A PARTIAL BIBLIOGRAPHY OF OYSTER CULTCH MATERIALS AND RESOURCE MANAGEMENT PROJECTS

prepared by

Ron Dugas Rick Leard Mark Berrigan

published by

Gulf States Marine Fisheries Commission P.O. Box 726 Ocean Springs, MS 39564

July 1991

This project was supported in part by the National Oceanic and Atmospheric Administration, National Marine Fisheries Service under Cooperative Agreement NA16FI0034-01.

A Partial Bibliography of Oyster Cultch Materials and Resource Management Projects

Prepared by

RON DUGAS*, RICK LEARD** AND MARK BERRIGAN***

Since the early 1960s, the oyster industry in the U.S. Gulf of Mexico has relied heavily on the dredging of clam shell, <u>Rangia cuneata</u>, to provide replacement cultch for oyster reefs. These shells were used primarily because they were cheaper than other materials and available in larger quantities. <u>Rangia</u> shells were primarily dredged from Mobile Bay, Alabama, and Lake Pontchartrain, Louisiana. Environmental and ecological concerns caused the closure of Mobile Bay to such dredging in 1982, and operations were halted in Lake Pontchartrain in 1990, thus ending the production of <u>Rangia</u> shells in quantities suitable for cultch replacement projects.

Without <u>Rangia</u> shells, the states and the oyster industry are facing a severe problem, namely the lack of a low-cost source of cultch material that is effective at catching and retaining oyster spat. This problem is compounded by reductions in funding for resource management programs of the states and habitat losses that have resulted in the recent decline in productivity on many reefs in the north central gulf.

The states and the oyster industry are now faced with the challenge of finding an alternative source of cultch in order to maintain production. To assist in this effort, the authors have developed the following partial bibliography of past research efforts. This bibliography primarily focuses on research and management projects dealing with the use of various cultch materials and planting methods. It also includes citations of past management projects. Although some works have probably been overlooked, it is hoped that this listing will provide assistance to states, the oyster industry and to other researchers that attempt to solve this problem by identifying previous work, thus avoiding duplication of efforts. We do hope this will be a beneficial effort, and the following is our up-to-date bibliography.

- **Richard L. Leard, Ph.D., Gulf States Marine Fisheries Commission, P.O. Box 726, Ocean Springs, Mississippi 39564
- ***Mark E. Berrigan, Florida Department of Natural Resources, Marjory Stoneman Douglas Building, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399

^{*}Ronald J. Dugas, Louisiana Department of Wildlife & Fisheries, 400 Royal Street, New Orleans, Louisiana 70130

- Abbe, G.R. 1988. Population structure of the American oyster, <u>Crassostrea</u> <u>virginica</u>, on an oyster bar in central Chesapeake Bay: changes associated with shell planting and increased recruitment. Journal of Shellfish Research 7:33-40.
- Adams, M.P., R.L. Walker, and P.B. Hefferman. 1989. Oyster spat recruitment: a menace to oyster culture in coastal Georgia. Abstract. Journal of Shellfish Research 8(2):454.
- Alabama Department of Conservation. 1944. Shells go back to the reefs. Alabama Conservation 15(12):3,14.
- Alabama Department of Conservation. 1947. Rehabilitation of oyster reefs planned. Alabama Conservation 18(10):6.
- Alabama Department of Conservation. 1948. Huge oyster program begins. Alabama Conservation 20(6):3,10.
- Aprill, G. and D. Maurer. 1976. The feasibility of oyster raft culture in east coast estuaries. Aquaculture 7:147-160.
- Ayer, W.D., B. Smith, and R.D. Acheson. 1970. An investigation of the possibility of seed oyster production in Great Bay, New Hampshire. Fish and Game Department, Marine Survey Report 2:1-106.
- Baughman, J.L. 1947. Texas rehabilitating oyster grounds. Atlantic Fisheries, July 1947:18,51.
- Baker, W.B., S.M. Ray, and A.M. Landry, Jr. 1991. Investigation of coal combustion by-product utilization for oyster reef development in Texas bay waters. Proceedings: Ninth International Ash Use Symposium 2:14 pp.
- Beaven, G.F. 1941. Shell planting operations in Maryland. Presented at the National Shellfisheries Association. 3 pp.
- Bell, J.O. 1952. A study of oyster production in Alabama waters. Masters Thesis. Texas Agricultural and Mechanical College. 81 pp.
- Berrigan, M.E. 1985. Oyster relay and oyster reef rehabilitation: 1984. Florida Department of Natural Resources, Division of Marine Resources, Tallahassee, Florida. 19 pp.
- Berrigan, M.E. 1988a. Oyster resource development programs 1982-1987. Florida Department of Natural Resource, Division of Marine Resources, Tallahassee, Florida. 35 pp.
- Berrigan, M.E. 1988b. Management of oyster resources in Apalachicola Bay following Hurricane Elena. Journal of Shellfish Research 7(2):281-288.
- Berrigan, M.E. 1990a. Oyster resource development and cultivation programs in Apalachicola Bay. Florida Department of Natural Resources, Division of Marine Resources, Tallahassee, Florida. 5 pp.

