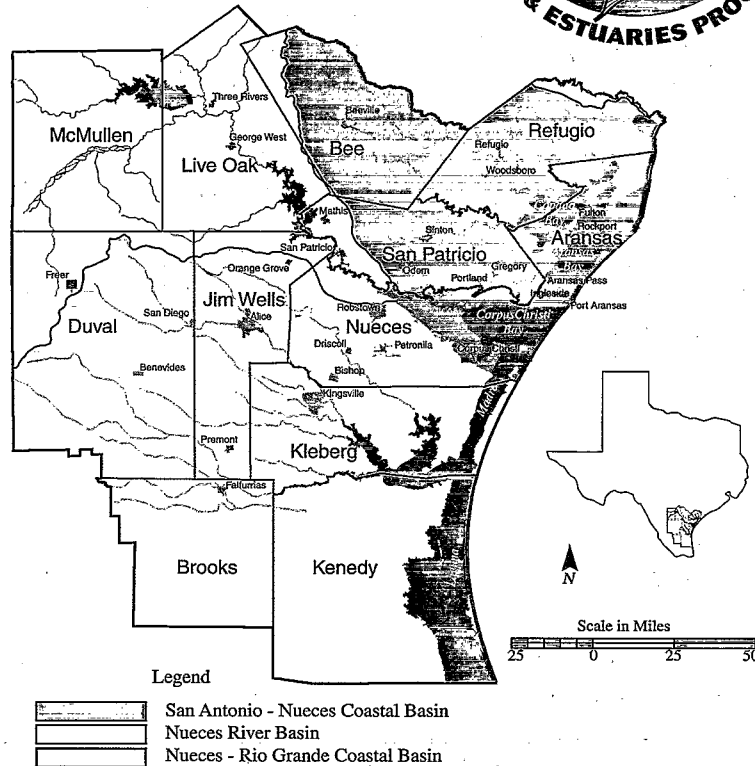
Evaluation of Shrimp Bycatch Reduction Devices in Texas Coastal Bend Waters

Demonstrating Practical Tools for Watershed Management Through the National Estuary Program

The Coastal Bend Bays & Estuaries Program

Characteristics:

- The Coastal Bend Bays & Estuaries Program (formerly the Corpus Christi Bay National Estuary Program) encompasses three of Texas' seven major estuaries and a wide variety of highly productive habitats, including oyster reefs, seagrass meadows, open bay bottoms, coastal marshes, wind tidal flats, barrier islands, and freshwater marshes.
- Shrimp (*Penaeus* sp.) are considered the most important commercial seafood product in Texas, accounting for over 90 percent by dollar value and approximately 80 percent by weight of all seafood landed each year.
- Commercial shrimp represented 60 - 90 percent (by weight) of total seafood harvest in the Coastal Bend from 1988 to 1993.
- The Aransas Pass-Rockport Harbor is ranked among the nation's top ten most valuable fishing ports.
- Bycatch is defined as the catch of organisms in shrimp trawls other than the targeted shrimp species.



The National Estuary Program

Estuaries and other coastal and marine waters are national resources that are increasingly threatened by pollution, habitat loss, coastal development, and resource conflicts. Congress established the National Estuary Program (NEP) in 1987 to provide a greater focus for coastal protection and to demonstrate practical, innovative approaches for protecting estuaries and their living resources.

As part of this demonstration role, the NEP offers funding for member estuaries to design and implement Action Plan Demonstration Projects that demonstrate innovative approaches to address priority problem areas, show improvements that can be achieved on a small scale, and help determine the time and resources needed to apply similar approaches basinwide.

