

SPAWNING EASTERN OYSTERS OUT OF
SEASON USING CONTINUOUS FLOW

by

Joseph D. Gray



MANAGEMENT DATA SERIES
No. 39
1990

**Texas Parks and Wildlife Department
Fisheries Division
4200 Smith School Road
Austin, Texas 78744**

ERRATA

for

Texas Parks and Wildlife Fisheries Division

MANAGEMENT DATA SERIES NO. 39

entitled

SPAWNING EASTERN OYSTERS OUT OF SEASON USING CONTINUOUS FLOW

MATERIALS AND METHODS, Page 2, 1st paragraph 6th line. Should be: 50μ

ACKNOWLEDGEMENTS

The author would like to thank Dr. Sammy Ray of Texas A & M and Mr. Robert Dye for their suggestions on conditioning of the oysters, and Paul Hammerschmidt for his review of the manuscript.

ABSTRACT

Eastern oysters (Crassostrea virginica) for this study were collected from Corpus Christi Bay, Texas. Oysters were conditioned for approximately 12 weeks in flow-through holding systems using unfiltered Matagorda Bay water. Spawning was induced in oysters through hormonal stimulation by adding sex products obtained from mature oysters. Resulting spawns produced 1.4 million hinged larvae indicating utilizing flow-through holding techniques may be successful in spawning Eastern oysters out of season in Texas.

INTRODUCTION

The Eastern oyster (*Crassostrea virginica*) is commercially harvested from public reefs along the Texas coast. The only commercially harvestable reefs below Nueces Bay occur in South Bay. However, these reefs account for less than 1% of the total commercial Eastern oyster landings in Texas (Quast et al. 1988).

Corpus Christi Bay supported a commercial Eastern oyster fishery until the late 1950's when most reefs became non-productive (Martinez, 1963, 1964). A small number of live reefs are located within Corpus Christi Bay, and some larger reefs in Nueces Bay. However, there is no evidence to date suggesting these oysters are repopulating the bay to commercial quantities (Hammerschmidt et al. 1988).

A management strategy used to restore depleted oyster fisheries is re-seeding local populations with artificially planted juveniles (Malinowski and Whitlatch 1988). Remote setting is another method used to introduce successful spat sets in the wild. This method involves controlled laboratory spawning of oysters, after which resulting larvae are raised to the eyed stage. Larvae can then be set on various cultch material and transported to reef areas, or simply released over existing natural or prepared reefs.

The development of an oyster hatchery program may be necessary to help replenish oyster populations within Corpus Christi Bay. A year around hatchery program would require methods to condition and spawn Eastern oysters on a continual basis or out of their normal Texas spawning season (April-October). Such methods have been developed by Dupuy et al. (1977). However, they are laborious because of algal culture requirements. Spawning of Eastern oysters out of season has not been accomplished in Texas (Ray Personal Communication).

The purpose of the present study is to spawn Eastern oysters out of season using continuous flow of unfiltered bay water through the holding systems.

MATERIALS AND METHODS

About 100 Eastern oysters > 40 mm were collected by hand from Indian Point in Corpus Christi Bay, Texas on 22 August 1989. Oysters were transported in ice chests to the Perry R. Bass Marine Fisheries Research Station near Palacios, Texas and placed in fiberglass raceways. Oysters were maintained on continuous flow utilizing unfiltered Matagorda Bay seawater at ambient temperatures and salinities. Several oysters were sacrificed for examination of gonadal material. On 25 August 1989, temperature and salinity of the incoming water were lowered from 30.4 C and 33 o/oo to 18 C and 15 o/oo using a water chiller (Model BHL-842D, Frigid Units, Toledo, Ohio) and addition of freshwater to the system. On 26 September 1989, several oysters were again checked to see if reabsorption of gametes had occurred. The temperature of the incoming water was increased to 23 C on 9 October 1989 to promote development of sexual products. Gonadal condition was determined on 24 October 1989. On 30 October 1989, all oysters were placed in a fiberglass raceway containing filtered recirculating water at 30 C and 15 o/oo. After

1 h, stripped sexual products from two male oysters were added to the water to hormonally induce spawning. When spawning was no longer observed, eggs and sperm were mixed together in a 40-l aquarium and aerated for 4 h. A 1-ml subsample was collected to determine fertilization. Spawns were then placed in a 100-l incubator. On 31 October 1989, the incubator was drained through a 50 filter to collect larvae. Larvae were preserved in 4% buffered formalin. Total number of larvae were determined by volumetric estimation (Bonn et al. 1976).

RESULTS

The initial gonadal check of the Eastern oysters indicated each oyster had either viable eggs or active spermatazoa. After 4 weeks at 18 C, no gametes were found in any of the specimens checked, indicating that reabsorption had occurred. After 15 days at 23 C, gametes were present in each oyster examined.

When the stripped sexual products were added to the raceway to induce spawning, one female began spawning immediately. Approximately 5 minutes later, two males were observed spawning. An estimated 1.4 million hinged larvae were produced following 30 minutes of spawning.

DISCUSSION

Successful spawning of Eastern oysters on a year round basis in Texas can be accomplished using continuous flow procedures provided there is enough food in the water source to maintain the condition of the oysters. Additionally, any cooling apparatus must be capable of maintaining temperatures < 20 C during times when the incoming ambient temperatures can be > 30 C. If Eastern oyster larvae can be reared to set using continuous flow, it would help reduce the cost and labor of developing oyster hatcheries in Texas by eliminating the time and expense of rearing algae.

LITERATURE CITED

- Bonn, E. W., W. M. Bailey, J. D. Bayless, K. E. Erickson, and R. E. Stevens, Editors. 1976. Guidelines for striped bass culture. Striped Bass Committee Southern Division, American Fisheries Society.
- Dupuy, J. L., N. T. Windsor, and C. E. Sutton. 1977. Manual for design and operation of an oyster seed hatchery for the Eastern oyster Crassostrea virginica. Special Report Number 142. Virginia Institute for Marine Science.
- Hammerschmidt, P. C., L. W. McEachron, and K. L. Meador. 1988. Trends in relative abundance of selected shellfishes and finfishes along the Texas coast: January 1977-December 1986. Management Data Series No. 133. Texas Parks and Wildlife Department, Coastal Fisheries Branch. Austin, Texas.
- Malinowski, S. and R. B. Whitlatch. 1988. A theoretical evaluation of shellfish resource management. Journal of Shellfish Research. 7(1):95-100.
- Martinez, R. 1963. Study of oyster population and experimental planting in Corpus Christi Bay. Project Report 1963. Texas Parks and Wildlife Department, Coastal Fisheries Branch. Austin, Texas.
- Martinez, R. 1964. Analysis of populations of sports and commercial finfish and of factors which affect these populations in the coastal bays of Texas -- Population studies of the sports and commercial finfish species of the Corpus Christi Bay system. Project Report 1964. Texas Parks and Wildlife Department, Coastal Fisheries Branch. Austin, Texas.
- Quast, W. D., M. A. Johns, D. E. Pitts, Jr., G. C. Matlock, and J. E. Clark. 1988. Texas Oyster Management Plan Source Document. Texas Parks and Wildlife Department, Coastal Fisheries Branch. Austin, Texas.
- Tarver, J. W., and R. J. Dugas. 1973. Experimental oyster transplanting in Louisiana. Technical Bulletin Number 7. Louisiana Wildlife and Fisheries Commission. New Orleans, Louisiana.

PWD-RP-3400-335-10'90

Dispersal of this publication conforms with Texas State Documents
Depository Law, and it is available at Texas State Publications
Clearinghouse and Texas Depository Libraries