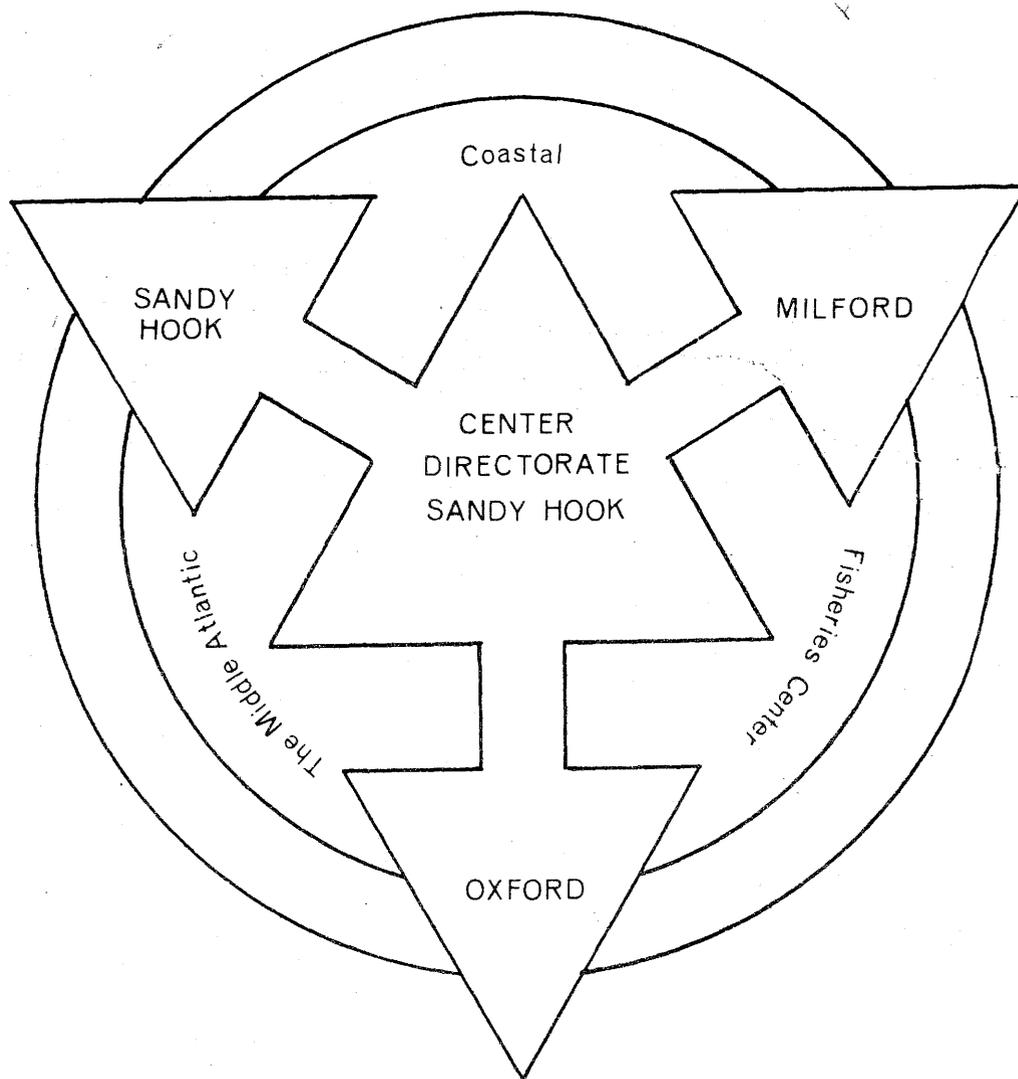


PRE-REVIEW INFORMATION COMPILATION:  
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U.S. DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Northeast Region

MIDDLE ATLANTIC COASTAL FISHERIES CENTER



Informal Report No. 67

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<sup>1/</sup> MAB = Middle Atlantic Bight

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<sup>1/</sup> MAB = Middle Atlantic Bight  
<sup>2/</sup> IOEC = Impact of Environmental Change

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## I. THE MIDDLE ATLANTIC COASTAL FISHERIES CENTER

**ORGANIZATION**        The Middle Atlantic Coastal Fisheries Center is one of a series of research centers established by the National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U. S. Department of Commerce. Each of these centers represents a program consolidation and grouping of several laboratories in different geographical locations.

The Middle Atlantic Coastal Fisheries Center is a consolidation and integration of the Sandy Hook (N. J.) Marine Laboratory, the Oxford (Md.) Biological Laboratory, the Milford (Conn.) Biological Laboratory, and the former Ann Arbor (Mich.) Technological Laboratory (now based at Milford). These units (regrouped and subdivided by disciplines) function under direct line authority of the Center Director, Dr. Carl Sindermann, who is responsible to the Associate Director for Resource Research, NMFS, for broad integrated programs of research on living coastal resources. The Center is composed of a Directorate, an associated centralized Administrative Unit, and four major research units. Research facilities of the Center are located at Sandy Hook, N. J., Milford, Conn., Oxford, Md., and Greenbackville, Va. Center headquarters are at Sandy Hook.

**MISSION**        The mission of the Center is to develop, establish, and to prosecute aggressively an integrated, multi-disciplinary research program on the biology and ecology of the living marine coastal organisms of the North Atlantic Ocean, especially in the zoogeographic area known as the Middle Atlantic Bight. This program is to be carried out in full cooperation with other interested Federal and State agencies, and with local academic and other research institutions. The research responsibilities of the major research units are as follows:

SINDERMANN, CARL J.

Professional Experience:

Center Director, Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service, Highlands, N. J., 1971-

Adjunct Professor, Department of Biology, Lehigh University, Bethlehem, Pennsylvania, 1973 to present.

Laboratory Director, Tropical Atlantic Biological Laboratory, Bureau of Commercial Fisheries, Miami, Florida, April 1968 to October 1971.

Adjunct Professor, Division of Fisheries Science, School of Marine and Atmospheric Sciences, University of Miami, and a member of Affiliate Faculty in Biology, Florida Atlantic University, 1968 to 1972.

Laboratory Director, Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland, 1963 to April 1968.

Visiting Professor of Biology, Georgetown University, 1965-1968.

Program Coordinator, Atlantic Herring Programs, Bureau of Commercial Fisheries, Boothbay Harbor, Maine, 1962-1963.

Program Leader, Atlantic Herring Programs, Bureau of Commercial Fisheries, 1959-1962.

Research Biologist, Fish and Wildlife Service (Immunogenetics, Biochemistry, and Pathology of Marine Organisms), 1954-1959.

Assistant Professor of Biology and member of Graduate Faculty in Microbiology, Brandeis University, 1953-1956.

Chief, North Atlantic Herring Investigations (a joint investigation of the Maine Department of Sea and Shore Fisheries, U. S. Fish and Wildlife Service and the Maine Sardine Industry), 1952-1954.

Assistant in Parasitology and Tropical Public Health, Harvard Medical School, 1952.

Instructor in Biology, Brandeis University, 1951-1953.

Parasitologist, Biology Survey, Massachusetts Department of Natural Resources, 1950.

SINDERMANN, CARL J. (cont.)

Degrees:

- Ph. D. in Biology, Harvard University, 1953
- A.M. in Biology, Harvard University, 1951
- B.S. in Zoology, University of Massachusetts, 1949

Administrative Experience:

Center Director, Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service, Highlands, N. J., 1971- to present.

Laboratory Director, Tropical Atlantic Biological Laboratory, Miami, Florida, 1968 to 1971.

Laboratory Director, USBCF Biological Laboratory, Oxford, Maryland, 1963-1968.

Program Coordinator, USBCF Biological Laboratory, Boothbay Harbor, Maine, 1962-1963.

Symposium and special session chairman and organizer, several scientific meetings, 1963 to present.

Scientific advisor to U. S. delegations, two international fisheries commissions.

Member, organizing and other administrative committees, several scientific societies.

Member, evaluation panels, NSF research grant and sea grant programs.

Member, oceanographic advisory committee, City of Miami and Dade County, Florida.

SINDERMANN, CARL J. (cont.)

Society Memberships and Offices Held:

Sigma Xi, American Society of Parasitologists, Wildlife Disease Association, American Institute of Fishery Research Biologists, National Shellfisheries Association, American Fisheries Society, Society for Invertebrate Pathology.

Member, Divisions Committee, Society for Invertebrate Pathology, 1969-1970.

Member, Fish Disease Committee, American Fisheries Society, 1968-

Member, Publications Award Committee, American Institute of Fishery Research Biologists, 1968-1970.

Member, Organizing Committee, Society for Invertebrate Pathology, 1967-1968.

Chairman, W. F. Thompson Award Committee, American Institute of Fishery Research Biologists, 1965-1967.

Co-chairman, Symposium on Fish Diseases, American Fisheries Society, 1969.

Co-chairman, American Society of Parasitologists, International Biological Program Committee on Parasites as Biological Tags, 1969-1972.

Member, Marine Biological Resource Committee, Marine Technology Society, 1972-.

Chairman, Committee on International Parasitology, American Society of Parasitologists, 1972 to present.

Academic and Professional Honors:

Members, Fisheries Improvement Committee, International Council for the Exploration of the Sea, 1973-.

Member, UJNR (United States-Japan Cooperation in Development and Utilization of Natural Resources) Panel on Aquaculture, 1974-.

Section Chairman, Third International Congress of Parasitology, Munich 1974.

Participant, First Caribbean Oceanoeering Conference, Puerto Rico, Feb., 1973.

Member, Marine Biological Resources Committee, Marine Technology Society, 1972-.

Luncheon Speaker, Food-Drugs from the Sea Conference, University of Rhode Island, 1972.

Session Chairman, Third World Mariculture Conference, St. Petersburg, Florida, January 1972.

U. S. Alternate Delegate, FAO Committee for the East Central African Fisheries (CECAF), Casablanca, Morocco, 1971.

Scientific Adviser, U. S. Delegation, Cooperative Investigations of the Northern Part of the eastern Central Atlantic (CINECA), Casablanca, Morocco, 1971.

Organizer and Chairman, American Fisheries Society Session on Living Marine Resources, Second National Biological Congress, Miami Beach, Fla., 1971.

- Session Chairman and Banquet Speaker, International Association for Aquatic Animal Medicine, Canada, 1971.
- Wildlife Society of America, 1971 award for best scientific publication in fisheries for 1970.
- Session Keynote Speaker, World Mariculture Society, Galveston, Texas, 1971.
- Session Organizer, Second Biological Congress, AIBS-American Fisheries Society, Miami, 1971.
- Session Chairman, 50th Anniversary Celebration Symposium, University of Washington College of Fisheries, 1970
- Colloquium Chairman, Second International Congress of Parasitology, Washington, D. C. 1970.
- Member, American Society of Parasitologists Committee on the International Biological Program, 1969 to present.
- Scientific Advisor, U. S. Delegation, International Commission for the Conservation of Atlantic Tunas, Rome, 1969.
- Member, Advisory Committee on Marine Sciences, City of Miami and Dade County, Florida, 1969-.
- Member, U. S. Delegation to FAO Committee for the Eastern Central Atlantic Fisheries, Accra, Ghana, 1969.
- Antarctic Observer, U. S. Department of State, 1966 to present.
- Member, Evaluation Panel, Sea Grant Program, NSF, 1968, 1969.
- Member, Bureau of Commercial Fisheries advisory group to NASA on back contamination from lunar exploration, 1967.
- Participant, 11th Pacific Science Congress, Tokyo, Japan, August 22 - September 3, 1966. Chairman, Divisional Session in Fishery Sciences at this Congress.
  
- Member or former member, Editorial Boards of the journals, AQUACULTURE, PROCEEDINGS OF THE NATIONAL SHELLFISHERIES ASSOCIATION, CHESAPEAKE SCIENCE, and JOURNAL OF FISH BIOLOGY.
- Manuscript referee. JOURNAL OF PARASITOLOGY, COPEIA, and JOURNAL OF THE FISHERIES RESEARCH BOARD OF CANADA.
- Participant, First International Congress of Parasitology, Rome, 1964.
- Participant, XVI International Congress of Zoology, Washington, 1963.
- Member, Oceanographic Planning Committee, Bureau of Commercial Fisheries, 1962.

SINDERMANN, CARL J. (cont.)

Symposium participant, 10th Pacific Science Congress, Honolulu, 1961.

National Science Foundation, travel grant for participation in 10th Pacific Congress, 1961.

Member, Grant Evaluation Panel, National Science Foundation, 1961, 1962.

Symposium participant, International Council for the Exploration of the Sea, Copenhagen, 1959.

National Microbiological Institute, National Institute of Health, U. S. Public Health Service, research grant for a 3-year study of marine dermatitis-producing schistosomes (1955 to 1957).

Sigma Xi, Harvard Chapter, 1953.

University of Massachusetts grant for study of marine invertebrates, Marine Biological Laboratory, Woods Hole, Massachusetts, 1949.

Research Interests:

1. Ecology, particularly the effects of pollution on living marine resources, and role of disease in the marine environment.
2. Parasitology, particularly the biology of parasites and diseases of marine organisms.
3. Immunogenetics, particularly as related to subpopulations of marine organisms, and including biochemical identification of infra-species groups.

Publications:

Since 1953 I have published over 80 scientific papers and review articles, principally in the fields of parasitology and immunogenetics. I have published (1970) two books, "Principal Diseases of Marine Fish and Shellfish," (Academic Press) and "Diseases of Marine Fishes" (T. F. H. Publications). I have in preparation a third book, "The Sea Might not Provide."

SINDERMANN, CARL J. (cont.)

Teaching Responsibilities:

From 1951 through 1956 I was a member of the faculty at Brandeis University, Waltham, Massachusetts, where I offered courses in General Education Biology, Invertebrate Zoology, Parasitology and Ecology.

In 1965 I was appointed Visiting Professor of Biology, Georgetown University, Washington, D. C., where I offered graduate courses titled "Problems in Invertebrate Zoology" and "Problems in Marine Biology," in 1966 and 1967.

In 1968 I was appointed Admunct Professor, Division of Fisheries Science, School of Marine and Atmospheric Sciences, University of Miami; and Member of the Affiliate Faculty in Biology, Florida Atlantic University. I have participated as a visiting lecturer in a course "Ecology of Marine Parasites" at the University of Miami, 1968 to 1971.

In 1973 I was appointed Adjunct Professor, Department of Biology, Lehigh University.

Publications:

Sindermann, C., and R. Gibbs. 1953. A dermatitis-producing schistosome that causes "clam-diggers itch" along the central Maine coast. Maine Dept. Sea and Shore Fish., Res. Bull. No. 12:1-20.

Sindermann, C. 1953. Parasites of fishes of north central Massachusetts. Mass. Div. Fish and Game, Fisheries Report for Lakes of North Central Massachusetts 1950 (1953): 4-28.

Sindermann, C. and A. Rosenfield. 1954a. Diseases of fishes of the western North Atlantic. I. Diseases of the sea herring (Clupea harengus). Maine Dept. Sea and Shore Fish., Res. Bull. No. 18: 1-23.

Sindermann, C. and A. Rosenfield. 1954b. Diseases of fishes of the western North Atlantic. III. Mortalities of sea herring caused by larval trematode invasion. Maine Dept. Sea and Shore Fish., Res. Bull. No. 21: 1-16.

SINDERMANN, CARL J. (cont.)

Sindermann, C. and L. Scattergood. 1954. Diseases of fishes of the western North Atlantic. II. Ichthyosporidium disease of sea herring. Maine Dept. Sea and Shore Fish., Res. Bull. No. 19: 1-40.

Sindermann, C. 1956. Diseases of fishes of the western North Atlantic. IV. Fungus disease and resultant mortalities of sea herring in the Gulf of Saint Lawrence in 1955. Maine Dept. Sea and Shore Fish., Res. Bull. No. 25: 1-23.