- Berrigan, M.E. 1990b. Biological and economical assessment of an oyster resource development project in Apalachicola Bay, Florida. Journal of Shellfish Research 9(1):149-158.
- Berrigan, M.E. 1991. Oyster resources in Apalachicola Bay, Florida. Florida Department of Natural Resources, Division of Marine Resources, Tallahassee, Florida. 101 pp.
- Bohn, R.E. 1989. Transferring oyster hatchery technology: can the East Coast learn from the West Coast? Journal of Shellfish Research 8(2):479.
- Bouma, A.H. 1976. Shell dredging and its influence on gulf coast environments. Gulf Publishing Company, Houston, Texas. 454 pp.
- Boury, M. 1929. Les Differents Systems de Collecteurs de Nassain. (Various systems of oyster spat collectors.) Rev. Trav. Peches Mar. Paris 2(3):313-315.
- Broadhurst, R.C. 1990. Alternatives to clamshell for oyster spat production. Masters Thesis, University of New Orleans. 39 pp.
- Budge, W.W. and G.W. Freeborn. 1970. Method and apparatus for growing free oyster spat. U.S. Patent No. 3,526,209, Washington, DC.
- Burr, J.G. 1933. Studies in oyster culture on the Texas Coast. Texas Game, Fish, and Oyster Commission, Bulletin 6:1-24.
- Butler, P.A. 1955. Selective setting of oyster larvae on artificial cultch. Proceedings of the National Shellfisheries Association 45:95-105.
- Butler, P.A. 1957. Production and utilization of seed oysters in the gulf area. Proceedings of the National Shellfisheries Association 47:19-22.
- Cake, E.W., Jr. 1983. Habitat suitability index models: Gulf of Mexico American oyster. U.S. Department of Interior, Fish and Wildlife Service. FWS/OBS-82/10.57. 37 pp.
- Carriker, M.R. 1959. The role of physical and biological factors in the culture of <u>Crassostrea</u> and <u>Mercenaria</u> in a saltwater pond. Ecological Monographs 29:219-266.
- Castagna, M., D.S. Haven, and J.B. Whitcomb. 1969. Treatment of shell cultch with polystream to increase the yield of seed oysters, <u>Crassostrea virginica</u>. Proceedings of the National Shellfisheries Association 59:84-90.
- Chapman, W.M. and G.D. Esveldt. 1943. The spawning and setting of the Pacific oyster, <u>Ostrea</u> gigas (Thumborg), in the state of Washington in 1942. Biological Report No. 43A. Department of Fisheries, State of Washington.
- Chatry, M., C. Dugas, and G. Laiche. 1986. Comparison of oyster setting rates on clamshell and crushed limestone. Louisiana Wildlife and Fisheries Commission Technical Bulletin 40:54-60.
- Chatry, M. 1987. Seed oyster production in Louisiana and prospects for enhancement In: C.J. Sindermann (editor), Reproduction, maturation, and

seed production of cultured species. U.S. Department of Commerce, National Marine Fisheries Service, Washington, DC. p. 27-30.