The NEP is managed by the U.S. Environmental Protection Agency (EPA). It currently includes 28 estuaries: Albemarle-Pamlico Sounds, NC; Barataria-Terrebonne Estuarine Complex, LA; Barnegat Bay, NJ; Buzzards Bay, MA; Casco Bay, ME; Charlotte Harbor, FL; Columbia River, OR and WA; Corpus Christi Bay, TX; Delaware Estuary, DE, NJ, and PA; Delaware Inland Bays, DE; Galveston Bay, TX; Indian River Lagoon, FL; Long Island Sound, CT and NY; Maryland Coastal Bays, MD; Massachusetts Bays, MA; Mobile Bay, AL; Morro Bay, CA; Narragansett Bay, RI; New Hampshire Estuaries, NH; New York-New Jersey Harbor, NY and NJ; Peconic Bay, NY; Puget Sound, WA; San Francisco Bay-Delta Estuary, CA; San Juan Bay, PR; Santa Monica Bay, CA; Sarasota Bay, FL; Tampa Bay, FL; and Tillamook Bay, OR.

The Problem:

Worldwide fisheries stocks are being depleted and many fisheries operations presently use harvesting equipment that does not discriminate between species. Shrimp trawl bycatch (species caught incidental of the species meant for harvest) in Coastal Bend bay waters is between 1.5 to 7 times the weight of shrimp harvested. A recent study suggests that populations of important commercial and recreational species are in decline within the Coastal Bend bays, including Atlantic croaker, southern flounder, gulf menhaden and adult blue crab. Presently there are no regulations for any gulf state mandated use of bycatch reduction devices (BRDs) in state territorial waters. However, concerns regarding finfish mortality associated with shrimp trawling prompted a 1990 amendment to the Magnuson Fishery Conservation and Management Act that mandated the development of a Bycatch Reduction Research Program.

The Project:

The purpose of the Bycatch Reduction Device Demonstration Project was to evaluate, for the first time in Texas coastal bays, the effectiveness of three BRDs. The project was designed to compare trawls with and without BRDs to determine bycatch reduction and shrimp retention rates.

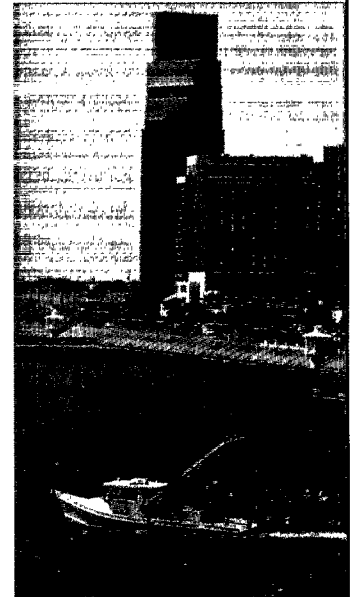
Introduction to Coastal Bend Bays & Estuaries Program

The Coastal Bend Bays & Estuaries Program (CBBEP) lies along the south central Texas Gulf coast in a semi-arid to subtropical climate. The Program's project area includes three of the seven major estuaries along the Texas coast. Among the major riverine systems that flow into the estuaries are the Mission, Aransas and Nueces Rivers. The composition and distribution of the habitats and biota of the Coastal Bend are greatly influenced by climate and their geographic setting.



Relatively healthy estuarine waters support a productive ecosystem and diverse economy. Bay related activities generate a total annual output in the region of \$4.1 billion, provide 53,068 jobs (about 1/3 of the employment in the area), and generate a personal income of \$1.3 billion. Bay and gulf commercial fisheries directly benefit from a productive bay system, and together generate \$45 million annually in total output in the region.

The number of licensed shrimp boats in the Coastal Bend has decreased steadily since 1985, however, statewide effort, or number of days fished, has increased 400 percent since 1961. The average shrimp caught per unit of effort has decreased in size by 40 percent between 1972 and 1993. During the same period, an increase in bay shrimp landings has occurred. In general, shrimpers are fishing for longer periods to catch smaller shrimp of less value.



Overview of the Project

A multi-partnership approach was taken in developing a project to evaluate the effectiveness of three BRDs. The partners included the Texas Seafood Producers Association, Texas Parks and Wildlife Department, and Texas Sea Grant College. Collectively, the group designed the project to allow for comparisons between trawls with and without BRDs to determine bycatch reduction and shrimp retention rates. All partners were involved in gear selection, placement and sampling methodology design.