Sindermann, C. 1956. The ecology of marine dermatitis producing schistosomes. I. Seasonal variation in infection of mud snails by larvae of Austrobilharzia variglandis. Jour. Parasitol. 42 (suppl.): 27.

Scattergood, L. and C. Sindermann. 1956. Problems of herring biology. Proc. Northeast Sec., American Fish. Soc., Pittsburgh, Pennsylvania, 1956.

Sindermann, C., A. Rosenfield, and L. Strom. 1957. The ecology of marine dermatitis producing schistosomes. II. Effects of certain environmental factors on emergence of cercariae of Austrobilharzia variglandis. Jour. Parasitol. 43: 382.

Sindermann, C., and A. Rosenfield. 1957. The ecology of marine dermatitis producing schistosomes. III. Oxygen consumption of normal and parasitized Nassarius obsoletus under varying conditions of salinity. Jour. Parasitol. 43 (suppl.): 28.

Sindermann, C. 1957. Diseases of fishes of the western North Atlantic. V. Parasites as indicators of herring movements. Maine Dept. Sea and Shore Fish., Res. Bull. No. 27: 1-30.

Sindermann, C. 1957. Mass mortalities of marine fishes in the Gulf of Saint Lawrence 1954-1956. Anat. Rec. 128: 622.

SINDERMANN, CARL J. (cont.)

Sindermann, C. 1957. Studies on the pathogenicity of Ichthyosporidium hoferi, fungus parasite of fishes. Jour. Parasitol. 43: 42.

Sindermann, C. 1957. Myxosporidiosis in immature sea herring from the Gulf of Maine. Jour. Parasitol. 43: 43.

Farrin, A., L. Scattergood, and C. Sindermann. 1957. Maintenance of immature sea herring in captivity. Prog. Fish. Cult. 19:188-189.

Sindermann, C. 1957. Diseases of fishes of the western North Atlantic VI. Geographic discontinuity of myxosporidiosis in immature sea herring. Maine Dept. Sea and Shore Fish., Res. Bull. No. 29: 1-20.

Sindermann, C. 1958. An epizootic in Gulf of Saint Lawrence fishes. Trans. 23rd North American Wildlife Conference: 349-360.

Sindermann, C. 1958. Anti-mammalian erythrocyte properties of sea herring serum. Anat. Rec. 131: 599.

Sindermann, C. and Donald Mairs. 1958. Serum protein changes in diseased sea herring. Anat. Rec. 131: 599-600.

Sindermann, C. 1959. Zoogeography of sea herring parasites. Jour. Parasit. 45(4): 34.

Sindermann, C., and A. Farrin. 1959. Ecological studies of Cryptocotyle lingua (Trematoda: Heterophyidae) whose larvae cause "pigment spots" of marine fish. Jour. Parasit. 45(4): 21-22.

Sindermann, C., and D. Mairs. 1959. The C blood group system of Atlantic sea herring. Anat. Rec. 134(3): 640.

Sindermann, C., and D. Mairs. 1959. Blood properties of pre- and post-spawning anadromous alewives. Anat. Rec. 134(3): 639-640.

SINDERMANN, CARL J. (cont.)

- Sindermann, C., and D. Mairs. 1959. A major blood group system in Atlantic sea herring. *Copeia* 1959(3): 228-232.
- Boyar, H., and C. Sindermann. 1959. Additional notes on the maintenance of immature sea herring in captivity. *Prog. Fish. Cult.* 21: 185-187.
- Scattergood, L., C. Sindermann, and B. Skud. 1959. Spawning of North American herring. *Trans. Am. Fish. Soc.* 88: 164-168.
- Mairs, D., and C. Sindermann. 1960. Intraspecies variability in electrophoretic patterns of fish serum. *Anat. Rec.* 137: 377-378.
- Sindermann, C., and D. Mairs. 1960. Comparative serology of five species of Atlantic clupeoid fishes. *Anat. Rec.* 137: 393.
- Sindermann, C. 1960. Ecological studies of marine dermatitis producing schistosome larvae in northern New England. *Ecol.* 41: 678-684.
- Sindermann, C. 1961. Parasite tags for marine fish. *J. Wildl. Mgmt.* 25: 41-47.
- Sindermann, C., and D. Mairs. 1961. A blood group system for spiny dogfish. *Biol. Bull.* 120(3):401-410.
- Sindermann, C. 1961. Isoagglutination in elasmobranch fishes. *Amer. Zool.* 1(3): 390.
- Sindermann, C. 1961. The effect of larval trematode parasites on snail migrations. *Amer. Zool.* 1(3): 389.
- Sindermann, C. 1961. Sporozoan parasites of sea herring. *J. Parasit.* 47(4), Sec. 2: 34.
- Sindermann, C. 1961. Serology of Atlantic clupeoid fishes. 10th Pacific Science Congress, Abstracts of Symposium Papers, pp. 185-186.

SINDERMANN, CARL J. (cont.)

Sindermann, C. 1961. Serological techniques in fishery research. Trans. 26th N. Amer. Wildl. Conf.: 298-309.

Sindermann, C., and D. Mairs. 1961. Blood properties of pre- and post-spawning anadromous alewives, Alosa pseudoharengus. Fishery Bulletin of the U. S. Fish and Wildlife Service 61: 145-151.

Sindermann, C. 1961. Parasitological tags for redfish of the western North Atlantic. Cons. Internat. Explor. de la Mer, Rapp. et Proc.-Verb. 150: 111-117.

Sindermann, C. 1961. Serological studies of Atlantic redfish, Sebastes marinus. Fishery Bulletin of the U. S. Fish and Wildlife Service 61: 351-354.

Mead, G. W., and C. J. Sindermann. 1961. Systematics and natural marks. Cons. Internat. Explor. de la Mer, Rapp. et Proc.-Verb. 150: 9-11.

Sindermann, C., and A. Farrin. 1962. Ecological studies of Cryptocotyle lingua (Trematoda: Heterophyidae) whose larvae cause "pigment spots" of marine fish. Ecology 43(1): 69-75.

Mairs, D. F., and C. J. Sindermann. 1962. A serological comparison of five species of Atlantic clupeoid fishes. Biol. Bull. 123(2): 330-343.

Hoffman, G. L., and C. J. Sindermann. 1962. Common parasites of fishes. U. S. Fish and Wildlife Service, Fishery Circular 144: 1-17.

Sindermann, C. J. 1962. Serology of Atlantic clupeoid fishes. American Naturalist 96(889): 225-231.

Sindermann, C. J. 1963. Use of plant hemagglutinins in serological studies of clupeoid fishes. Fishery Bulletin of the U. S. Fish and Wildlife Service 63(1): 137-141.

Sindermann, C. J. 1963. Disease in marine populations. Trans. 28th N. Amer. Wildl. Conf.: 336-356.

## SINDERMANN, CARL J. (cont.)

- Sindermann, C. J. 1963. Immunogenetic studies of elasmobranch fishes. Proc. XVI Internat. Cong. Zool. 2: 210.
- Sindermann, C. J., and K. A. Honey. 1963. Electrophoretic analysis of the hemoglobins of Atlantic clupeoid fishes. Copeia 1963(3): 534-537.
- Sindermann, C. J., and K. A. Honey. 1964. Serum hemagglutinins of the winter skate (Raja ocellata) from the western North Atlantic. Copeia 1964: 139-144.
- Sindermann, C. J. 1964. Effects of environment on several diseases of herring from the western North Atlantic. ICNAF Envir. Sympos. Rome, Serial No. 1241, Contrib. No. E-5, pp. 1-17. (Also published as Spec. Publ. Int. Comm. Northw. Atlant. Fish. No. 6, p. 603-610 (1965).
- Sindermann, C. J. 1964. Immunogenetic and biochemical approaches to the identification of marine subpopulations. Proc. Sympos. on Exper. Mar. Ecol., Occas. Pub. No. 2, Graduate School of Oceanography, Univ. Rhode Island, pp. 33-38.
- Sindermann, C. J. 1964. BCF Biological Laboratory at Oxford: Present and Future. USDI FWS Circular 200, pp. 8-17.
- Rosenfield, A., and C. Sindermann, 1965. Starch-gel electrophoresis of oyster serum. Amer. Malacological Union Bull. 32: 8-9.
- Sindermann, C. J. 1966. Larval ecology of the trematode Cryptocotyle lingua. Proc. First Internat. Cong. Parasit. (Rome) 1964, vol. 1, pp. 12-13.
- Sindermann, C. J. 1966. Parasites of oysters, Crassostrea virginica, from the east coast of North America. Proc. First Internat. Cong. Parasit. (Rome) 1964, vol. 1, pp. 585-586.
- Sindermann, C. J. 1966. Epizootics in oyster populations. Proc. 11th Pacific Science Cong. (Tokyo), vol. 2, pp. 10-11.

SINDERMANN, CARL J. (cont.)

- Sindermann, C. J. 1966. Diseases of marine fishes: A review, *Advances in Marine Biology* 4: 1-89.
- Sindermann, C. J. 1967. Blood types in fish. *Am. Biol. Teacher* 29(6): 439-441.
- Sindermann, C. J. 1967. Recent advances in oyster culture in the Far East. *Amer. Malacol. Union, Ann. Repts. for 1967*: 52-53.
- Sindermann, C. J., and A. Rosenfield. 1967. Principal diseases of commercially important marine bivalve Mollusca and Crustacea. *USFWS Fish. Bull.* 66: 335-385.
- Sindermann, C. J. 1968. Bibliography of oyster parasites and diseases. *USDI FWS SSR-Fish. No. 563*, 13 pp.
- Sindermann, C. J., and G. E. Krantz. 1968. Erythrocyte antigens and natural isoagglutinins of the American eel, Anguilla rostrata, from Chesapeake Bay. *Chesa. Sci.*, 9: 94-98.
- Sindermann, C. J. 1968. Mortalities of oysters, with particular reference to Chesapeake Bay and the Atlantic coast of North America. *USFWS SSR-Fish. No. 569*, 10 p.
- Sindermann, C. J. 1970. *Principal Diseases of Marine Fish and Shellfish*. Academic Press, New York. 369 pp.
- Sindermann, C. J. 1970. *Diseases of Marine Fishes*. T. F. H. Publications, Jersey City, N. J. 89 pp.
- Sindermann, C. J. 1970. Bibliography of diseases and parasites of marine fish and shellfish. *Tropical Atlantic Biological Laboratory, Miami, Florida, Informal Report No. 11*, 440 pp.
- Sindermann, C. J. 1970. The role and control of diseases and parasites in mariculture. *Proc. 2nd Conf. Food-Drugs from the Sea, Univ. Rhode Island, 1969*. pp. 145-173.

SINDERMANN, CARL J. (cont.)

- Sindermann, C. J. 1970. Diseases of marine animals transmissible to man. *Laboratory Medicine* 1(1): 50-54.
- Sindermann, C. J. 1970. Disease and parasite problems in marine aquiculture. In "Marine Aquiculture" (W.J. McNeil, Ed.) pp. 103-134. Oregon State Univ. Press, Corvallis.
- Villella, J. B., E. S. Iversen, and C. J. Sindermann. 1970. Comparison of the parasites of pond-reared and wild pink shrimp (Penaeus duorarum Burkenroad) in south Florida. *Trans. Amer. Fish. Soc.* 99(4): 789-794.
- Sindermann, C. J. 1970. Predators and diseases of commercial marine Mollusca of the United States. *A.M.U. Bulletin (Abstract)*.
- Sindermann, C. J. 1971. Use and potential of bioresources: Harvesting the hydrosphere. *Proc. Natl. Symp. on Hydrobiology*, pp. 16-18.
- Sindermann, C. J. 1971. Our aquatic legacy -- can we save it? *The Exchangite*, June 1971, pp. 6-10.
- Sindermann, C. J. 1971. Internal defenses of Crustacea: A review. *Fish. Bull.* 69(3): 455-489.
- Sindermann, C. J. 1971. Disease-caused mortalities in mariculture -- status and predictions. *Proc. World Mariculture Society, 2nd Ann. Workshop*, Jan. 28-29, 1971, Galveston, Texas, pp. 69-74.
- Sindermann, C. J. 1972. Some biological indicators of marine environmental degradation. *Proc. Wash. Acad. Sci. Symposium "The Fate of the Chesapeake Bay"*. *J. Wash. Acad. Sci.* 62(2): 184-189.
- 1973.
- Sindermann, C. J. Disease problems in mariculture: ghosts, dragons or Rumpelstiltskins. *Proc. World Mariculture Society, 3rd Annual Meeting (in press)*. 1973. pp. 30-32

- Sindermann, C. 1973. A biologist's view of the Stockholm Conference on the Human Environment. Proc. Third Food-Drugs from the Sea Conf. URI, Jan. 73. pp. 11-16.
- Sindermann, C. J. 1974. Fisheries implications in planning offshore ports. pp. 77-87. In. McWethy, P. J. and S. B. Nelson (eds). Handbook for offshore port planning, Marine Tech. Soc., Wash., D. C. 287 pp.
- Sindermann, C. J. 1974. Two emerging problems in marine aquaculture -- coastal pollution and disease. International Council for the Exploration of the Sea, Fisheries Improvement Committee, Rept. No. CM1974/E: 38, 6 pp.
- Sindermann, C. J. 1974. An assessment of man's impact on living resources of the New York Bight. International Council for the Exploration of the Sea, Fisheries Improvement Committee, Rept. No. CM1974/E: 39, 7 pp.
- Sindermann, C. J. (ed.) 1974. Diagnosis and control of mariculture disease in the United States. Middle Atlantic Coastal Fisheries Center, Technical Ser. Pub. No. 2, 306 pp.
- Sindermann, C. J. (in press). The significance of disease in tropical and subtropical mariculture. Proc. Fourth Food Drugs from the Sea Conf., Marine Tech. Soc. Mayaguez, P.R., 1974.
- Sindermann, C. J. (<sup>1974</sup>in press). Aquatic animal diseases: some critical issues in 1974. Proc. Gulf Coast Reg. Sympos. on Disease of Aquatic Animals, Baton Rouge, La., 1974. pp1-12.
- Sindermann, C. J. (in press). Marine disease problems in the United States. Proc. Third Joint Meeting, Aquaculture Panel, U.S.-Japan Coop. Pgrm. Natl. Resources, Tokyo, 1974.
- Sindermann, C. J. (in press). The role of environmental contaminants in open system mariculture. Proc. First Caribbean Oceanering Conf. Feb. 73.

March, 1975

BIOGRAPHICAL RESUME

June 17, 1975

1. NAME: John A. Holston

2. ORGANIZATION AND ADDRESS:

National Marine Fisheries Service  
Middle Atlantic Coastal Fisheries Center  
Highlands, New Jersey 07732

3. DATE AND PLACE OF BIRTH:

October 13, 1921 Boston, Massachusetts

4. EDUCATION:

1943 - Medford High School, Medford, Mass. - graduated  
1946-50 - Boston College, graduated B.S. Chemistry cum laude

Additional courses in: Energy and Thermodynamics  
Fermentation Biochemistry  
Intracellular Metabolism

5. EMPLOYMENT:

1941-1945 U. S. Army, 4th Infantry Division. Service in  
Southwest Pacific and in Europe.  
Demobilized September 1945.

1950-1955 Chemist, Technological Laboratory,  
U.S.F&WS, East Boston, Mass.

1956-1958 Assistant Chief, Technology Section,  
U.S.F&WS, Washington, D. C.

1958-1961 Chief, Branch of Technology, U.S. Bureau of  
Commercial Fisheries, Washington, D. C.

1961-1966 Deputy Assistant Director, U. S. Bureau of  
Commercial Fisheries, Washington, D. C.

1966-1970 Laboratory Director, Technology Laboratory,  
U.S.B.C.F., Gloucester, Mass.