- Crisp, D.J. 1967. Chemical factors inducing settlement in <u>Crassostrea</u> <u>virginica</u> (Gmelin). Journal of Animal Ecology 36(2):329-335.
- Deegen, F., P.L. Lewis, and T. Van Devender. 1980. Rehabilitation of natural oyster reefs destroyed or damaged by a natural disaster. Completion Report, P.L. 88-309 Project No. 2-349-D(4b), Mississippi Bureau of Marine Resources. 30 pp.
- Demoran, W.J. 1970. Rehabilitation and restoration of oyster grounds damaged by the hurricane of August 17, 1969. Completion Report, P.L. 88-309 Project No. 2-130-D(4b), Mississippi Marine Conservation Commission. 22 pp.
- Demoran, W.J. 1974. Re-establish oyster reefs destroyed by flood waters. Completion Report, P.L. 88-309 Project No. 2-214-D(4b), Mississippi Marine Conservation Commission. 16 pp.
- Drinnan, R.E. 1967. The effect of early fouling of shell surfaces on oyster spatfall. Abstract. Proceedings of the National Shellfisheries Association 59:2.
- Dugas R. 1984. New findings may spur state's oyster production. Louisiana Conservationist, November/December issue.
- Dugas, R.J. 1982. The Louisiana oyster. Louisiana Department of Wildlife and Fisheries. 33 pp.
- Dupuy, J.L., N.T. Windsor, and C.E. Sutton. 1977. Manual for design and operation of an oyster seed hatchery for the American Oyster, <u>Crassostrea</u> <u>virginica</u>. Virginia Institute of Marine Science, Special Report No. 142. <u>In</u>: Applied Marine Science and Ocean Engineering. 104 pp.
- Eckmayer, W.J. 1976. Oyster reef cultivation for cultch material. Completion Report, P.L. 88-309 Project No. 2-253-R, Alabama Department of Conservation and Natural Resources. 14 pp.
- Eckmayer, W.J. 1977. Oyster reef cultivation for cultch material. Alabama Marine Resources Bulletin 12:23-30.
- Eckmayer, W.J. 1978. Evaluation of oyster management techniques following a resource disaster. Completion Report, P.L. 88-309 Project No. 2-279-R, Alabama Department of Conservation and Natural Resources. 60 pp.
- Eckmayer, W.J. 1983. Growth and survival of hatchery-reared oysters set on three types of cultch in Bon Secour Bay, Alabama. North American Journal of Fisheries Management 3:171-175.
- Engle, J.B. 1936. Effects of dredging on natural oyster reefs and planted bottoms in Alabama. A Report of the U.S. Bureau of Fisheries. 6 pp.
- Engle, J.B. 1945. The condition of the natural oyster reefs and other oyster bottoms in Alabama in 1943 with suggestions for their improvement. U.S. Fish and Wildlife Service, Special Scientific Report No. 29. 42 pp.

- Engle, J.B. 1948. Investigations of the oyster reefs of Mississippi, Louisiana, and Alabama following the Hurricane of September 19, 1947. U.S. Department of the Interior, Fish and Wildlife Service, Special Scientific Report No. 59. 34 pp.
- Engle, J.B. 1955. Ten years of study on oyster setting in a seed area in upper Chesapeake Bay. Proceedings of the National Shellfisheries Association 46:88-99.
- Futch, C.R. 1983. Oyster reef construction and relaying programs. <u>In</u>: S. Andree (editor) Apalachicola Oyster Industry: Conference Proceedings. Florida Sea Grant College Report No. 57. p. 34-38.
- Galtsoff, P.S. and R.H. Luce. 1930. Oyster investigation in Georgia, U.S. Department of Commerce, Bureau of Fisheries, Document No. 1077. p. 61-100.
- Galtsoff, P.S., H.F. Prytherch, and H.C. McMillin. 1930. An experimental study in the production and collection of seed oysters. Bulletin of the U.S. Bureau of Fisheries XLVI. p. 197-263.
- Galtsoff, P.S. 1943. Increasing the production of oysters and other shellfish in the United States. Texas Game and Fish 1(18):7,12-14; 1(9):8,16-18.
- Garvey, M.M. 1986. Suitability of stabilized coal waste as a substratum for setting and growing the American Oyster <u>Crassostrea</u> <u>virginica</u> (Gmelin). Masters Thesis, University of Delaware. 87 pp.
- Gary, L.R. 1906. The conditions of oyster culture in the waters of the parishes of Vermilion and Iberia, Louisiana. Bulletin of the Gulf Biological Station 4:1-27.
- Gates, W.H. 1907. A few notes on oyster culture in Louisiana. Bulletin of the Gulf Biological Station 15:1-32.
- Gibbons, M.C., R. Mann, and L.D. Wright. 1989. Laboratory and field studies of oyster larvae settlement on three substrates, oyster shell, tire chips, and expanded shale, and the relative mobility of the three substrate. Virginia Institute of Marine Science, Marine Resources Report No. 89-3, Virginia Marine Resources Commission. 7 pp.
- Gulf Coast Research Laboratory and Mississippi Marine Conservation Commission. 1972. Proceedings of a public symposium on the oyster fisheries of the gulf states. October 6, 1972, Biloxi, Mississippi.
- Gunn, R.C. 1984. A report on the development and use of an artificial cultch suitable for off-bottom oyster culture in British Columbia. Fisheries Development Report No. 33. Marine Resources Branch, Ministry of Environment, Province of British Columbia. 25 pp.
- Gunter, G. 1938. A new oyster cultch for the Texas Coast. Proceedings of the Texas Academy of Sciences 21:14.
- Gunter, G. 1969. Reef shell or mudshell dredging in coastal bays and its effect upon the environment. Transactions of the 34th North American Wildlife and Natural Resources Conference. p. 51-74.