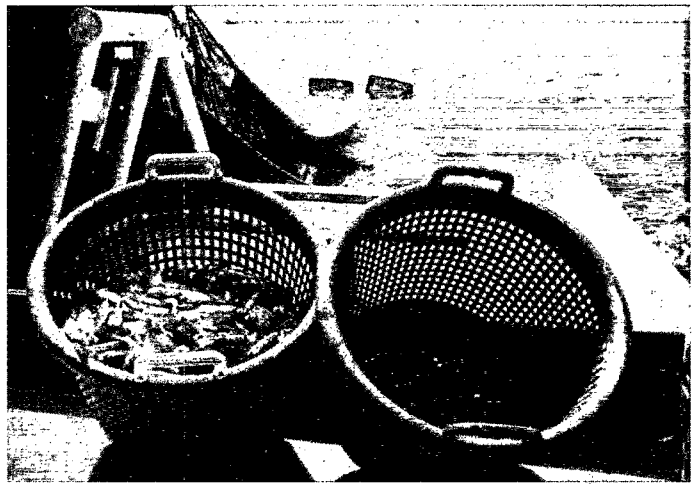
Project Objectives

At the request of the shrimping industry, the CBBEP Management Committee approved funding for a demonstration project to evaluate the effectiveness of three BRDs, 1) large mesh extended funnel (LMEF), 2) a two-inch space bar turtle exclusion device (TED); and 3) a fish eye, which is a trawl with an escape hole for fish to exit. Paired-trawl sampling in Coastal Bend bay waters facilitated comparisons between BRDs and conventional trawls to determine bycatch reduction and shrimp retention rates. Sampling commenced in spring 1997 and concluded after the fall bay shrimp season the same year.

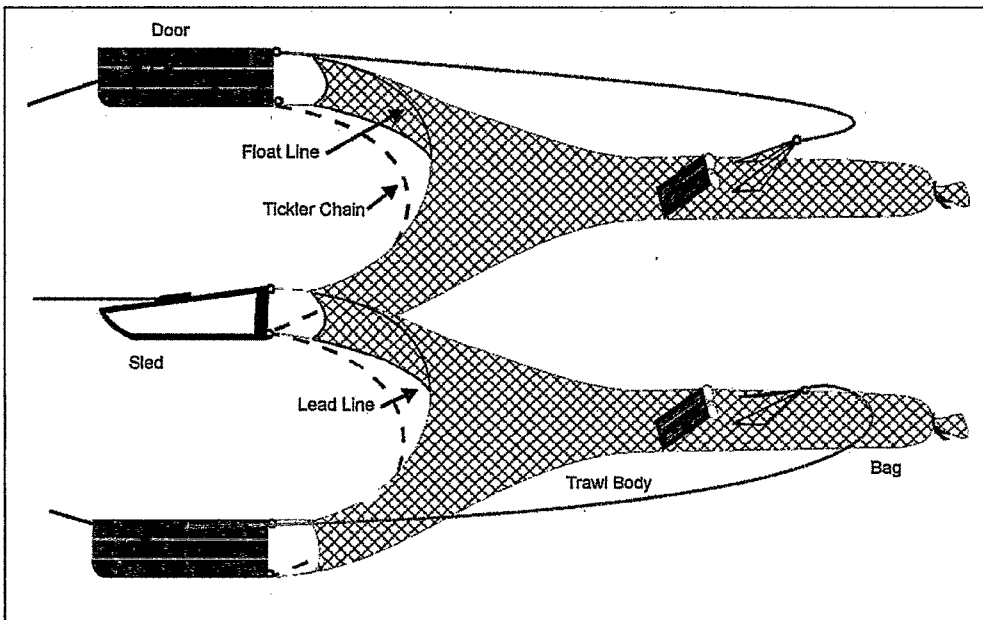
Implementing the Project

Twenty comparative trawl tows were conducted with each BRD during the 1997 spring and fall commercial bay-shrimp seasons. Two trawls, one with a BRD and one without were towed simultaneously. For each trawl, samples were separated into shrimp and bycatch then weighed separately aboard the vessel. A 25-pound subsample was collected from each tow, separated into species groups, weighed, and counted.