1970-1971 Deputy Regional Director for Research,  
NOAA/NMFS, Gloucester, Mass.

1971-  
present Deputy Center Director, Middle Atlantic  
Coastal Fisheries Center, NOAA/NMFS  
Highlands, N.J.

6. TRAINING:

- 1964 CSC Executive Training Institute, Brookings Institute, Washington, D.-C.
- 1966 CSC Executive Training Institute, U. of Virginia, Charlottesville, Va.
- 1963 Economics of Natural Resources, CSC/U. of Maryland
- 1972 Project Management, CSC/Institute for Professional Advancement, Newark, N.J.

7. SCIENTIFIC HONORS AND AWARDS:

- Outstanding Service Awards - 1958, 1965, 1972, 1975.
- Fellow, American Association for the Advancement of Science, 1969.
- Fellow, American Institute of Chemists, 1970.
- Fellow, Royal Society for Health, 1970.
- President, Atlantic Fisheries Technologist, 1967.

8. MEMBERSHIP IN SCIENTIFIC SOCIETIES:

- Member, Institute of Food Technologists, 1950-1975
- Member, American Institute for Chemists, 1965-1975
- Member, American Association for the Advancement of Science, 1950-1975
- Member, Royal Society (Health), 1967-1975.

DR. J. KNEELAND MCNULTY

Born: Alamosa, Colorado. May 14, 1923.

Married: June 24, 1950.

Children: Three

1. Brief educational background and work experiences or employment history.

Education:

1935-1937	St. Thomas's Choir School, New York, New York
1937-1941	The Choate School, Wallingford, Connecticut
1941-1943	Trinity College, Hartford, Connecticut
1943-1944	University of Pennsylvania, Philadelphia, Pennsylvania (Navy V-12)
1945	Cornell University Midshipmen's School, Ithaca, New York (ENS USNR)
1948-1950	Trinity College, Hartford, Connecticut - B.S. General Science
1950-1952	University of Connecticut, Storrs, Connecticut - M.S. Zoology
1959-1961 & 1965-1966	University of Miami, Coral Gables, Florida - Ph. D. Marine Sciences

Employment:

1943-1947	U.S. Navy (A.S., S2/C, ENS)
1947-1948	Reporter, New Haven Journal Courier, New Haven, Connecticut
1948-1950	Part-time reporter, Hartford Courant, Hartford, Connecticut
1952-1953	Research Assistant, Bears Bluff Laboratories, Wadmalaw Island, South Carolina
1953-1961	Research Instructor, Institute of Marine Science, Miami, Florida
1961-1965	Fishery Biologist (General), Bureau Sport Fish. & Wildl. (River Basins), Vero Beach, Florida.
1966-1971	Fishery Biologist (Research) and since July 1969 Supervisory Fishery Biologist (Research), NMFS Biological Laboratory, St. Petersburg Beach, Florida
1971	Acting Officer in Charge, NMFS Biological Laboratory, St. Petersburg Beach, Florida

## 2. Brief narrative account of research accomplishments.

Dr. McNulty published the first account of the seasonality of oyster spawning in South Carolina while working under Dr. G. Robert Lunz at Bear Bluff Laboratories. Under Dr. Hilary B. Moore at the University of Miami, Dr. McNulty published several papers on the effects of domestic sewage pollution on the benthos, zooplankton, and fouling organisms of Biscayne Bay, and also papers on the benthos of south Florida estuaries generally. His dissertation on pollution was published as a book in the Studies in Tropical Oceanography, University of Miami Press, in 1970, and has subsequently been reviewed in most fisheries and oceanographic journals. He has been project leader and more recently program leader of studies that include the Gulf of Mexico Estuarine Inventory (Florida portion) while at the St. Petersburg Beach Biological Laboratory, and is preparing the studies for publication at present. He has held the position of Acting Officer in Charge since August 1971.

## 3. Chronological listing of publications.

McNulty, J. Kneeland

1953. Seasonal and vertical patterns of oyster settlement off Wadmalaw Island, South Carolina. Bears Bluff Laboratory Contribution Number 15, 17 p.

Hela, Ilmo, Clarence A. Carpenter, Jr., and J. Kneeland McNulty

1957. Hydrography of a positive, shallow, tidal bar-built estuary (Report on the hydrography of the polluted area of Biscayne Bay). Bull. Mar. Sci. Gulf & Carib., 7(1): 47-99.

McNulty, J. Kneeland, E. S. Reynolds, and S. M. Miller

1960. Ecological effects of sewage pollution in Biscayne Bay, Florida: distribution of coliform bacteria, chemical nutrients, and volumes of zooplankton. Trans. 2nd Seminar on Biological Problems in Water Pollution, C. M. Tarzwell, ed., p. 189-202, 10 figs.

McNulty, J. Kneeland

1961. Ecological effects of sewage pollution in Biscayne Bay, Florida: sediments and the distribution of benthic and fouling macro-organisms. Bull. Mar. Sci. Gulf & Carib., 11(3): 394-447, 17 figs.

McNulty, J. Kneeland

- 1962a. Level sea bottom communities in Biscayne Bay and neighboring areas. Bull. Mar. Sci. Gulf & Carib., 12(2): 204-233, 14 figs.

REPORTS

McNulty, J. K.

A review of MESA-funded benthic ecological studies being conducted for the Middle Atlantic Coastal Fisheries Center (MACFC) and by its contractors. For: Proceed. Belle W. Baruch Institute for Mar. Biol. and Coastal Research Symp., "Ecology of Marine Benthos", 7-10 May 1975.

Middle Atlantic Coastal Fisheries Center. 1975. Results in 1974 of MESA-Funded biological studies conducted by the Middle Atlantic Coastal Fisheries Center (MACFC) and by its contractors. MACFC Informal Report No. 60, 26 Mar. 75.

Middle Atlantic Coastal Fisheries Center. 1975. MESA interim alternate dump site narrative report. MACFC Informal Report No. 66. May 75.

- McNulty, J. Kneeland, Robert C. Work, and Hilary B. Moore.  
1962b. Some relationships between the infauna of the level bottom and the sediment in south Florida. *Bull. Mar. Sci. Gulf & Carib.*, 12(3): 322-332, 4 figs.
- McNulty, J. Kneeland, and Nelia Lopez  
1969. Year-round production of ripe gametes by benthic polychaetes in Biscayne Bay, Florida. *Bull. Mar. Sci.*, 19(4): 945-954.
- McNulty, J. Kneeland  
1970. Effects of abatement of domestic sewage pollution on the benthos, volumes of zooplankton, and the fouling organisms of Biscayne Bay, Florida. *Stud. Trop. Oceanogr.* 9, Univ. of Miami Press, Coral Gables, Fla. 128 p.
- McNulty, J. Kneeland, and Lucius Johnson  
1971. Automated Determination of Total Phosphorus in Estuarine Water. *Proc. of the Fifth Technicon International Congress, 1970, Vol. 2: 353-355.*
- McNulty, J. Kneeland, William N. Lindall, Jr., and James E. Sykes  
In Press. Description of estuarine areas of the west coast of Florida--cooperative Gulf of Mexico estuarine inventory. *NMFS Circular Series.*

4. Scientific honors and awards received.

Sigma Xi (1952)  
Outstanding Performance Rating (1968-1969)

5. Presentation of technical papers before scientific societies.

A.I.B.S., University of Florida, August, 1954; Effects of pollution on benthos, boring organisms and fouling organisms of Biscayne Bay, Florida. (Unpublished)

A.W.W.A., Jacksonville, Florida, November, 1957: Pollution studies in Biscayne Bay, Florida (Unpublished).

Second Seminar on Biological Problems in Water Pollution held at the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, April, 1959: Ecological effects of sewage pollution in Biscayne Bay, Florida: Distribution of coliform bacteria, chemical nutrients, and volumes of Zooplankton. (Published)

Ecol. Soc. America, Oklahoma State University of Agriculture and Applied Science, Stillwater, Oklahoma, September 1960; Animal-sediment relationships. (Unpublished as given--a revision later published)

Conference on Estuaries, Jekyll Island, Georgia, April 1964:  
Ecological effects of domestic sewage pollution in Biscayne Bay, Florida.  
(Unpublished as given--taken from parts of dissertation)

1970 Technicon International Congress, November 2-4, 1970, at New York Hilton.

6. Specific participation in scientific conferences and workshops.

First Seminar on Biological Problems in Water Pollution held at the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, April 1956.

Second Seminar on Biological Problems in Water Pollution held at the Robert A. Taft Sanitary Engineering Center, Cincinnati, Ohio, April 1959.

First International Conference on Waste Disposal in the Marine Environment, University of California, Berkeley, California, July 1959.

Conference on Estuaries, Jekyll Island, Georgia, April 1964.

Technical Coordinating Committee, Gulf States Marine Fisheries Commission--numerous sessions, 1966-1969.

7. Consultant-type functions.

Assisted Wallis Associates, Inc., West Palm Beach, Florida, with literature survey and analysis of conclusions, March-June 1966, on Biscayne Bay, Florida (free of charge).

Assisted Navy Mine Defense Lab., Panama City, Florida, offices in Naval Intelligence, Washington, D.C., and the Scientific and Technical Intelligence Center, Washington, D.C., with problems relating to marine biology while on two-week tours of active duty for training, Naval Reserve, 1959-1970.

8. Special assignments.

Member of Departmental Study Team to evaluate plans of the Virgin Islands government to construct an airport at Mangrove Lagoon, Jersey Bay, St. Thomas, V.I., 1968 and 1970. Report: McNulty, J. Kneeland, Robertson, William B., Jr., and Horton, Billy F., 1958. Departmental study team report and recommendations on proposed new jet airport, St. Thomas, Virgin Islands. 39 p., 12 figs. (Mimeogr.)

Conducted special investigation for NMFS of the causes of the decline in the catch of white shrimp in Escambia Bay, February-March 1972.

Participated in drafting the MESA proposal for the New York Bight study sponsored by NOAA, March-April 1972.

5

RESUME - McNulty

9. Other information.

Holds SCUBA diving certification.

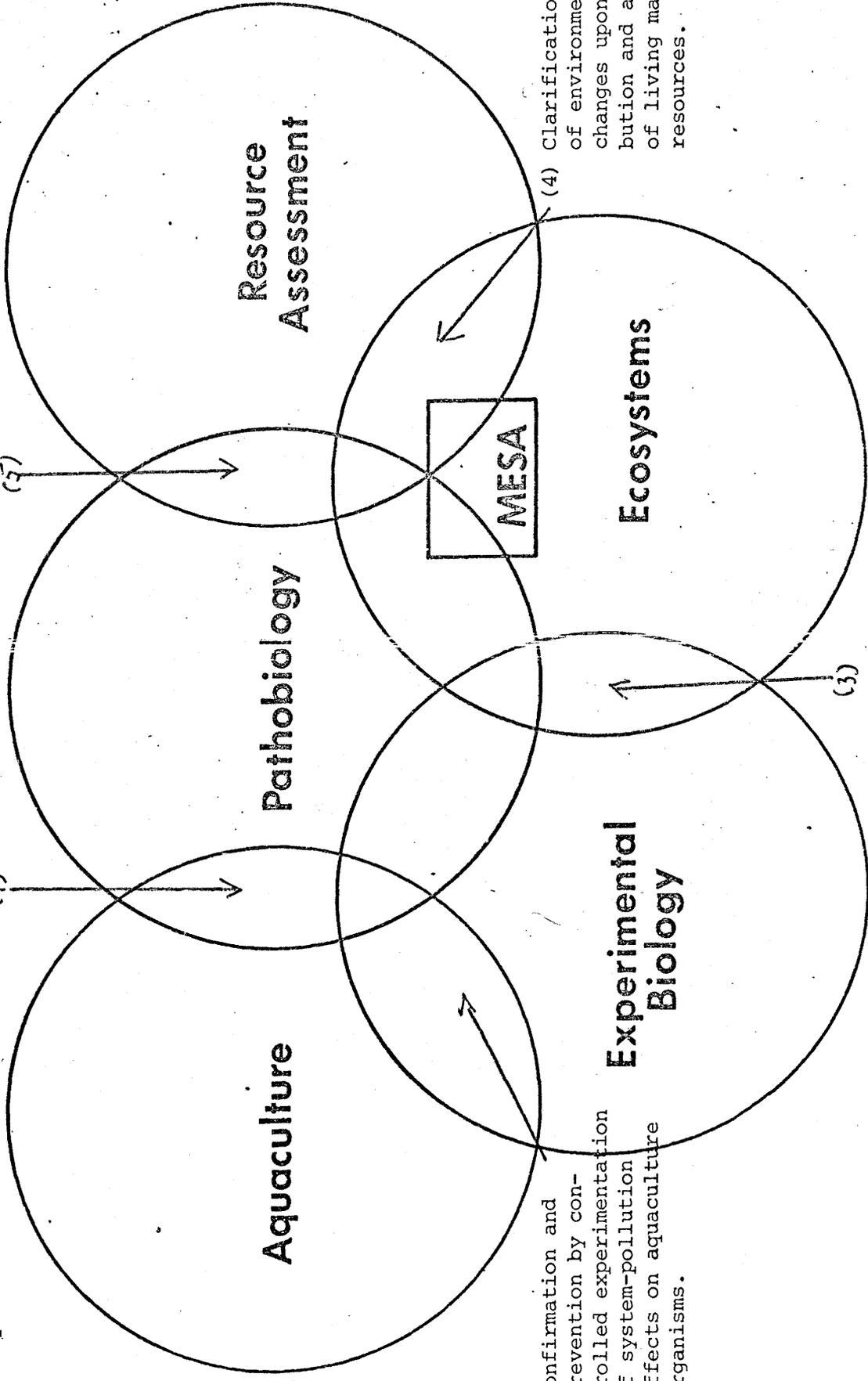
Holds rank CDR USNR (Retired).

Taught teen-age church school classes, St. Peter's Cathedral (Episcopal) 1967-1971, and is a member of the Cathedral choir at present.

Participant in several distance-running marathons (5-8 miles), 1967 to present.

# Middle Atlantic Coastal Fisheries Center Interrelationships of Research Investigation Groups and the Relative Position of MESA - Funded Studies

(1) Etiological and Preventative Studies of Larval Diseases, A Critical Review in Inhibiting Commercial Feasibility of Aquaculture. (5) Clarification of impact of pathogen-induced mortalities on the abundances of living marine organisms.



(2) Confirmation and prevention by controlled experimentation of system-pollution effects on aquaculture organisms.

(4) Clarification of impact of environmental changes upon distribution and abundances of living marine resources.

(3) Confirmation by controlled experimentation of field observations as to environmental impact upon living marine organisms.