- Gunter, G. 1972. Use of dead reef shell and its relation to estuarine conservation. Transactions of the 37th North American Wildlife and Natural Resources Conference. p. 110-121.
- Gunter, G. and W.D. Burke. 1978. Further notes on how oysters land when planted. Proceedings of the National Shellfisheries Association 68:1-4.
- Hardin, J. 1990. Artificial turf for oysters. Concrete International, October 1990. p. 43-46.
- Haven, D., M. Castagna, P. Chanley, M. Wass, and J. Whitcomb. 1966. Effects of the treatment of an oyster bed with Polystream and Sevin. Chesapeake Science 7(4):179-188.
- Haven, D.S. 1980. Virginia seed sources. <u>In</u>: D. Webster and H. Ahearn (editors), Oyster culture in Maryland '79: a conference proceedings. Report No. UM-SG-AS-80-01, University of Maryland Sea Grant Program, College Park, Maryland. p. 25-37.
- Haven, D.S. and D. Garten. 1972. Shellbags for catching oyster spat. Marine Research Advisory No. 6. Virginia Institute of Marine Science. 4 pp.
- Haven, D.S., J.M. Zeigler, J.T. Dealteris, and J.P. Whitcomb. 1987. Comparative attachment, growth and mortalities of oyster (<u>Crassostrea virginica</u>) spat on slate and oyster shell in the James River, Virginia. Journal of Shellfish Research 6(2):45-48.
- Hidu, H., S. Chapman, and P.W. Soule. 1975. Cultchless setting of European oysters, <u>Ostrea</u> edulis, using polished marble. Proceedings of the National Shellfisheries Association 65:13-14.
- Hofstetter, R.P. 1981. Rehabilitation of public oyster reefs damaged or destroyed by a natural disaster. Data Management Series No. 21, Texas Parks and Wildlife Department, Austin, Texas. 9 pp.
- Homziak, J. 1988. Oyster seed sources, hatcheries, and their role in the management of oyster grounds. <u>In</u>: D. Burrage (editor), The Mississippi oyster industry: past, present, and future. MA56P 88-048. p. 45-52.
- Homziak, J., P. Simm, L.W. Bennett, and R. Herring. 1989. Suitability of fly-ash cement aggregate for oyster cultch. Abstract, Journal of Shellfish Research 8(2):475.
- Hopkins, S.H. 1955. Oyster setting on the gulf coast. Proceedings of the National Shellfisheries Association 45:52-55.
- Hopkins, A.E. 1961. Oyster cultural experiments on the Mississippi gulf coast. Journal of the Mississippi Academy of Sciences, 6(1954-1960):31-32.
- Hopkins, S.H. and R.W. Menzel. 1952. Methods for the study of oyster plantings. Convention Addresses, National Shellfisheries Association. p. 108-112.