The LMEF had the highest total bycatch reduction rates by weight and second highest by number, with no significant overall shrimp loss in spring. In addition, the LMEF reduced the most abundant bycatch species, spot (*Leiostomus xanthurus*), during spring and fall and the blue crab (*Callinectes sapidus*) in the spring. Both Atlantic croaker and sand seatrout were also greatly reduced in the fall with the LMEF.



to reduce bycatch while limiting shrimp loss. Overall, the LMEF significantly reduced bycatch more effectively by weight and number than the other two BRDs during both spring and fall.



The two-inch space bar TED was first in total bycatch reduction by number during spring, but had significant shrimp loss by weight resulting in greater shrimp loss than total bycatch reduction. The two-inch space bar TED also had the greatest reduction rates for sand seatrout (*Cynoscion arenarius*) in the spring.

Results of the fish eye BRD varied among groups but showed greatest reduction rates for Atlantic croaker and southern flounder (*Paralichthys lethostigma*) in the spring.

Success Stories

Results from the project varied between seasons and among BRDs, but there are indications that BRDs have the potential

More importantly, this project thawed relations between historical adversaries in the shrimp resource management arena, namely shrimpers and shrimp regulators. Hailed by both sides as a step in the right direction, the project-fostered partnerships are the foundation for continued pursuit of common goals in an atmosphere of mutual trust.

The CBBEP will continue to promote this type of activity to increase the lines of communication and to further enhance our knowledge of bycatch-related issues.

Lessons Learned

There are many factors involved in determining which BRDs function more effectively than others. Some factors include trawl mesh size and type, length of trawl bag, BRD type, size, and placement along trawl, tow speed and duration, shrimp size, bycatch composition, wrack type, variations in bottom substrate, and water depth. Therefore, the need to continue refining the sampling gear and methodology to evaluate additional alternatives for bycatch reduction are necessary in order to maintain this highly productive commercial fishery.

For further information, contact:

Billy Fuhs, Coastal Fisheries Division
Texas Parks and Wildlife Department
702 Navigation Circle
Rockport, Texas 78382
Phone (512) 729-2328
Fax (512) 729-1437

Richard Volk, Director
Coastal Bend Bays & Estuaries Program
6300 Ocean Drive
Natural Resources Center Suite 3300
Corpus Christi, Texas 78412
Phone (512) 980-3420
Fax (512) 980-3437



Printed on Recycled Paper

Previous Publications in the Demonstration Project Series

Report Title	National Estuary Program	Date	Publication #
Biological Nutrient Removal Project	Long Island Sound, CT/NY	1995	EPA842-F-95-001A
Buttermilk Bay Coliform Control Project	Buzzards Bay, MA	1995	EPA842-F-95-001B
Georgetown Stormwater Management Project	Delaware Inland Bays, DE	1995	EPA842-F-95-001C
Texas Coastal Preserves Project	Galveston Bays, TX	1995	EPA842-F-95-001D
Shell Creek Stormwater Diversion Project	Puget Sound, WA	1995	EPA842-F-95-001E
City Island Habitat Restoration Project	Sarasota Bay, FL	1995	EPA842-F-95-001F
Buzzards Bay "Sep Track" Initiative	Buzzards Bay, MA	1997	EPA842-F-97-002G
New Options for Dredging in Barataria-Terrebonne	Barataria-Terrebonne Basin, LA	1997	EPA842-F-97-002H
Coquina Bay Walk at Leffis Key	Sarasota Bay, FL	1997	EPA842-F-97-002I
"Pilot Project Goes Airborne"	Narragansett Bay, RI	1997	EPA842-F-97-002J
The National Estuary Program: A Ten-Year Perspective	General NEP Discussion	1998	EPA842-F-98-003K
Rock Barbs in Oregon's Tillamook Bay Watershed	Tillamook Bay, Oregon	1998	EPA842-F-98-003L
The Weeks Bay Shoreline & Habitat Restoration Project	Mobile Bay, AL	1998	EPA842-F-98-003M

For copies of any of these publications contact:

National Clearinghouse for Environmental Publications

Telephone: (513) 489-8190

Facsimile: (513) 489-8695



United States
Environmental Protection Agency
(4504F)
Washington, DC 20460