MIDDLE ATLANTIC COASTAL FISHERIES CENTER

Center Director  
Target Grade - GS-16  
Dr. Carl J. Sindermann  
GS-15

CENTER ADMINISTRATION

MESA COORDINATION

J. Kneeland McNulty  
Fish. Biol. Res. Adm.  
GS-14

Deputy Center Director  
Target Grade - GS-15  
John A. Holston  
GS-15

Secretary Typing  
Kathe Walkers  
GS-07

Administrative Services

Hayberry, Daryl L.  
Center Adm. Officer - GS-12

LaIRD, Mary G.  
Budget Analyst - GS-05

\*Mickens, Doreen A.  
Clerk/Steno - GS-03

1 Work Study  
GS-02

Technical Services

Officer-in-Charge  
Dr. Arthur S. Merrill

LeBaron, John  
Computer Programmer - GS-09

Steinle, Suellen  
Computer Aid - GS-04

\*2 Work Study  
GS-03

\*3 High School  
GS-01

Special Studies Unit

Contaminant Coordinator  
Dr. A. Calabrese

Aquaculture Planning  
Dr. James E. Hanks

EXPERIMENTAL BIOLOGY INVESTIGATION

Target Grade - GS-15  
Dr. James E. Hanks  
Director, GS-15

Riccio, Rita  
Tech. Publ. Editor  
GS-09

PATHOLOGY INVESTIGATIONS

Target Grade - GS-15  
Dr. Aaron Rosenfield  
Director, GS-15

Secretary-Target Grade  
GS-05  
N. Wheatly, Clerk/Steno-GS-04

Physiological Effects of Pollutant Stress  
Chief, Target Grade - GS-13/14

Dr. Anthony Calabrese - GS-13  
Fish. Biol. Supervisory

Thurberg, Frederick  
Physiologist GS-12

Gould, Edith  
Biochemist GS-12

Collier, Ries S.  
Fish. Biol. GS-09

MacInnes, John  
Fish. Biol. GS-09

Dawson, Margaret  
Res. Physiologist GS-09

Miller, James E.  
Fish. Biol. GS-09

Nelson, David  
Fish. Biol. GS-07

\*Givens, Sharon A.  
Student Assistant GS-04

2 Work/Study  
GS-03

Aquaculture Genetics  
Chief Target Grade GS-13/14

Dr. Arlene Longwell GS-13  
Geneticist Supervisory

Jewell, Sheila  
Fish. Biol. GS-11

Hughes, James E.  
Fish. Biol. GS-07

Geneticist GS-09  
Vacant

1 Work Study  
GS-03

Spawning and Rearing of Molluscs,  
Chief, Target Grade - GS-13/14

Warren Landers - GS-13  
Fish. Biol. Supervisory

Rhodes, Edwin W.  
Fish. Biol. GS-11

Cable, Wayne D.  
Fish. Biol. GS-09

\*Reed, Robin  
Student Assistant GS-03

1 Work/Study  
GS-03

Aspects of Nutritional Requirements of Molluscs  
Chief, Target Grade GS-13/14

Dr. R. Ukeles - GS-13  
Microbiologist Supervisory

Rose, Williams  
Microbiologist GS-07

Bishop, Jean Lou  
Biol. Lab. Tech. GS-07

2 Work/Study  
GS-03

Disease and Environmental Stress  
Chief, Target Grade - GS-13/14

Dr. Robert Murchelano - GS-13  
Fish. Biol. Supervisory

Sawyer, Thomas K.  
Fish. Biol. GS-13

Bodamer, Joel E.  
Physiologist GS-11

Siskowski, John  
Fish. Biol. GS-07

Robb, Richard  
Microbiologist GS-12

MacLean, Sharon  
Bio. Sci. Tech. GS-05

Wade, Jane T.  
Bio. Lab. Tech. GS-07

2 Work/Study  
GS-03

Life Studies; Comparative  
Pathology - Chief -  
Target Grade - GS-13/14

Dr. Robert Murchelano - GS-13  
Fish. Biol. Supervisory

Farley, Austin  
Fish. Biol. GS-12

Johnson, Phyllis  
Histologist GS-12

Newman, Martin  
Fish. Biol. GS-11

Xern, Frederick  
Fish. Biol. GS-09

Smith, Cecelia  
Biol. Lab. Tech. GS-07

Wright, Dorothy  
Biol. Lab. Tech. GS-05

Aquaculture-Control of Disease  
Chief, Target Grade GS-13/14

Vacant

Blogoslawski, Walter  
Res. Microb. GS-12

Brown, Carolyn  
Biologist GS-09

\*1 Work/Study  
GS-03

RESOURCE ASSESSMENT INVESTIGATIONS

Target Grade - GS-15  
Dr. Arthur S. Merrill  
Director, GS-15

Program Coordinator  
D. Christensen - GS-12  
Fish. Biol. Supervisory

Secretary Target Grade  
GS-05  
C. Noonan, Secretary/Steno - GS-05

Multispecies, Middle Atlantic  
Chief, Target Grade GS-13/14

T. Azarovitz - GS-12  
Fish. Biol. Supervisory

MacKenzie, Clyde  
Fish. Biol. GS-12

Ropes, John  
Fish. Biol. GS-12

McQuay, David  
Biol. Lab. Tech. GS-05

Silverman, Malcolm  
Fish. Biol. GS-05

\*Thomas, Andrew  
Biol. Aid - GS-04

\*Anderson, Val.  
Biol. Aid - GS-03

\*Aussicker, Curt  
Biol. Tech. GS-04

\*1 Work/Study  
Biol. Aid GS-03

Life Studies Prerecruits-  
Middle Atlantic Bight  
Chief, Target Grade - GS-13/14

W. Smith - GS-12  
Fish. Biol. Supervisory

Kendall, Arthur  
Fish. Biol. GS-12

Fahay, Michael  
Fish. Biol. GS-11

Berrien, Peter  
Fish. Biol. GS-11

Sibunka, John D.  
Fish. Biol. GS-07

Roberts, Susan  
Fish. Biol. GS-05

deGorge, Cindy  
Fish. Biol. GS-05

Silverman, Myron  
Fish. Biol. GS-07

\*Finan, Doris  
Biol. Lab. Tech. GS-05

\*Wells, Alyce  
Graphics Arts Tech. GS-05

\*Rosenberg, Patricia  
Biol. Aid - GS-04

Biological Assessment - Sportfish  
Middle Atlantic Bight  
Chief, Target Grade - GS-13/14

S. Wilk, GS-12  
Fish. Biol. Supervisory

Morse, Wallace  
Fish. Biol. GS-07

\*Ralph, Daniel  
Fish. Biol. GS-05

\*Steady, Eugene  
Biol. Lab. Tech. GS-05

\*Meyer, Clara  
Biol. Aid GS-04

\*2 Work/Study  
GS-03

Fishery Analysis - Middle Atlantic Sportfish  
Chief, Target Grade GS-13/14

Anthony Pacheco - GS-13  
Fish. Biol. Supervisory

Chang, Sukwoo  
Fish. Biol. GS-12

(Biometrician)

Morrison, Charles  
Phy. Sci. Tech. GS-09

Ward, George, Jr.  
Biol. Lab. Tech. GS-07

Freeman, Bruce  
Fish. Biol. GS-11

\*Turner, Stephen  
Biol. Aid GS-04

\*Cox, Michele  
Office Draftsman GS-04

FACILITY ADMINISTRATION

Sandy Hook  
Officer-in-Charge  
Dr. John B. Pearce

ADMINISTRATION

Pawlikowski, Helen  
Adm. Officer - GS-09

Schadt, June  
Adm. Clerk - GS-05

Leimborg, Elizabeth  
Gen. Acct. Clerk GS-05

Jeffress, Dorothy  
Supply Clerk GS-04

Sanchez, Donna  
Clerk Typist GS-03

\*Olsen, Kathi  
Secretary/Steno GS-03

LIBRARY

Trafford, Mabel  
Librarian GS-07

\*Hanning, Edith  
Library Tech. GS-05

MAINTENANCE

Allen, William  
Gen. Fac. & Equip. Fore  
Supervisory WG-10

Leuer, Edward  
Cabinet Maker WG-11

Rosenberg, Peter  
Wood Craftsman WG-10

Mellish, Arthur  
Pipefitter WG-10

Adams, Solomon  
Maint. Worker WG-04

\*Farwell, Frederick  
Electrician WG-10

\*1 High School  
GS-01

SMALL VESSELS

Wicklund, Irving  
Motor Vessel Capt. WG-11

Fisler, Henry  
Motorboat Oper. WG-10

\*Haines, Jimmy  
Cook-Seaman WG-05

\*Sebesta, William  
Motorboat Oper. WG-10

Oxford  
Officer-in-Charge  
Dr. Aaron Rosenfield

ADMINISTRATION

O'Connell, William  
Adm. Officer GS-11

Smith, MaryAnn  
Adm. Clerk GS-05

Sawyer, Dorothy  
Clerk Typist GS-03

LIBRARY

Lang, Helen  
Library Tech. GS-07

MAINTENANCE

Heister, Paul  
Bldg. Repairman WG-10

Brooks, Barney L.  
Laborer WG-03

James, Solomon  
Maint. Worker WG-08

SMALL VESSELS

Motorboat Captain  
Vacant

EDITORIAL REVIEW

Tubish, Haskell  
Res. Microbiologist GS-12

Swann, Jane  
Editorial Assist. GS-05

Hilford  
Officer-in-Charge  
Dr. James E. Hanks

ADMINISTRATION

Lanyon, Douglas  
Adm. Officer GS-09

Fraumenberger, Estelle  
Adm. Clerk GS-05

\*Willis, Evelyn  
Clerk Typist GS-03

\*Windsor, Cheryl  
Clerk Typist GS-02

MAINTENANCE

Provost, Kenneth  
Gen. Fac. & Equip. Fore. WG-07

Onofrey, Andrew  
Maint. Worker WG-04

\*Schwartz, Albert  
Maintenance Man WG-08

\*Mozdlewski, Eugene  
Janitor WG-02

SMALL VESSELS

Motorboat Captain  
Vacant

Behavior of Fish Under Stress  
Chief, Target Grade - GS-13/14

Beri Olla - GS-13  
Fish. Biol. Supervisory

Bejda, Allen  
Fish. Biol. GS-11

Studholme, Anne  
Fish. Biol. GS-11

Samet, Carol  
Fish. Biol. GS-09

Hartie, Allan  
Fish. Biol. GS-09

Impact of Environmental Changes  
New York Bight - Chief - Target  
Grade GS-13/14

Dr. James Thomas - GS-12  
Fish. Biol. Supervisory

Mahoney, John B.  
Fish. Biol. GS-12

Phoel, William  
Fish. Biol. GS-09

Evans, Christine  
Botanist GS-07

O'Reilly, John E.  
Fish. Biol. GS-09

Rogers, Leslie  
Biol. Tech. GS-05

Stelmie, Frank  
Fish. Biol. GS-07

\*Caracciolo, Janice  
Bio. Lab. Tech. GS-06

\*Cohn, Myra  
Bio. Lab. Tech. GS-05

\*Halsey, Martha B.  
Biol. Aid GS-04

4 Work/Study  
GS-03

Microbiology and Chemistry - Middle  
Atlantic Bight - Chief Target Grade  
GS-13/14

Dr. John Graikowski - GS-13  
Microbiologist Supervisory

Greig, Richard  
Chemist - GS-12

Dudley, Shearon  
Biologist - GS-11

Babinchek, John  
Microbiologist - GS-11

Nitkowski, Maureen  
Microbiologist - GS-07

Wenzloff, Douglas  
Chemist - GS-07

Nelson, Betty Ann  
Phy. Sci. Tech. GS-05

4 Work/Study  
GS-03

Impact of Environmental Change,  
Middle Atlantic Bight - Chief,  
Target Grade - GS-13/14

Robert N. Reid - GS-11  
Fish. Biol. Supervisory

McGrath, Richard  
Fish. Biol. GS-09

ReJosh, David  
Fish. Biol. GS-07

\*Frame, Ann E.  
Suov. Biol. Lab. Tech. GS-07

4 Work/Study  
GS-03

Biochemical Modeling - Middle Atlantic Bight  
Chief - Target Grade - GS-13/14

Dr. Robert Tucker - GS-12  
Fish. Biol. Supervisory

Young, James S.  
Fish. Biol. GS-11

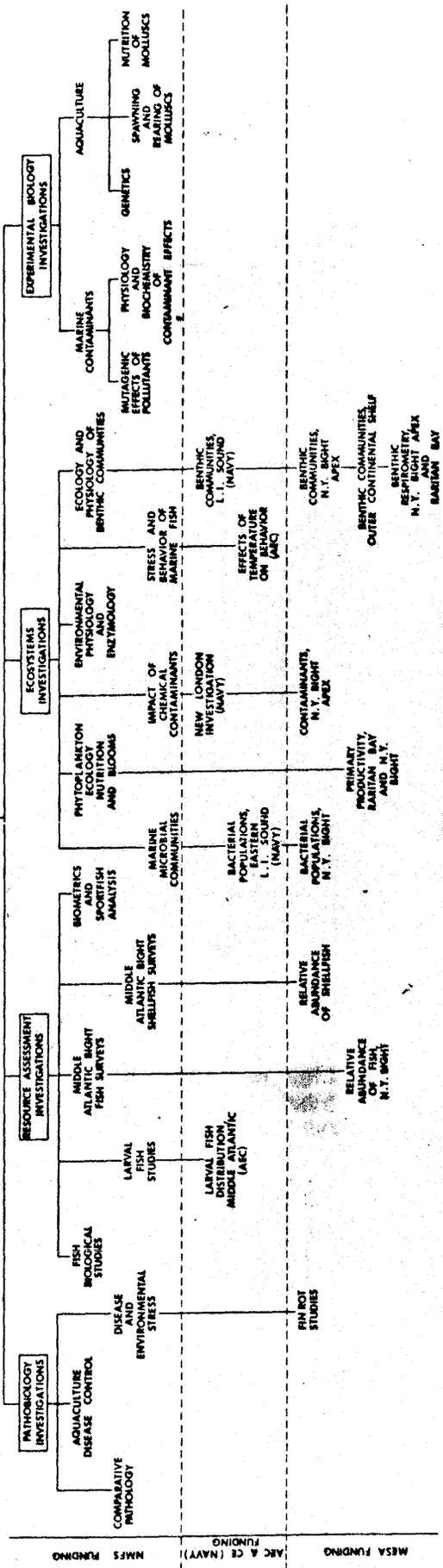
Matte, Albert  
Oceanographer - GS-07

Drexler, Andrew  
Chemist - GS-05

\*Waldhauer, Elsie  
Card Punch Operator GS-03

**RESEARCH PROGRAMS OF MACFC-NMFS  
AND THEIR RELATIONSHIP TO MESA-NYB AND OTHER REBURSABLES  
(JANUARY 1975)**

MIDDLE ATLANTIC COASTAL FISHERIES CENTER  
Sandy Hook, N. J., Oxford, Md., Millford, Conn.