- Ingle, B.M. and W.K. Whitfield, Jr. 1968. Oyster culture in Florida. Florida Board of Conservation, Marine Research Laboratory, Education Series No. 5. 25 pp.
- Kennedy, V.S. 1980. Comparison of recent and past patterns of oyster settlement and seasonal fouling in Broad Creek and Tred Avon River, Maryland. Proceedings of the National Shellfisheries Association 70(1):36-46.
- Krantz, G.E. and H.E. Davis. 1980. Biological efficiency of spat collection devices placed on oyster seed areas in Maryland. Research Notes, UM-SG-TS-80-07, Maryland Sea Grant. p. 4-14.
- Kyle, G. 1958. 4-H oyster farms to be cultivated. Alabama Conservation 29(5):20.
- Layton, P. and G. Aprill. 1970. Rehabilitation of the oyster industry in Delaware Bay: feasibility study of raft culture of oysters in Delaware Bay area. Annual Progress Report of the Fish and Wildlife Technical Assistance Committee of Delaware River Basin Commission. 36 pp.
- Leary, T.R. 1969. Oyster rehabilitation in San Antonio Bay. Completion Report, P.L. 88-309 Project No. 2-65-D-46, Texas Parks and Wildlife Department. 3 pp.
- Linton, T.L. 1968. Feasibility studies of raft culturing in Georgia. Proceedings of the Oyster Culture Workshop, July 11-13, 1967. University of Georgia, Marine Institute. p. 69-73.
- Little, E.J. and J.A. Quick, Jr. 1976. Ecology, resource rehabilitation, and fungal parasitology of commercial oysters, <u>Crassostrea</u> <u>virginica</u> (Gmelin), in Pensacola Estuary, Florida. Florida Marine Research Publication No. 21. 89 pp.
- Loosanoff, V.L. 1932. Observations on the propagation of oysters in the James and Corrotoman Rivers and the Seaside of Virginia. Virginia Commission of Fisheries, Newport News, Virginia. 46 pp.
- Loosanoff, V.L. 1954. How to increase production of seed oysters in Connecticut. Proceedings of the National Shellfisheries Association 45:19-22.
- Loosanoff, V.L. 1958. Use of plastics for collecting oyster set. Commercial Fisheries Review 20(9):52-54.
- Loosanoff, V.L. 1961. Treatment of cultch to collect heavier sets of oysters. U.S. Fish and Wildlife Service, Biology Laboratory, Milford, Connecticut, Bulletin 8(25):1-5.
- Lunz, G.R., Jr. 1938. Oyster culture with reference to dredging operations in South Carolina. Report to U.S. Engineers Office, Charleston, South Carolina. p. 1-135.
- Lunz, G.R. 1954. A general pattern of oyster setting in South Carolina. Proceedings of the National Shellfisheries Association 45:47-51.
- Lunz, G.R. 1955. Cultivation of oysters in ponds at Bears Bluff laboratories. Proceedings of the National Shellfisheries Association 46:83-87.

- Lunz, G.R. 1958. Unused oyster shell in South Carolina suitable for seed oyster production. Proceedings of the National Shellfisheries Association 48:44-51.
- MacKenzie, C.L., Jr. 1970. Causes of oyster spat mortality, conditions of oyster setting beds, and recommendations for oyster bed management. Proceedings of the National Shellfisheries Association 60:59-67.
- MacKenzie, C.L., Jr. 1975. Development of a program to rehabilitate the oyster industry of Prince Edward Island. Marine Fisheries Review 37(3):21-35.
- MacKenzie, C.L., Jr. 1977a. Use of quicklime to increase seed oyster production. Aquaculture 10:45-51.
- MacKenzie, C.L., Jr. 1977b. Development of an aquacultural program for rehabilitation of damaged oyster reefs in Mississippi. Marine Fisheries Review 39(8):1-13.
- MacKenzie, C.L., Jr. 1983. To increase oyster production in the Northeastern United States. Marine Fisheries Review 45(3):1-22.
- MacKenzie, C.L., Jr. 1989. A guide to enhancing estuarine molluscan shellfisheries. Marine Fisheries Review 51:1-47.
- Mann, R., B.J. Barber, J.P. Whitcomb, and K.S. Walker. 1990. Settlement of oysters, <u>Crassostrea virginica</u> (Gmelin) on oyster shell, expanded shale and tire chips in the James River, Virginia. Journal of Shellfish Research 9(1):173-175.
- Marshall, H.L. 1969. Development and evaluation of new cultch materials and techniques for three-dimensional oyster culture. Division of Commercial and Sport Fisheries, North Carolina Department of Conservation and Development, Special Scientific Report 17:1-35.
- Marwitz, S.R. and C.E. Bryan. 1990. Rehabilitation of public oyster reefs damaged by natural disaster in San Antonio Bay. Texas Parks and Wildlife Department. Management Data Series No. 32. 10 pp.
- Maurer, D. and G. Aprill. 1973. Feasibility study of raft culture of oysters in the Delaware Bay area. Delaware River Basin Commission October. 180 pp.
- May, E.B. 1968. Raft culture of oysters in Alabama. Proceedings of the Oyster Culture Workshop, July 11-13, 1967. Georgia Game and Fish Commission, Marine Fisheries Division 6:76-77.
- May, E.B. 1969. Feasibility of off-bottom oyster culture in Alabama. Alabama Marine Resources Bulletin 3:1-14.
- May, E.B. 1971. A survey of the oyster and oyster shell resources in Alabama. Alabama Marine Resources Bulletin 4:1-53.
- Melancon, E., Jr., R. Trapani, G. Scott, and L. Bahr. 1987. Culture of the oyster, <u>Crassostrea virginica</u> (Gmelin) from seed to market on bedding reefs in Barataria Bay, Louisiana, U.S.A. <u>In</u>: C.J. Sindermann (editor), Reproduction, maturation and seed production of cultured species. NOAA