MACFC FUNDING  
NMFS FUNDING

ARC & CE (NAVY)

MESA FUNDING

Mid-Atlantic Fisheries Center

Administrative Services

OFC-NOS Vessel Liaison

Technical Services

MESA-NYB Liaison

Ecosystems Investigations  
Dr. J. Pearce,  
Director

MA-006-EI-  
Behavior of Fish  
under Stress

MA-061-EI  
Behavior of Fish  
under Temperature  
Stress (AEC Reim-  
bursable)

MA-007-EI-Middle  
Atlantic Bight

MA-008-EI-Bio-  
chemical Modelling

MA-009-EI-Micro-  
biology and  
Chemistry

MA-055-EI-MESA-NY  
Bight (Reimbursable)

MA-067-EI-Primary  
Productivity and  
Pollution

MA-069-EI-Biolog-  
ical Effects-New  
London (Navy Reimb)

Resource Assessment  
Investigations  
Dr. A. Merrill,  
Director

MA-002-S2-  
Multispecies,  
Middle Atlantic

MAC-005-RF-Fishery  
Analysis-M.A.  
Sportfish

MA-053-SI-Biological  
Assessment

MA-060-RF-Biological  
Assessment-Sportfish

MA-063-SII-Multi-  
species Coastal  
Assessment

MA-064-RF-Population  
Dynamics

MA-065-Larval Fish  
(AEC reimbursable)

MA-071-RF-Forage-  
Predator Relations

Pathobiology  
Investigations  
Dr. A. Rosenfield,  
Director

MA-016-EI-Com-  
parative Pathol-  
ogy

MA-017-EI-Disease  
and Environmental  
Stress

MA-058-AQ-Control  
of Disease

MA-070-EI-Cell  
Diseases of Molluscs  
(FDA reimbursable)

Experimental Biology  
Investigations  
Dr. J. Hanks,  
Director

Contaminant  
Studies

MA-014-EI-  
Mutagenic  
Effects of  
Pollutants

MA-015-EI-  
Physiological  
Effects of  
Pollutants

Aquaculture  
Studies

MA-059-AQ-  
Spawning and  
Rearing of  
Molluscs

MA-057-AQ-  
Nutrition of  
Molluscs

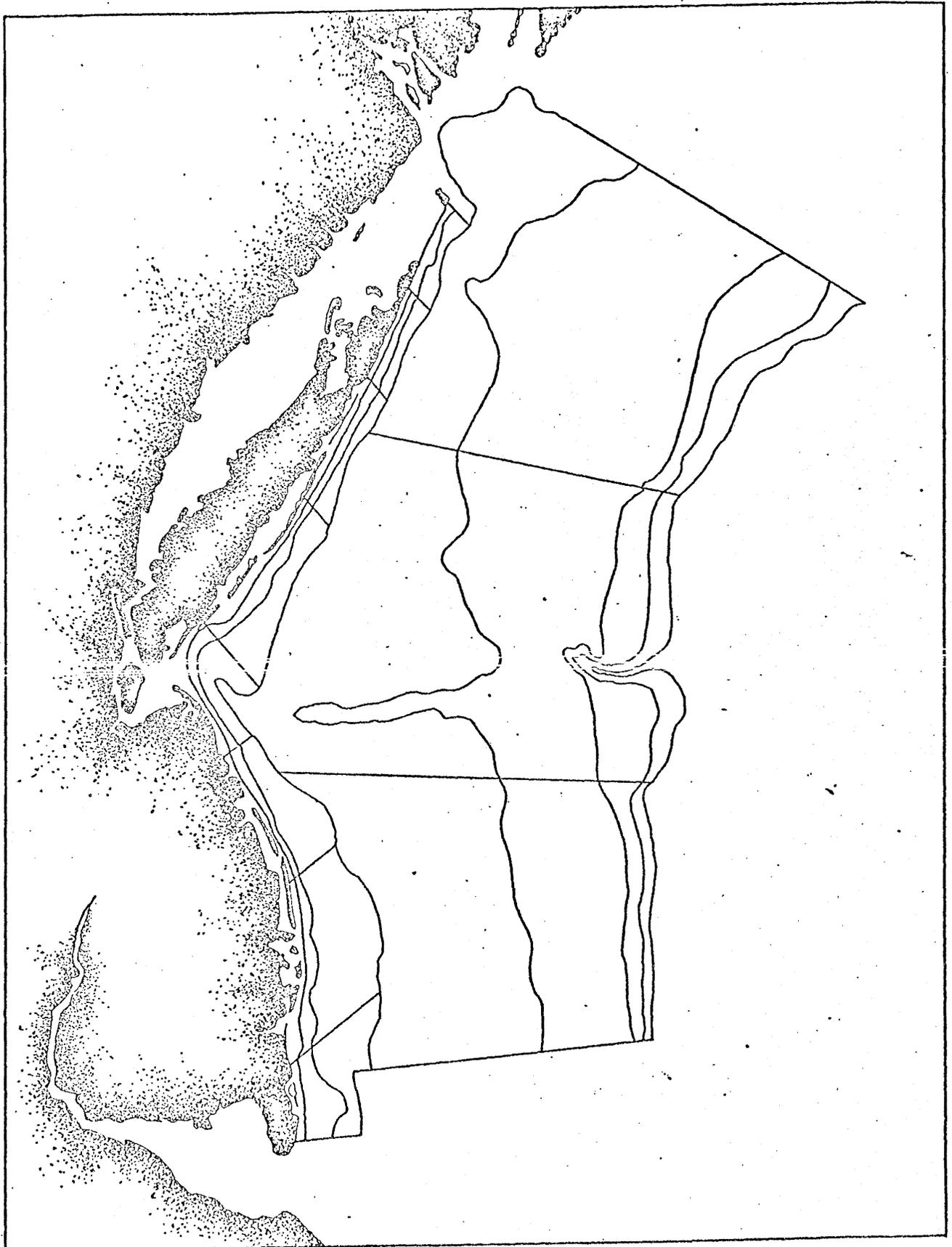
MA-056-AQ-  
Aquaculture  
Genetics

### III. A MORE DETAILED DESCRIPTION OF THE RESEARCH OF THE MIDDLE ATLANTIC COASTAL FISHERIES CENTER

#### RESOURCE ASSESSMENT INVESTIGATIONS

The National Marine Fisheries Service (NMFS) has long been engaged in offshore assessment of fish stocks along the Atlantic coast, especially on the highly productive Georges Bank and Gulf of Maine grounds. More recently, studies have been extended into the mid-Atlantic and Chesapeake Bay regions. In the past, this amount of effort was deemed sufficient to assess the North Atlantic commercial stocks. However, the increase in fishing pressure by foreign fleets, with the concurrent decrease in stocks on the traditional North Atlantic grounds, has caused an increase in fishing intensity in the Middle Atlantic areas. Along with dwindling stocks, there is an apparent degradation of critical estuarine and coastal spawning and nursery grounds. In addition, our technological gains in the field of freezing, holding, processing, and transportation of fishery products have expanded the markets to new inland areas where seafood products had not previously been utilized. Moreover, recreational fishing pressure on these stocks has increased steadily. These factors listed above have put a serious strain on fishery resources along the Atlantic coast of the United States and many are in jeopardy of being depleted by over-fishing. It, therefore, becomes essential that the fishery stocks along the Atlantic coast and adjacent estuaries be assessed as completely as possible in order that wise management policies be established to save them from further depletion.

To properly assess the resources along the entire Atlantic coast, a comprehensive and intensive national program of integrated research has been developed which, in the Middle Atlantic Coastal Fisheries Center, involves four investigations. All investigations are working together as one coordinated group called Resource Assessment Investigations, in order that the status of our current and the future commercial and recreational stocks can be predicted. The Center's coastal resource program couples with and complements those being conducted by NMFS Centers to the north and south.



Northern Leg, Bimonthly (MARMAP) Finfish Survey Cruise. Trawling is by randomly selected stations within each of the above strata. Southern leg extends from Delaware Bay to Cape Hatteras.

Name: Arthur S. Merrill

Place and Date of Birth: Savannah, Georgia, April 15, 1916

1. Education and Training

a. Degrees

B.S., 1952 - University of Miami (Zoology, Botany)  
M.A., 1961 - Harvard University (Biology)  
Ph.D., 1970 - University of Delaware (Biology)

b. Other courses

One-day training courses at Management Center of Cambridge in Technical Writing, Washington, D. C.; Technical Editing, Philadelphia, Pennsylvania; and Understanding and Motivating Employees, Washington, D. C.

Executive School course, National Training Center, Charlottesville, Virginia, March 2-14, 1969

c. Special scientific or technical skills acquired not indicated by above

None

2. Experience

September 1969 to present - Laboratory Director, National Marine Fisheries Service (Bureau of Commercial Fisheries), Oxford, Maryland

April 1968 to September 1969 - Acting Laboratory Director, Bureau of Commercial Fisheries, Oxford, Maryland

May 1964 to April 1968 - Assistant Laboratory Director, Bureau of Commercial Fisheries, Oxford, Maryland

June 1959 to May 1964 - Fishery Biologist (Research), Bureau of Commercial Fisheries, Woods Hole, Massachusetts

February 1958 to June 1959 - Fishery Research Biologist (Marine) (temporary), Bureau of Commercial Fisheries, Woods Hole, Massachusetts

January 1954 to September 1957 - President, Tri-Beta Construction Co., Inc., 25 Rhode Avenue, North Merrick, New York

3. Publications

See attached list

#### 4. Scientific Honors and Awards

Member - Beta Beta Beta, Phi Eta Sigma, Sigma Xi

Listed in Vetter's "An International Directory of Oceanographers" (fourth edition) and Blackwelder's "Directory of Zoological Taxonomists of the World"

Editor, Proceedings of the National Shellfisheries Association, 1965-68;  
Co-Editor, 1968-70

Associate Editor, Fishery Bulletin, 1970 to present

Bureau of Commercial Fisheries citation for outstanding performance on August 4, 1966; cash award for outstanding performance on July 5, 1968

#### 5. Paper Presentations before Scientific Societies

American Malacological Union:

1960 - "Remarks concerning the benefits of systematic and repetitive collecting from navigation buoys"

1961 - "Some observations on the growth and survival of organisms on the shell of Placopecten magellanicus;" "The sea scallop fishery"

1962 - "Nest building in Musculus"

1964 - "Observations on adverse relations between the hydroid, Hydractinia echinata, and certain mollusks"

1965 - "Benthic ecology and faunal change in the estuary of the Patuxent River;" "The surf clam fishery"

1966 - "Method of shell repair in the sea scallop"

1967 - "Techniques for obtaining growth rates of offshore commercially important bivalves"

1968 - "Distribution and density of the surf clam"

1970 - Convener of Symposium on Commercial Marine Mollusks of the United States and presented two papers entitled "The North Atlantic sea scallop" and "Pollution problems in commercial mollusks"

National Shellfisheries Association:

1960 - "Abundance and distribution of sea scallops off the middle Atlantic coast"

1965 - "Setting and growth of the American oyster, Crassostrea virginica, on navigation buoys in the Chesapeake Bay"

International Commission for the Northwest Atlantic Fisheries:

1960 - "Middle Atlantic scallop density and abundance"

1963 - "Natural mortality estimates for the sea scallop"

Harvard Natural History Society:

1963 - "The sea scallop industry"

Atlantic States Marine Fisheries Commission:

1967 - "Surf clam program"

1968 - "Blue crab research and oyster disease problems"

American Littoral Society:

1971 - "Your future in the sea--1971"

Affiliation in Scientific Organizations and Offices Held

Society of Systematic Zoology

American Malacological Union (Executive Committee Councillor at Large, 1962-66;  
Vice President, 1969-70; President Elect, 1970-71; President, 1971-72)

National Shellfisheries Association (Editor of Proceedings, 1965-68; Co-Editor,  
1968-70)

California Malacozoological Society, Inc.

Malacological Society of London

Malacological Society of Australia

American Littoral Society

Atlantic Estuarine Research Society

Atlantic Fisheries Biologists

Consulting Activities

Consulted regularly with Canadian biologists regarding cooperative offshore  
sea scallop studies (1960-63)

Cooperated with the Maine Department of Natural Resources in studies pertaining  
to inshore sea scallops (1962)

Advised members of the sea scallop industry on progress in sea scallop research  
(1960-63)

Advised members of the surf clam industry on progress in surf clam research  
(1964-71)

## Special Professional Assignments

Special advanced research study at Harvard University under employee training program (1962-63)

Assignment to evolve a special program in connection with a quantitative and qualitative study of the offshore benthic fauna along the east coast of the United States. The program involved blending the efforts of personnel in three institutions (Bureau of Commercial Fisheries, Woods Hole Oceanographic Institution, and U.S. Geological Survey) into a cooperative working unit (1963-64)

Assignment to supervise preparation of a brochure of programs and perspectives of the Bureau of Commercial Fisheries Biological Laboratory at Oxford, Maryland, for publication (1964)

Prepared with Chief of Shellfish Advisory Service, Mr. James Engle, a comprehensive report on Potomac River shellfisheries--a special assignment from Division of Biological Research (1965)

Division trainee as Acting Deputy Assistant Director for Biological Research, Washington, D. C. (July-September 1965)

Training assignment at National Museum, Department of Mollusks, Washington, D. C., for molluscan research (October 1968-April 1969)

Member, Chesapeake Bay Crab Research Advisory Board (1969 to present)--to assist recovery of a commercial fishery which had failed due to a resource disaster

Chairman, Thermal Research Advisory Committee (1969)--to assist Maryland Department of Water Resources in better understanding problems relating to present and potential conflicts from power plant use of public waters

Member of task force for Sandy Point, Maryland, Waste Treatment Study--to determine the effectiveness of the treatment facility's ability to provide adequate protection of the shellfish beds (1969)

Training assignment at Bureau of Commercial Fisheries Ichthyological Laboratory, Washington, D. C. (September 1969-July 1970)

Member of Review Panel for Chesapeake Bay Biological Research Planning Conference (1970)

Pro Tem Project Manager to develop the National Oceanic and Atmospheric Administration's comprehensive five-year Environmental Quality Plan in the New York Bight (1971)

RECORD OF EDUCATION AND SCIENTIFIC ACCOMPLISHMENTS  
THROUGH JUNE 1970

ARTHUR S. MERRILL

Degrees

University of Miami, Miami, Fla.	B.S.	1952
Harvard University, Cambridge, Mass.	M.A.	1961
University of Delaware, Newark, Del.	Ph.D.	1970

Publications (\*papers presented before scientific societies have been published in abstract form or in full)

- Merrill, Arthur S. 1959. An unusual occurrence of Mya arenaria L. and notes on other marine mollusks. *Nautilus*, 73(2): 39-43.
- Merrill, Arthur S. 1959. A comparison of Cyclopecten nanus Verrill & Bush and Placopecten magellanicus (Gmelin). Occasional Papers on Mollusks, Museum of Comparative Zoology, Harvard, 2(25): 209-228.
- Merrill, Arthur S. 1960. Living inclusions in the shell of the sea scallop Placopecten magellanicus. *Ecology*, 41(2): 385-386.
- Merrill, Arthur S. and John B. Burch. 1960. Hermaphroditism in the sea scallop, Placopecten magellanicus (Gmelin). *Biological Bulletin*, 119(2): 197-201.
- Merrill, Arthur S. 1961. \*Remarks concerning the benefits of systematic and repetitive collecting from navigation buoys. *American Malacological Union Bulletin*, No. 27, p. 26. (Abstract)
- Merrill, Arthur S. 1961. Shell morphology in the larval and postlarval stages of the sea scallop, Placopecten magellanicus (Gmelin). *Bulletin of the Museum of Comparative Zoology at Harvard College*, 125(1): 1-20.
- Merrill, Arthur S. 1961. \*Some observations on the growth and survival of organisms on the shell of Placopecten magellanicus. *American Malacological Union Bulletin*, No. 28, pp. 4-5. (Abstract)
- Merrill, Arthur S. 1961. \*The sea scallop fishery. *American Malacological Union Bulletin*, No. 28, p. 14. (Abstract)
- Merrill, Arthur S. 1962. Range extension for Cymatium caribbaeum with a note on adventitious dispersal. *Nautilus*, 75(3): 94-95.

- Merrill, Arthur S. 1962. Variation and change in surface sculpture in Anomia aculeata. Nautilus, 75(4): 131-138.
- Merrill, Arthur S. 1962. \*Abundance and distribution of sea scallops off the middle Atlantic coast. Proceedings of the National Shellfisheries Association for 1960, 51: 74-80.
- Merrill, Arthur S. 1962. \*Nest building in Musculus. American Malacological Union Bulletin, No. 29, pp. 11-12. (Abstract)
- Galtsoff, Paul S. and Arthur S. Merrill. 1962. Notes on shell morphology, growth and distribution of Ostrea equestris Say. Bulletin of Marine Science of the Gulf and Caribbean, 12(2): 234-244.
- Merrill, Arthur S. 1963. Mollusks from a buoy off Georgia. Nautilus, 77(2): 68-70.
- Merrill, Arthur S. and Ruth D. Turner. 1963. Nest building in the bivalve genera, Musculus and Lima. Veliger, 6(2): 55-59.
- Glench, William J. and Arthur S. Merrill. 1963. Some shell malformations. Shells and Their Neighbors, No. 16, pp. 1-2.
- Robertson, Robert and Arthur S. Merrill. 1963. Abnormal dextral hyperstrophy of post-larval Heliacus (Gastropoda: Architectonicidae). Veliger, 6(2): 76-79.
- Merrill, Arthur S. 1964. \*Observations on adverse relations between the hydroid, Hydractinia echinata, and certain mollusks. American Malacological Union Bulletin, No. 31, p. 2. (Abstract)
- Merrill, Arthur S. and Julius A. Posgay. 1964. Estimating the natural mortality rate of the sea scallop (Placopecten magellanicus). International Commission for the Northwest Atlantic Fisheries Research, Bulletin No. 1, pp. 88-106.
- Merrill, Arthur S. and Kenneth J. Boss. 1964. Reactions of hosts to proboscis penetration by Odostomia seminuda (Pyramidellidae). Nautilus, 78(2): 42-45.
- Merrill, Arthur S. and John R. Webster. 1964. Progress in surf clam biological research. In The Bureau of Commercial Fisheries Biological Laboratory, Oxford, Maryland: Programs and Perspectives. U.S. Fish and Wildlife Service, Circular 200, pp. 38-47.
- Emery, K. O. and Arthur S. Merrill. 1964. Combination camera and bottom grab. Oceanus, 10(4): 2-7.

- Merrill, Arthur S. 1965. The benefits of systematic biological collecting from navigation buoys. Association of Southeastern Biologists Bulletin, 12(1): 3-8.
- Merrill, Arthur S., K. O. Emery, and Meyer Rubin. 1965. Ancient oyster shells on the Atlantic continental shelf. Science, 147(3655): 398-400.
- Emery, K. O., Arthur S. Merrill, and James V. A. Trumbull. 1965. Geology and biology of the sea floor as deduced from simultaneous photographs and samples. Limnology and Oceanography, 10(1): 1-21.
- Boss, Kenneth J. and Arthur S. Merrill. 1965. The family Pandoridae in the western Atlantic. Johnsonia, 4(44): 181-215.
- Boss, Kenneth J. and Arthur S. Merrill. 1965. Degree of host specificity in two species of Odostomia (Pyramidellidae: Gastropoda). Proceedings of the Malacological Society of London, 36(6): 349-355.
- Baker, Emmett, B. and Arthur S. Merrill. 1965. An observation of Laevicardium mortoni actually swimming. Nautilus, 78(3): 104.
- Merrill, Arthur S. and Richard E. Petit. 1965. Mollusks new to South Carolina. Nautilus, 79(2): 58-66.
- Merrill, Arthur S. 1965. \*The surf clam fishery. American Malacological Union Bulletin, No. 32, pp. 4-5. (Abstract)
- Boss, Kenneth J. and Arthur S. Merrill. 1965. \*Benthic ecology and faunal change in the estuary of the Patuxent River. American Malacological Union Bulletin, No. 32, p. 17. (Abstract)
- Ropes, John W. and Arthur S. Merrill. 1966. The burrowing activities of the surf clam. Underwater Naturalist, 3(4): 1-7.
- Merrill, Arthur S. 1966. Collecting from navigation buoys. In How to Collect Shells, A Symposium. American Malacological Union. pp. 54-55.
- Edwards, Robert L. and Arthur S. Merrill. 1966. \*Seasonal cycle of temperature in the Middle Atlantic. Proceedings of the Second International Oceanographic Congress, Moscow, No. 113-S1b.
- Merrill, Arthur S., Julius A. Posgay, and Fred E. Nichy. 1966. Annual marks on shell and ligament of sea scallop (Placopecten magellanicus). U.S. Fish and Wildlife Service, Fishery Bulletin, 65(2): 299-311.
- Merrill, Arthur S. and Kenneth J. Boss. 1966. \*Benthic ecology and faunal change relating to oysters from a deep basin in the lower Patuxent River, Maryland. Proceedings of the National Shellfisheries Association for 1965, 56: 81-87.

- Shaw, William N. and Arthur S. Merrill. 1966. \*Setting and growth of the American oyster, Crassostrea virginica, on navigation buoys in the lower Chesapeake Bay. Proceedings of the National Shellfisheries Association for 1965, 56: 67-72.
- Merrill, Arthur S. and Hugh S. Porter. 1966. Further note on distribution of Cymatiidae in western Atlantic. Nautilus, 80(1): 31-32.
- Merrill, Arthur S. 1966. \*Shell repair in the sea scallop, Placopecten magellanicus. American Malacological Union Bulletin, No. 33, pp. 35-36. (Abstract)
- Merrill, Arthur S. 1967. Shell deformity of mollusks attributable to the hydroid, Hydractinia echinata. U.S. Fish and Wildlife Service, Fishery Bulletin, 66(2): 273-279.
- Merrill, Arthur S. 1967. Offshore distribution of Hydractinia echinata. U.S. Fish and wildlife Service, Fishery Bulletin, 66(2): 281-283.
- Merrill, Arthur S. and John W. Ropes. 1967. Distribution of southern quahogs off the middle Atlantic coast. Commercial Fisheries Review, 29(4): 62-64.
- Ropes, John W., Arthur S. Merrill, and Thomas M. Groutage. 1967. \*Marking surf clams for growth studies. Proceedings of the National Shellfisheries Association for 1966, 57: 4. (Abstract)
- Ropes, John W., Robert M. Yancey, and Arthur S. Merrill. 1967. \*The growth of juvenile surf clams at Chincoteague Inlet, Virginia. Proceedings of the National Shellfisheries Association for 1966, 57: 5. (Abstract)
- Barker, Allan M. and Arthur S. Merrill. 1967. Total solids and length-weight relation of the surf clam, Spisula solidissima. Proceedings of the National Shellfisheries Association for 1966, 57: 90-94.
- Engle, James B. and Arthur S. Merrill. 1967. The surf clam -- New Jersey's most valuable seafood resource. New Jersey Nature News, 22(4): 148-153.
- Ropes, John W. and Arthur S. Merrill. 1967. Malacobdella grossa in Pitar morrhuana and Mercenaria campechiensis. Nautilus, 81(2): 37-40.
- Merrill, Arthur S. and Julius A. Posgay. 1967. \*Juvenile growth of the sea scallop, Placopecten magellanicus. American Malacological Union Bulletin, No. 34, pp. 51-52. (Abstract)
- Merrill, Arthur S. and Haskell S. Tubiash. 1968. Commercial molluscs of the Atlantic coast of the United States. Symposium on Mollusca, Mandapam, 1968. Marine Biological Association of India. Abstracts of Papers, pp. 76-77. (Abstract)

- Merrill, Arthur S. and Robert W. Hanks. 1969. The Bureau of Commercial Fisheries Biological Laboratory at Oxford, Maryland, meeting the problems of the shellfisheries. Association of Southeastern Biologists Bulletin, 16(4): 103-106.
- Merrill, Arthur S. and Richard E. Petit. 1969. Mollusks new to South Carolina: II. Nautilus, 82(4): 117-122.
- Merrill, Arthur S. and John W. Ropes. 1969. \*The distribution and density of the ocean quahog, Arctica islandica. American Malacological Union Bulletin, No. 36, p. 19. (Abstract)
- Ropes, John W. and Arthur S. Merrill. 1969. \*The distribution and density of the surf clam, Spisula solidissima. American Malacological Union Bulletin, No. 36, p. 20. (Abstract)
- Ropes, John W., J. Lockwood Chamberlin, and Arthur S. Merrill. 1969. Surf clam fishery. In F. E. Firth, ed., The Encyclopedia of Marine Resources. Van Nostrand Reinhold Co., New York. pp. 119-125.
- Merrill, Arthur S., J. Lockwood Chamberlin, and John W. Ropes. 1969. Ocean quahog fishery. In F. E. Firth, ed., The Encyclopedia of Marine Resources. Van Nostrand Reinhold Co., New York. pp. 125-129.
- Merrill, Arthur S. and John W. Ropes. 1969. The general distribution of the surf clam and ocean quahog. Proceedings of the National Shellfisheries Association for 1968, 59: 40-45.
- Ropes, John W. and Arthur S. Merrill. 1970. Marking surf clams. Proceedings of the National Shellfisheries Association for 1969, 60: 99-106.
- Merrill, Arthur S. 1970. Fluxina Dall is a Calliostoma Swainson. Nautilus, 84(1):
- Merrill, Arthur S. and Haskell S. Tubiash. In Press. Commercial molluscs of the Atlantic and Gulf coasts of the United States. Symposium on Mollusca, Mandapam, 1968. Marine Biological Association of India.

DARRYL J. CHRISTENSEN

DATE OF BIRTH: September 26, 1940  
Coalinga, California

EDUCATION AND TRAINING:

B.S. Degree - Wildlife Conservation and Game Management, Univ. of Wyoming, 1963.

M.S. Degree - Zoology, Univ. of Wyoming, 1965.

Other courses: Cornell University, September 1973 thru June 1974  
27 Semester hours.

<u>Course</u>	<u>Credit Hours</u>	<u>Grade</u>
Oceanography	3	A
Marine Ecology	3	A
Estuarine Ecology	2	A
Population Dynamics	2	A-
Fishery Science	4	B
Environmental Pollution	3	A
Fish Pathology	2	A+
Ecological Basis for Water Resource Management	3	A+
Outdoor Recreation	2	A-
Computer Programming	3	S*

\* Took course on pass-fail option. S signifies passing grade.

Special Scientific or Technical Skills not indicated by above:

SCUBA - Trained in special school for Indiana State Police and Law Enforcement Officers in Regular SCUBA and Search and Rescue.

EXPERIENCE:

July 1965 to April 1969: Research Fisheries Biologist in charge of state-wide fisheries research of streams and rivers of Indiana for State of Indiana Division of Fish and Game. Conceived and executed research projects oriented toward solving specific fisheries management problems. Reports were made analyzing the results of research projects and making recommendations for future actions by appropriate fisheries management biologists. Worked closely with the Stream Pollutions Control Board to determine the extent of fish kills and monitor the return of fish populations.

April 1969 - Aug. 1974:- Fishery Biologist (Research), NMFS, MACFC, Oxford Laboratory, Oxford, Maryland.  
Aquaculture and Ecology Program. Conducted research on oyster predator control of raft-caught seen oysters as well as basic information on estuarine ecology, fouling and competition from noncommercial species.

Pathobiology Program. Conducted research on molluscan neoplasms found in a side study of the estuarine ecology program. Collected and examined fish specimens for heavy metal induced pathology. Included in this program was a 15-month study of fish off the coast of Virginia for heavy metal analysis.

EXPERIENCE (continued):

Estuarine Resources Assessment Program. Conducted research on living marine resources of several estuarine rivers emptying into Chesapeake Bay. This research included determining the influence of water quality on the distribution of finfish and the normal seasonal distributions of finfish. A final report of the findings is in preparation.

August 1974 to January 1974: Fishery Biologist (Research) Sandy Hook Laboratory, Coastal Survey Investigation. Participated on groundfish survey cruises, prepared cruise reports and designed format for Commercial Fishermen Report.

January 1975 to Present: Program Coordinator for Resource Assessment Investigations, Middle Atlantic Coastal Fisheries Center, Sandy Hook Laboratory, Highlands, N. J. Act for the Director of Resource Assessment Investigations for administrative matters in his absence. Prepare special reports, documents and research proposals as needed. Coordinate activities between different resource assessment investigations. Summarizing research conducted at Oxford, Maryland for publication or report.

PUBLICATIONS:

Christensen, Darryl J. 1965. A study of brook trout ecology with emphasis on spawning behavior. 88 pp. Wyoming Game and Fish Commission Cooperative Research Project #2.

The following are published reports available through the Indiana Division of Fish and Game, Department of Natural Resources and are the results of research conducted as an employee of the Fish and Game while primarily supported by PL 309 funds.

1966. Effects of the ten inch size limit on channel catfish. 6 p.

1966. Williams Dam creel census. 7 p.

1967. Effects of commercial fishing on fish populations of the East Fork of the White River. 20 pp. PL 309 4-16-R-1.

1968. The distribution of fishes throughout the White River system and the effects of various environmental factors upon the commercial fishery. 55 pp. PL 309 4-16-R-2 in part.

1968. Effects of a corn cannery effluent on fish concentrations, fish movements and angler harvest. PL 309 4-16-R-2 in part.

1968. Evaluation of the fish concentrating effects of Williams Dam. 10 pp. PL 309 4-16-R-2 in part.

DARRYL J. CHRISTENSEN

PUBLICATIONS (Continued)

1969. Evaluation of the fish concentrating effects of Hindostan Falls. 7 pp. PL 309 Project 4-16-R-2 in part.
1969. Carp baiting studies final report. 30 pp.
1970. Darryl J. Christensen. Flatworm predation of raft-caught seed oysters. Chesapeake Bay Affairs Commercial Fisheries News. Vol. 3, No. 1.
1971. Darryl J. Christensen. Early development and chromosome number of the polyclad flatworm, Euplana gracilis. Trans. Am. Micros. Soc., 90(4): 457-463.
1973. Darryl J. Christensen. Prey preference of Stylochus ellipticus in Chesapeake Bay. Proc. National Shellfisheries Assoc. Vol. 63: 35-38.
1974. Darryl J. Christensen, A. Farley, and F. Kern. Epizootic neoplasms in the clam Macoma balthica (L.) from Chesapeake Bay. Jour. Nat. Cancer Inst. 52(6): 1739-1749.

In Preparation

Darryl J. Christensen. Seasonal changes in the relative numbers of fish in coastal waters off Chincoteague, Virginia.

In House Reports

Catch of Albatross IV and Delaware II on Groundfish Survey, October 23-October 4, 1974 (Part 1, Covering Mid-Atlantic Shelf).

Monthly Report to Fishermen - R. V. Delaware II, February 1975

SCIENTIFIC HONORS AND AWARDS:

Received fellowship for support leading to Master's Degree.  
Received NOAA fellowship for graduate study.

AFFILIATION IN SCIENTIFIC ORGANIZATIONS AND OFFICES HELD:

American Fisheries Society  
Atlantic Estuarine Research Society  
Sigma Xi

SPECIAL PROFESSIONAL ASSIGNMENTS:

Assigned to observe Naval Ordinance underwater testing series in lower Chesapeake Bay, fall 1970. Prepared a written report.  
Participated in numerous planning sessions, prepared documents and collected specimens for heavy metal analysis none of which resulted in information usable for a personal publication.

ORGANIZATION: Coastal Survey Investigation, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Highlands, N.J.

ACTIVITY AREA: Middle Atlantic Bight / Resource Assessment / Finfish and Shellfish

OBJECTIVE: To efficiently and effectively utilize the fishery resources of the Middle Atlantic by establishing an adequate data base for management decisions. Resource assessment data, supplemented by existing sources, including fishery statistics, will provide accurate information permitting the development of predictive models for middle Atlantic coastal fisheries resources.

SUMMARY: Fishery stocks in the Middle Atlantic are subjected to a combined influence of increasing fishing pressures and environmental extremes. Fishing pressures have changed drastically in recent years with the influence of foreign fleets offshore and with the recent and rapid development of inshore recreational fishing. Stresses of normal environmental extremes of temperature and salinity have been compounded by a reduction in quality and area of estuarine nursery zones. In recent years the above factors have decreased the yield or catch rate of a number of our utilized fishery resources and in unrealized ways affected unexploited stocks. Many of these fishes migrate not only within the middle Atlantic area but range along the shelf waters of the entire Atlantic coast. These facts demonstrate why a strict regional approach is not practical; and show the need for a cooperative coastwise program utilizing joint data banks for storage of information.

Using standard trawl gear, we will continue our sampling pattern in order to estimate and monitor numbers and distribution of all benthic fish and selected shellfish species with principal emphasis in the Middle Atlantic Bight. Since the life pattern of many inshore finfish incur migrations of not only on a coastal scale but to the offshore waters, we will continue to coordinate and refine sampling systems cooperatively carried on by

Federal and State fishery laboratories both north and south of the region (from Nantucket to Cape Canaveral). Assessment of groundfish will be based on fall and spring surveys, coastwise in concept, particularly to monitor juvenile and adult components. Input statements on age, fecundity, growth, and stock identification will derive from other task units working on these species groups of special interest (sciaenids, flounders, etc.). As a data base of information builds up, we will begin biometrical analyses to estimate the potential yield and harvestable fractions of particular stocks.