Technical Report No. NMFS 47. U.S. Department of Commerce, Washington, DC. p. 21-26.

- Moore, H.F. and T.E.B. Pope. 1910. Oyster culture experiments and investigations in Louisiana. U.S. Commercial Fisheries Document No. 731. p. 1-52.
- Muden, F.H. 1975. Rehabilitation of natural oyster production grounds in Pamlico Sound area damaged or destroyed by Hurricane Ginger. North Carolina Department of Natural and Economic Resources, Special Scientific Report No. 27. 25 pp.
- Mueller, K.M. 1989. Alternative cultch materials: physiology and growth of <u>Crassostrea</u> <u>virginica</u> grown on stabilized coal ash. Abstract, Journal of Shellfish Research 8(2):477.
- Nelson, T.C. 1934. The use of furnace slag as oyster cultch. Fishing Gazette 51(8):4-6.
- Nelson, T.C. 1924. The attachment of oyster larvae. Biological Bulletin (Woods Hole) 46(3):143-151.
- Newell, R.I.E. and B.J. Barber. 1990. Summary and recommendations of the oyster recruitment and standing stock monitoring workshop. Horn Point Environmental Laboratory, University of Maryland. 32 pp.
- Ogle, J. and K. Flurry. 1981. Studies of various substrates in relation to setting of oysters larvae with comments on commercial applications. Abstract, Journal of Shellfish Research 1(1):120.
- Ogle, J. and A. Chestnut. 1979. Recycling freshly shucked oyster shells. Northeast Gulf Science 3(1):50-51.
- Ortega, S., J.P. Sutherland, and H.C. Baggett. 1991. Effect of two methods of cultch deployment on recruitment of the American oyster, <u>Crassostrea</u> virginica. Journal of Shellfish Research (in preparation).
- Ortega, S., J.P. Sutherland, and C.H. Peterson. 1990. Environmental determination of oyster success in the Pamlico Sound. A research report financed in Part by the U.S. Environmental Protection Agency and the North Carolina Department of Natural Resources and Community Development, through the Albemarle-Pamlico Estuarine Study.
- Perret, W.S. and M.F. Chatry. 1988. The Louisiana oyster fishery: industry and management confront a changing environment. Journal of Shellfish Research 7(2):305-306.
- Perret, W.S., R.J. Dugas, and M.F. Chatry. 1989. Enhancing Louisiana's oyster resources through shell planting. Journal of Shellfish Research 8(2):478.
- Pollard, J.F. 1973. Experiments to re-establish historic oyster seed grounds and to control the southern oyster drill. Louisiana Wildlife and Fisheries Commission Technical Bulletin No. 6. 82 pp.