Primary recipients of these data will be Federal groups and in-house personnel developing ICNAF and bilateral policies. State agencies and industry representatives (commercial and recreational) will be given requested information to assist in management decisions.

RESOURCES:           FY 74     91.2 K  
                      FY 75     98.0 K

SENIOR STAFF:       Thomas Azarovitz

THOMAS R. AZAROVITZ

DATE OF BIRTH: April 3, 1942  
Detroit, Michigan

EUDCATION AND TRAINING:

High School - Linden, New Jersey  
B.S. Degree - Monmouth College, West Long Branch, N. J., 1965  
Biology.

Special Scientific or Technical Skills:

NOAA Training Course - Effective Supervision

Totally versed in the use of infrared remote sensing instruments and data applications of these devices to fishery and population monitoring research.

Experienced in methodology of groundfish population sampling. Also knowledge of groundfish sampling technique including research vessels and gear.

EXPERIENCE:

Aug. 1964 - April 1966	U. S. Dept. of the Interior, BSW, Sandy Hook Marine Laboratory, Highlands, N. J., Biological Technician.
April 1966 - July 1968	Sandy Hook Laboratory, Highlands, N. J., Fishery Biologist (General).
July 1968 - to Present	U.S. Dept. of Comm., NOAA, NMFS. MACFC, Sandy Hook Laboratory, Fishery Biologist (Research) Supervisory.

AFFILITATION IN SCIENTIFIC ORGANIZATIONS AND OFFICES HELD:

American Society of Limnology and Oceanography  
The American Fisheries Society  
Atlantic Estuarine Research Society

SPECIAL PROFESSIONAL ASSIGNMENTS:

Member, of the Panel on Oceanography and Marine Resources of the Committee on Space Programs for Earth Observations, Advisory to the Dept. of Interior.

Chairman, Safety Committee - Sandy Hook Laboratory, 1972-73.

HONORS AND AWARDS:

May 6, 1974, Superior Performance Award - for planning, coordination and successful completion of the first coastal resource assessment survey.

PUBLICATIONS:

Published

- Richard B. Stone and Thomas R. Azarovitz. 1968. An occurrence of unusually cold water off the Florida Coast. Underwater Naturalist 5(2): 14-17.
- Monthly temperature and animal observation charts printed and distributed by G.P.O., January 1966 - June 1969 inclusive.
- Williams, R. G., J. E. Lamoureux and Thomas R. Azarovitz. 1971. Seasonal variations of temperature and sound speed in Block Island Sound. Naval Underwater Systems Center.
- Azarovitz, T. R. 1973. Cruise Report - Gear Testing Cruise, Delaware II/Atlantic Twin (Mar. 31 - Apr. 3, 1973).
- Azarovitz, T. R. 1973. Cruise Report - Coastal Groundfish Survey, Atlantic Twin (May 8 - June 4, 1973).
- Azarovitz, T. R. 1973. Cruise Report - Coastal Groundfish Survey, Atlantic Twin (Oct. 1 - Nov. 7, 1973).
- Azarovitz, T. R. 1974. Cruise Report - N. Y. Bight - MESA, Albatross IV (Feb. 2-5, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Nantucket Shoals to Jacksonville, Fla. Atlantic Twin/Delaware II (April 1 - May 9, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (June 3-7, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (July 24-29, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Aug. 16-21, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Sept. 23-29, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Oct. 22-28, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Nov. 18-25, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Catch of Albatross IV and Delaware II on Groundfish Survey, Sept. 23 - October 4, 1974 (Part I, Covering Mid-Atlantic Shelf).

AZAROVITZ, THOMAS R.

PUBLICATIONS (Continued):

Published

- Azarovitz, T. R. 1975. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Jan. 31 - Feb. 6, 1975).
- Azarovitz, T. R. 1975. Cruise Report - Mid-Atlantic Groundfish Survey, Albatross IV (March 4-21, 1975).
- Azarovitz, T. R. 1975. Cruise Report - Coastal Groundfish Survey, Atlantic Twin (March 18-24, 1975).
- Azarovitz, T. R. 1975. Cruise Report - Block Island Sound, Atlantic Twin (March 25, 1975.).
- Azarovitz, T. R. 1975. Cruise Report - Monthly Groundfish Survey, New York Bight, Albatross IV (April 1-10, 1975).
- Azarovitz, T. R. 1975. Cruise Report - Catch of Albatross IV on Groundfish Survey 75-3, Part I, March 14-18, 1975 and Part II, March 20-29, 1975 (Covering Mid-Atlantic Shelf and Lower Georges Bank).

In Preparation

- Azarovitz, T. R. and Marvin Grosslein. New York Bight Atlas - Monograph 15 Fish Distribution.
- Azarovitz, T. R. Effects on wind and tide on a thermal plume in Barnegat Bay, New Jersey.
- Azarovitz, Seasonal Distribution loggerhead turtle - Atlantic coast.
- Azarovitz, T. R. Groundfish Survey Cruise - Catch Results.
- Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker.  
MESA Report - Groundfish Survey Results, Report #1, Oct. 31 - Dec. 5, 1972.
- Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker.  
MESA Report - Groundfish Survey Results, Report #2, May 8 - June 4, 1973.
- Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker.  
MESA Report - Groundfish Survey Results, Report #3, Oct. 1 - Nov. 7, 1973.
- Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker.  
MESA Report - Groundfish Survey Results, Report #4, Apr. 1 - May 2, 1974.
- Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker.  
MESA Report - Groundfish Survey Results, Report #5, Sept. 23 - Oct. 4, 1974.
- Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker.  
MESA Report - Groundfish Survey Results, Report #6, March 4-24, 1975.

COASTAL SURVEY INVESTIGATION

Published

- Richard B. Stone and Thomas R. Azarovitz. 1968. An occurrence of unusually cold water off the Florida Coast. Underwater Naturalist 5(2): 14-17.
- Monthly temperature and animal observation charts printed and distributed by G.P.O., January 1966 - June 1969 inclusive.
- Williams, R. G., J. E. Lamoureux and Thomas R. Azarovitz. 1971. Seasonal variations of temperature and sound speed in Block Island Sound. Naval Underwater Systems Center.
- Azarovitz, T. R. 1973. Cruise Report - Gear Testing Cruise, Delaware II/Atlantic Twin (Mar. 31 - Apr. 3, 1973).
- Azarovitz, T. R. 1973. Cruise Report - Coastal Groundfish Survey, Atlantic Twin (May 8 - June 4, 1973).
- Azarovitz, T. R. 1973. Cruise Report - Coastal Groundfish Survey, Atlantic Twin (Oct. 1 - Nov. 7, 1973).
- Azarovitz, T. R. 1974. Cruise Report - N. Y. Bight - MESA, Albatross IV (Feb. 2-5, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Nantucket Shoals to Jacksonville, Fla. Atlantic Twin/Delaware II (April 1 - May 9, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (June 3-7, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (July 24-29, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Aug. 16-21, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Sept. 23-29, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Oct. 22-28, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Nov. 18-25, 1974).
- Azarovitz, T. R. 1974. Cruise Report - Catch of Albatross IV and Delaware II on Groundfish Survey, Sept. 23 - October 4, 1974 (Part I, Covering Mid-Atlantic Shelf).

COASTAL SURVEY INVESTIGATION

PUBLICATIONS (Continued):

Published

- Azarovitz, T. R. 1975. Cruise Report - Monthly Groundfish Survey, New York Bight, Delaware II (Jan. 31 - Feb. 6, 1975).
- Azarovitz, T. R. 1975. Cruise Report - Mid-Atlantic Groundfish Survey, Albatross IV (March 4-21, 1975).
- Azarovitz, T. R. 1975. Cruise Report - Coastal Groundfish Survey, Atlantic Twin (March 18-24, 1975).
- Azarovitz, T. R. 1975. Cruise Report - Block Island Sound, Atlantic Twin (March 25, 1975.).
- Azarovitz, T. R. 1975. Cruise Report - Monthly Groundfish Survey, New York Bight, Albatross IV (April 1-10, 1975).
- Azarovitz, T. R. 1975. Cruise Report - Catch of Albatross IV on Groundfish Survey 75-3, Part I, March 14-18, 1975 and Part II, March 20-29, 1975 (Covering Mid-Atlantic Shelf and Lower Georges Bank).
- MacKenzie, C. L., Jr. 1975. Development of a program to rehabilitate the oyster industry of Prince Edward Island. Mar. Fish. Rev. Vol. 37, No. 3, p. 21-35.

In Preparation

- Azarovitz, T. R. and Marvin Grosslein. New York Bight Atlas - Monograph 15 Fish Distribution.
- Azarovitz, T. R. Effects on wind and tide on a thermal plume in Barnegat Bay, New Jersey.
- Azarovitz, Seasonal Distribution loggerhead turtle - Atlantic coast.
- Azarovitz, T. R. Groundfish Survey Cruise - Catch Results.
- Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker. MESA Report - Groundfish Survey Results, Report #1, Oct. 31 - Dec. 5, 1972.
- Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker. MESA Report - Groundfish Survey Results, Report #2, May 8 - June 4, 1973.
- Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker. MESA Report - Groundfish Survey Results, Report #3, Oct. 1 - Nov. 7, 1973.
- Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker. MESA Report - Groundfish Survey Results, Report #4, Apr. 1 - May 2, 1974.

COASTAL SURVEY INVESTIGATION

In preparation - Continued

Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker.  
MESA Report - Groundfish Survey Results, Report #5, Sept. 23 -  
Oct. 4, 1974.

Azarovitz, T. R., M. Silverman, V. Anderson, A. Thoms, and C. Aussicker.  
MESA Report - Groundfish Survey Results, Report #6, March 4-24, 1975.

MacKenzie, C. L., Jr. Sea anemone control of oyster populations in  
Maryland.

MacKenzie, C. L., Jr. Use of quickline to increase oyster seed production.

MacKenzie, C. L., Jr. Population biology and role in the marine ecosystem  
of Cancer irroratus (Crustacea: decapoda).

MacKenzie, C. L., Jr. Impact of predators on commercial hard clam populations.

MacKenzie, C.L., Jr. Similar annual oyster setting levels in New Jersey  
and Connecticut.

MacKenzie, C. L., Jr. Functional ecology of oyster populations under  
an improving cultivation system.

Anderson, V. Four reversed summer flounder, Paralichthys dentatus (L.),  
from the Middle Atlantic Bight, 1974.

Published:

- Ropes, John W. 1957. The blue crab. *R. I. Maritimes* 1(2): 6-7.
- Baptist, John P., Osgood R. Smith and John W. Ropes. 1957. Migrations of the horseshoe crab, Limulus polyphemus, in Plum Island Sound, Massachusetts. U. S. Fish. Wildl. Serv., Spec. Sci. Rep., Fish. No. 220, 15 p.
- Ropes, John W. and Charles E. Martin. 1960. The abundance and distribution of hard clams in Nantucket Sound, Massachusetts, 1958. U. S. Fish. Wildl. Serv., Spec. Sci. Rep. Fish. No. 354, 12 p.
- Ropes, John W. 1961. Longevity of the horseshoe crab, Limulus polyphemus (L.). *Trans. Am. Fish. Soc.* 90(1): 79-80.
- Ropes, John W. 1963. The incidence of Malacobdella grossa in hard clams from Nantucket Sound, Massachusetts. *Limnol. Oceanogr.* 8(3): 353-355.
- Ropes, John W. 1964. Tests of internal tags for green crabs (Carcinus maenas). *Proc. Nat. Shellfish. Assoc.* 53: 147-159.
- Ropes, John W. and Alden P. Stickney. 1965. Reproductive cycle of Mya arenaria in New England. *Biol. Bull.* 128(2): 315-327.
- Ropes, John W. 1966. Pitar morrhuana, new host for Malacobdella grossa. *Nautilus* 79(4): 129-131.
- Ropes, John W. 1966. Hermaphroditism in the surf clam, Spisula solidissima. Abstract. *Annu. Rep. Amer. Malacol. Union., Bull. No. 33*, p. 26.
- Ropes, John W. and Arthur S. Merrill. 1966. The burrowing activities of the surf clam. *Underwater Natur.* 3(4): 11-17.
- Ropes, John W. 1967. The locomotion and behavior of surf clams, Spisula solidissima. Abstract. *Proc. Nat. Shellfish. Ass.* 57: 4.
- Ropes, John W. 1967. Surf clamming -- a growing fishery. *Fish. News Int.* 6(8): 58-60.
- Ropes, John W. and Arthur S. Merrill. 1967. Malacobdella grossa in Pitar morrhuana and Mercenaria campechiensis. *Nautilus* 81(2): 37-40.
- Merrill, Arthur S. and John W. Ropes. 1967. Distribution of southern quahogs off the middle Atlantic coast. *Commer. Fish. Rev.* 29(4): 62-64.
- Ropes, John W., Arthur S. Merrill and Thomas M. Groustige. 1967. Marking surf clams for growth studies. Abstract. *Proc. Nat. Shellfish. Ass.* 57: 4.
- Ropes, John W., Robert M. Yancey and Arthur S. Merrill. 1967. The growth of juvenile surf clams at Chincoteague Inlet, Virginia. Abstract. *Proc. Nat. Shellfish. Ass.* 57: 5.

Published: Cont.

- Ropes, John W. 1968. Hermaphroditism in the surf clam, Spisula solidissima. Proc. Nat. Shellfish. Ass. 58: 63-65.
- Ropes, John W. 1968. Reproductive cycle of the surf clam, Spisula solidissima, in offshore New Jersey. Biol. Bull. 135(2): 349-365.
- Ropes, John W. 1968. The feeding habits of the green crab, Carcinus maenas (L.). U. S. Fish Wildl. Serv., Fish. Bull. 67(2): 183-203.
- Ropes, John W. 1968. Data on the feeding habits of the green crab, Carcinus maenas (L.). U. S. Fish Wildl. Serv., Data Rep. No. 29.
- Ropes, John W. 1968. The reproductive cycle of surf clams in offshore New Jersey. Abstract. Proc. Nat. Shellfish. Ass. 58: 8-9.
- Ropes, John W. 1968. Soft-shell clams found in Chincoteague Inlet. Ches. Bay Affairs, Commer. Fish. News 1(3): 2-3.
- Ropes, John W. 1968. Maryland surf clam industry shows increase. Ches. Bay Affairs, Commer. Fish. News 1(6): 1-3.
- Ropes, John W. 1968. The reproductive cycle of surf clams in offshore New Jersey. Abstract. Proc. Nat. Shellfish. Ass. 58: 8-9.
- Ropes, John W. 1968. The reproductive cycle of surf clams in offshore New Jersey. Program Abstr., Amer. Soc. Limnol. Oceanogr., 31st Annu. Meeting, Madison, Wis., June 17-21, 1968.
- Merrill, Arthur S. and John W. Ropes. 1969. The general distribution of the surf clam and ocean quahog. Proc. Nat. Shellfish. Ass. 59: 40-45.
- Merrill, Arthur S. and John W. Ropes. 1969. The distribution and density of the ocean quahog, Arctica islandica. Abstract. Annu. Rep. Amer. Malacol. Union, Bull. No. 36: 19.
- Ropes, John W. and Arthur S. Merrill. 1969. The distribution and density of the surf clam, Spisula solidissima. Abstract. Annu. Rep. Amer. Malacol. Union, Bull. No. 36: 20.
- Ropes, John W., J. L. Chamberlin and Arthur S. Merrill. 1969. Surf clam fishery. In F. E. Firth (ed.), the Encyclopedia of Marine Resources. Van Nostrand Reinhold Co., New York. p. 119-125.
- Merrill, Arthur S., J. L. Chamberlin and John W. Ropes. 1969. Ocean quahog fishery. In F. E. Firth (ed), The Encyclopedia of Marine Resources. Van Nostrand Reinhold Co., New York. p. 125-129.
- Ropes, John W. 1969. The surf clam fishery. N. Y. Shell Club Notes, No. 150: 11-13.
- Ropes, John W. 1970. Maryland surf clam landings increase. Ches. Bay Affairs, Commer. Fish. News 3(2): 3-4.