9

- Pomerat, C.M. and C.M. Weiss. 1946. The influence of texture and composition of surface on the attachment of sedentary marine organisms. Biological Bulletin (Woods Hole) 91:57-65.
- Price, K.S., K. Mueller, J. Rosenfeld, and T. Warren. 1988. Stabilized coal ash as substratum for larval oyster settlement: A pilot field study. Understanding the Estuary: Advances in Chesapeake Bay Research. Proceedings of a conference. University of Delaware. p. 128-136.
- Price, K.S., C.E. Scklekat, and K.M. Hansen. 1991. Project ash cultch: A report on optimal oyster cultch based on a prepared fly ash substratum. Proceedings: Ninth Annual Ash Use Symposium 2:15 pp.
- Prytherch, H.F. 1924. Experiments in the artificial propagation of oysters. U.S. Department of Commerce, Bureau of Fisheries. Appendix 11 to the Report of the U.S. Commissioner of Fisheries, fiscal year 1923. p. 1-14.
- Prytherch, H.F. 1930. Improved methods for the collecting of seed oysters. U.S. Department of Commerce, Bureau of Fisheries. Appendix 4 to the Report of the U.S. Commissioner of Fisheries, fiscal year 1930. p. 47-59.
- Quayle, D.B. and T.P. Clark. 1970. Cultchettes, a synthetic oyster cultch. B.C. Research. Technical Operation of the British Columbia Research Council, Vancouver 167, Canada.
- Quayle, D.B. and T.P. Clark. 1971. Artificial oyster cultch and method of producing same. U.S. Patent No. 3,552,357, Washington, DC.
- Quast, W.D., M.A. Johns, D.E. Pitts, Jr., G.C. Matlock, and J.E. Clark. 1988. Texas oyster fishery management plan. Texas Parks and Wildlife Department, Coastal Fisheries Branch, Fishery Management Plan Series No. 1. 44 pp.
- Reisinger, E.A., Jr. 1978. Demonstrate revitalization of oyster beds by resurfacing and reseeding. Fourth quarter report and summation of fifth year's work, 1977-1978. CPRC Contract No. 10740077. Coastal Resources Division, Georgia Department of Natural Resources, Brunswick, Georgia. 25 pp.
- Ritchie, T.P. and R.W. Menzel. 1969. Influence of light on larval settlement of American Oysters. Proceedings of the National Shellfisheries Association 59:116-120.
- Ryder, J.A. 1883. Rearing oysters from artificially fertilized eggs, together with notes on pond culture, etc. Bulletin of the U.S. Fisheries Commission for 1883, 3:281-294.
- Ryder, L.L. 1981. Oyster cultivation by reef construction. Completion Report, P.L. 88-309 Project No. 2-320-D, Florida Department of Natural Resources. 19 pp.
- St. Amant, L.S. 1959. Successful use of reef oyster shell as oyster cultch in Louisiana. Proceedings of the National Shellfisheries Association 49:71-76.
- St. Amant, L.S. 1961. The cultch planting program, Ninth Biennial Report, Louisiana Wildlife and Fisheries Commission 1960-1961. p. 151-152.

- Sangaree, L.C. and J.W. Schneider. 1984. Oyster cultivation by reef construction and oyster transplanting program. Completion Report, P.L. 88-309 Project No. 2-407-D, Florida Department of Natural Resources. 16 pp.
- Sangaree, L.C. 1983. Oyster cultivation by reef construction. Completion Report, P.L. 88-309, Project No. 2-370-D, Florida Department of Natural Resources, 20 pp.
- Sayce, C.S. and C.C. Larson. 1966. Willapa oyster studies--use of the pasture harrow for the cultivation of oysters. Commercial Fisheries Review 28(1):21-26.
- Shaw, W.N. 1962. Raft culture of oysters in Massachusetts. U.S. Department of Interior, Fish and Wildlife Service, Fisheries Bulletin 61(197):481-495.
- Shaw, W.N. 1965. Pond culture of oysters past, present and future. North American Wildlife and Natural Resources Conference 13:114-120.
- Shaw, W.N. 1967a. Seasonal fouling and oyster setting on asbestos plates in Broad Creek, Talbot County, Maryland, 1963-65. Chesapeake Science 8(4):228-236.
- Shaw, W.N. 1967b. Advances in the off-bottom culture of oysters. Proceedings of the Gulf and Caribbean Institute, 19th Annual Session (1966). p. 108-115.
- Shaw, W.N. 1969. The past and present status of off-bottom oyster culture in North America. Transactions of the American Fisheries Society 93(4):755-761.
- Shaw, W.N. 1971. Oyster culture research, off-bottom growing techniques. The American Fish Farmer 2(9):16-21.
- Shaw, W.N. 1972. An off-bottom oyster culture demonstration at Oxford, Maryland. Abstract, Proceedings of the National Shellfisheries Association 62:7.
- Sheehy, M. 1990. Settlement of the American Oyster, <u>Crassostrea</u> <u>virginica</u>, on natural and artificial substrates. Duke University Marine Laboratory. Dr. J.D. Costlow, Advisor.
- Sieling, F.W. 1950. Influence of seasoning and position of oyster shells on oyster setting. Proceedings of the National Shellfisheries Association, August, 41:57-61.
- Smith, R.O. 1949. Summary of oyster farming experiments in South Carolina 1939-1940. Special Scientific Report 63. U.S. Department of the Interior. Fish and Wildlife Service. Washington, DC. p. 1-20.
- Sport Fishing Institute. 1987. Artificial reef development center. Reef Briefs 12:2-3.
- Summers, M.W. 1966. Rehabilitation and restoration of oyster seed grounds. Completion Report, P.L. 88-309 Project No. 2-27-D-1[4(b)] & 2-24-D-1, Louisiana Department of Wildlife and Fisheries. 10 pp.
- Summers, M.W 1967. Shell planting for oyster cultch. Completion Report, P.L. 88-309 Project No. 2-54-D, Louisiana Department of Wildlife and Fisheries. 10 pp.

- Supan, J. 1983. Evaluation of a leased oyster bottom in Mississippi Sound. Gulf Research Reports 7(3):261-266.
- Swingle, H. 1975. Studies of oyster reef cultivation and artificially inducing crab molting. Completion Report, P.L. 88-309 Project No. 2-201-R, Alabama Department of Conservation and Natural Resources. 3 pp.
- Swingle, H.A. and E.A. Hughes. 1976. A review of the oyster fishery of Alabama. Alabama Marine Resources Bulletin No. 11. p. 58-73.
- Tarver, J.W. 1970. Clam shell planting for oyster cultch. Completion Report, P.L. 88-309 Project No. 2-114-D, Louisiana Department of Wildlife and Fisheries. 5 pp.
- Tung, K. and J.W. Zahradnik. 1974. Submerged plastic net structures for oyster propagation. Abstract, Proceedings of the National Shellfisheries Association 64:8.
- Van Hoose, M.S. 1986. Shell planting crucial for ailing oyster industry. Alabama Conservation. p. 18-19.
- Watlers, K.W. and T.E. Prinslow. 1975. Culture of the mangrove oyster, <u>Crassostrea rhizophorae</u>, Guilding, in Puerto Rico. Proceedings of the World Mariculture Society 6:221-233.
- Webster, D. and D. Meritt. 1988. Stabilizing oyster ground. Oyster Aquaculture Workbook Series. UM-56-Map-88-04. Maryland Sea Grant Extension Program, University of Maryland. 6 pp.
- White, C.J. and W.S. Perret. 1974. Efforts to re-establish oyster tonging in Lake Calcasieu, Louisiana. Louisiana Wildlife and Fisheries Commission Technical Bulletin No. 11. 15 pp.
- Whitfield, W.K., Jr. 1971. Construction of artificial oyster reefs. Completion Report, P.L. 88-309 Project No. 2-52-D, Florida Department of Natural Resources. 27 pp.
- Whitfield, W.K., Jr. 1973. Construction and rehabilitation of commercial oyster reefs in Florida from 1949 through 1971 with emphasis on economic impact in Franklin County. Florida Department Natural Resources, Marine Research Laboratory, Special Scientific Report. No. 38. 42 pp.
- Whitfield, W.K., Jr. 1974. Artificial oyster reef development. Completion Report, P.L. 88-309 Project No. 2-150-D, Florida Department of Natural Resources. 15 pp.
- Whitfield, W.K., Jr. and D.S. Beaumariage. 1977. Shellfish management in Apalachicola Bay, Past-Present-Future. <u>In</u>: R.J. Livingston and E.A. Joyce, Jr. (editors), Proceedings of the Conference on the Apalachicola Drainage System, Florida Marine Research Publication 26:130-140.
- Woodburn, K.D. 1961. Prospectus on oyster rehabilitation for the Hillsborough County Port Authority. Florida State Board of Conservation, Marine Laboratory. 9 pp.