Published: Cont.

Ropes, John W. 1970. Surf clam growth being studied by BCF. Ches. Bay Affairs, Commer. Fish. News 3(4): 3-4.

Ropes, John W. 1970. Clam parasites being studied. Ches. Bay Affairs, Commer. Fish. News 3(6): 4.

Ropes, John W. and Arthur S. Merrill. 1970. Marking surf clams. Proc. Nat. Shellfish. Ass. 60: 99-106.

Ropes, John W. 1970. Surf clams and ocean quahogs. Annu. Rep. Amer. Malacol. Union, Bull. No. 37: 22-23.

Ropes, John W. 1971. Percentage of solids and length-weight relationship of the ocean quahog. Proc. Nat. Shellfish. Ass. 61: 88-90.

Ropes, John W. and Arthur S. Merrill. 1971. Data on samples for surf clams and ocean quahogs. U. S. Dept. Commer., Nat. Oceanic Atmos. Admin., Nat. Mar. Fish. Serv., Data Rep. 57: 43 on 1 microfiche.

Ropes, John W. and Arthur S. Merrill. 1971. LP<sup>Ⓢ</sup> polysulfide proves No. 1 -- even with surf clams. Materially Speaking No. 12, Thiokol Chem. Corp., p. 7-11.

Barker, Allan M. and John W. Ropes. 1971. The Atlantic surf clam fishery - 1969. Commer. Fish. Rev. 33(6): 35-42.

Ropes, J. W. 1971. Maryland's hard clam studied at Oxford Laboratory. Ches. Bay Affairs, Commer. Fish. News 4(6): 2-3.

Ropes, John W. 1972. Chromosome number of the surf clam, Spisula solidissima. Nautilus 85(3): 93-95.

Ropes, John W. and Allan M. Barker. 1972. The Atlantic surf clam fishery - 1970. Mar. Fish. Rev. 34(9-10): 36-44.

Ropes, John W. 1972. The Atlantic coast surf clam fishery 1965-69. Mar. Fish. Rev. 34(7-8): 20-29.

Ropes, J. W., A. M. Barker, and G. E. Ward, Jr. 1972. The Atlantic coast surf clam fishery - 1971. NOAA, Natl. Mar. Fish. Serv., Mar. Fish. Rev. 34(11-12): 48-54.

Ropes, J. W. and A. S. Merrill. 1973. To what extent do surf clams move? Nautilus 87(1): 19-21.

In Press:

Merrill, A. S. and J. W. Ropes. Important edible mollusks of the United States. COA Bulletin.

Ropes, J. W. and A. S. Merrill. Shellfish Beds. In: Odum, H. T., B. G. Copeland, and E. MacMahon (ed.), Coastal Ecological Systems of the United States. The Conservation Foundation.

Ropes, J. W. A management program for surf clams. Chesapeake Bay Affairs, Commer. Fish. News.

In Preparation:

Ropes, John W. and Arthur S. Merrill. The distribution and density of surf clams.

Merrill, Arthur S. and John W. Ropes. The distribution and density of ocean quahogs.

Ropes, J. W. The speed of burrowing by surf clams, Spisula solidissima.

Ropes, J. W., A. M. Barker, and G. E. Ward, Jr. The Atlantic coast surf clam fishery -- 1972.

Ropes, J. W. and G. E. Ward, Jr. The Atlantic coast surf clam fishery -- 1973.

ORGANIZATION: Resource Assessment, Biological Investigation,  
Middle Atlantic Coastal Fisheries Center,  
NMFS, NOAA, Highlands, N.J.

ACTIVITY AREA: Life History Agents of Marine Finfishes -  
East Coast from Florida to Massachusetts

OBJECTIVE: Fish populations of the Middle Atlantic Bight  
have been subjected to encroachment of foreign  
fleets, increased U.S. commercial and sport  
fisheries, and reduction in quality and area of  
suitable spawning and nursery grounds. These  
forces have combined with natural fluctuations,  
in varying proportions, to jeopardize our coastal  
fishery resources to the extent that some are  
on the verge of depletion. Unfortunately, our  
basic biological knowledge of the life histories  
of coastal fishes is inadequate for recommending  
immediate and sound national and international  
management policies. We are not in a position  
to determine recruitment, levels of exploitation,  
or the impact of long-term natural fluctuations  
and man-made changes in the environment upon our  
fishery resources. The scientific base needed  
to properly manage our coastal fisheries will  
incorporate the understanding of basic biological  
components that make up the life history patterns  
of coastal species. It is essential that the  
assessment of fishery stocks along the Atlantic  
coast be augmented in order that proper manage-  
ment policies can be established to insure the  
maximum sustainable yield of important marine  
resources.

SUMMARY: Programs are now underway to:

- 1) collect biological materials pertinent to  
selected Atlantic coast sport and commercial  
species such as drums, flounders, porgies,  
sea basses, during groundfish cruises, and  
routine port sampling;
- 2) analyze biological materials to determine one  
or more of the following: age composition  
and growth rate, sexual development, spawning  
season, fecundity, and food and feeding  
habits;

- 3) conduct stock and racial identification studies of selected species by means of discriminant function analysis of morphometric and meristic variates;
- 4) record all data collected on the appropriate automatic data processing forms, transfer to punch cards, and incorporate into sorting, listing, and statistical systems;
- 5) retrieve and analyze data for use in technical reports, scientific publications, and special problem areas;
- 6) retrieve data requested by various user groups such as population and environmental analysts, NMFS research, industry, sportsmen, management and regulatory agencies.

RESOURCES:           FY 74       164.3 K  
                      FY 75       159.1 K

SENIOR STAFF:       Stuart Wilk

STUART J. WILK

DATE OF BIRTH: June 6, 1942  
Passaic, N. J.

EDUCATION AND TRAINING:

B.S. Degree - Biology, Delaware Valley College of Science and Agriculture, Doyles Town, Pa., 1965.

Other courses- Graduate studies in microbiology, oceanology, and marine and freshwater ecology, Fordham University, N.Y., 1966 and 1967.

-- Supervisory Training Course (Oct., 1973).

Special scientific or technical skills not indicated by above:

Ecological Techniques - received six weeks (daily) accelerated training and practical applications, 1962.

Histological Techniques - one year of training in practical applications, 1963.

Serological Techniques - one year accelerated training in practical applications, 1964.

Microbiological Techniques - one year accelerated training, 1965.

Biological Aid (summer student) U. S. Dept. of Interior, BSF, Sandy Hook Marine Laboratory, 12 weeks each in 1963 and 1964.

SCUBA diver certification, BSF, 1963-1970.

EXPERIENCE:

Natural History Studies of the bluefish, Pomatomus saltatrix (L.) along the Atlantic coast (1963- ):

Designed and participated in the field collection program of bluefish along the Atlantic coast.

Designed and conducted bluefish "Return-a-Scale" tagging experiments for validation of annual marks.

Designed and applied indexing formats to bluefish data files.

Analyzed 35,000 bluefish for size and age composition, growth pattern, gonadal maturation, food habits and anatomical characteristics.

Designed automatic data processing techniques and procedures for use in analysis of bluefish body proportion data, in order that discriminant function analysis statistics could be employed to describe population and racial differences.

STUART J. WILK

EXPERIENCE (Continued):

Designed and applied photographic techniques to be used in collecting permanent records of fish body proportions for use in discriminant function analysis.

Ecological and Behavioral Studies (1963-68).

Participated in ecological surveys of natural reefs (1963-1966).

Participated in underwater surveys to recommend future outfall locations off Long Island, N.Y. (1966).

Designed experiments and equipment to test the effect of artificial light on marine fish (1967).

Participated in survey cruises to establish temperature range preferences of marine benthic species and analyzed age and size data relative to depth, salinity, temperature, and distances offshore (1968).

Aided in design and participated in underwater experiments relative to the behavior of the winter flounder, Pseudopleuronectes americanus (Walbaum) (1968).

Underwater Equipment Design and Development:

Participated in sea tests and made modifications to the submerged vehicle Sea-Kite (1965-1966).

Aided in design, construction and placement of assorted anchoring devices, for constant recording temperature and current units (1966-1967).

Natural History Studies of Sciaenids and Related Species (1968- )::

Designed, developed and applied automatic data processing techniques to facilitate natural history and assessment studies of marine species in the following areas:

- 1) Age and growth based on scale analysis.
- 2) Distribution of species based on geographical and physical parameters of their environment.
- 3) Migrations based on tagging experiments and field surveys.
- 4) Racial and population structure of coastal stocks based on discriminant function analysis of measured and photographed morphometric and meristic materials.

Designed and conducted trawl surveys from New York to Florida to collect data pertinent to the life history and assessment studies of weakfish (Cynoscion regalis), spot (Leiostomus xanthurus), Atlantic croaker (Micropogon undulatus), Northern kingfish (Menticirrhus saxatilis), and southern kingfish (Menticirrhus americanus) (1968-1972).

STUART J. WILK

EXPERIENCE (Continued):

Monmouth Medical Center - Dept. of Pathology (1968-1969):  
Conducted clinical bacteriology studies at night and on weekends  
for one and one-half years.

Biology of Marine Fishes of the N. Y. Bight (1974- )::

Designed program to collect basic biological information from all  
finfishes occurring in the N.Y. Bight.

PUBLICATIONS:

Published

- Wilk, S. J. 1966. Sighting of the black rudderfish, *Underwater Naturalist*, 3(4): 23.
- Wilk, S. J. 1967. Two observations of predator avoidance. I. Striped mullet, *Mugil cephalus*. II. Silverside, *Menidia menidia*. *Underwater Naturalist*, 4(2): 27-28.
- Wicklund, R., S. Wilk, and L. Ogren. 1968. Observations on wintering locations of the northern pipefish and spotted seahorse. *Underwater Naturalist*, 5(2): 26-28.
- Olla, B., R. Wicklund, and S. J. Wilk. 1969. Behavior of winter flounder in a natural habitat. *Trans. Am. Fish. Soc.*, 98(4): 717-720.
- S. J. Wilk and R. Schmidt. 1971. A note on the capture of the black ruff, *Centrolophus niger* (Gmelin), in New Jersey waters. *Chesapeake Sci.*, 12(3): 185.

In Press

- Walford, L. A., S. J. Wilk, B. Olla, A. Kendall, B. Freeman, D. Deuel, and M. Silverman. The bluefish (*Pomatomus saltatrix*); A synoptic review of its biology. NMFS Fish Facts and ASMFC Leaflet.
- Wilk, S. J. 1975. The weakfish (*Cynoscion regalis*), a review of its biology and present research. Proc. 1973. Annual Meeting ASMFC.
- Wilk, S. J. 1975. Weakfish -- A wide ranging species. ASMFC Leaflet.
- Wilk, S. J. and M. Silverman. Summer benthic fish fauna of Sandy Hook Bay, New Jersey. U. S. Dept. Comm., NMFS, Spec. Sci. Rep. Fish.
- Wilk, S. J. and M. Silverman. Fish and hydrographic collections made by the research vessels *Dolphin* and *Delaware II* during 1968-72 from New York to Florida. U. S. Dept. Comm., NMFS, Spec. Sci. Rep. Fish.

STUART J. WILK

PUBLICATIONS (Continued):

In Preparation

- Walford, L. A., S. J. Wilk, and M. Silverman. Age and growth patterns of the bluefish, Pomatomus saltatrix, on the east coast of the United States.
- Wilk, S. J. Annotated bibliography of bluefish, Pomatomus saltatrix.
- Wilk, S. J. and L. A. Walford. A morphometric study of the bluefish, Pomatomus saltatrix on the east coast of the United States.
- Walford, L. A., B. Freeman, and S. J. Wilk. Theoretical distribution of the bluefish, Pomatomus saltatrix, based on temperature.
- Wilk, S. J. Annotated list of bluefish, Pomatomus saltatrix, food items.
- Wilk, S. J. The bluefish. In: MESA New York Bight Atlas Monograph 15 - Fish Distribution.
- Wilk, S. J. The weakfish. In: MESA New York Bight Atlas Monograph 15 - Fish Distribution.

Reports

- Wilk, S. J., W. W. Morse, D. E. Ralph, and E. J. Steady. 1974. Semi-annual Report -- Life history aspects of the New York Bight finfishes. (June - November 1974). 125 pp.
- Wilk, S. J. 1968. Cruise Report -- Dolphin 68-7 (July 30-August 2, 1968); Moriches Inlet, N. Y., to Shark River Inlet, N. J. Mimeo.
- Wilk, S. J. 1968. Cruise Report -- Dolphin 68-13 (October 29-November 8, 1968); Oregon Inlet, N. C. to Bogue Inlet, N. C. Mimeo.
- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-9 (April 15-25, 1969); Cape May, N. J. to Cape Lookout area of N. C. Mimeo.
- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-15 (June 25-30, 1969); Sea Bright, N. J. to Ocean City, Md. Mimeo.
- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-21 (August 19-21, 1969); A single transect off Ocean City, Md. Mimeo.
- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-23 (September 10-18, 1969); Barnegat Inlet, N. J. to Cape Fear, N. C. Mimeo.
- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-25 (September 30-October 1, 1969); Shinnecock Inlet, N. Y., to Jones Inlet, N. Y. Mimeo.
- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-29 (October 28-November 6, 1969); Ocracoke Inlet, N. C., to Charleston, S. C. Mimeo.

Reports (Continued)

- Wilk, S. J. 1970. Cruise Report -- Dolphin 70-7 (May 6-7, 1970);  
A single transect off Great Egg Harbor, N. J. Mimeo
- Wilk, S. J. 1970. Cruise Report -- Dolphin 70-16 (July 6-10, 1970);  
Fire Island Inlet, N. Y., to Ocean City, Md. Mimeo.
- Wilk, S. J. 1970. Cruise Report -- Dolphin 70-19 (August 3-7, 1970);  
Fire Island Inlet, N. Y. to Ocean City, Md. Mimeo.
- Wilk, S. J. 1970. Cruise Report -- Dolphin 71-3 (March 29-April 9, 1970);  
Barnegat Inlet, N. J., to New Smyrna Beach, Fla. Mimeo.
- Wilk, S. J. 1971. Cruise Report -- Dolphin 71-11 (July 12-23, 1971);  
Barnegat Inlet, N. J., to Ponce de Leon Inlet, Fla. Mimeo.
- Wilk, S. J. 1971. Cruise Report -- Dolphin 71-14 (August 23-27, 1971).  
Fire Island, N.Y. to Ocean City, Md. Mimeo.
- Wilk, S. J. 1971. Cruise Report -- Delaware 71-2 (November 2-3, 1971);  
Fire Island, N. Y., to Barnegat Inlet, N. J. Mimeo.
- Wilk, S. J. 1971. Cruise Report -- Delaware 71-3 (November 8-19, 1971);  
Assateague Island, Va., to Cape Kennedy, Fla. Mimeo.
- Wilk, S. J. 1972. Cruise Report -- Delaware 72-8 (March 20-31, 1972);  
Oregon Inlet, N. C., to Cape Kennedy, Fla. Mimeo.
- Wilk, S. J. 1972. Cruise Report -- Delaware 72-15 (May 15-26, 1972);  
Oregon Inlet, N. C., to Cape Kennedy, Fla. Mimeo.

AFFILIATION IN SCIENTIFIC ORGANIZATIONS:

American Fishery Society  
American Littoral Society  
American Geographical Society  
American Society of Ichthyologists and Herpetologists  
Atlantic Estuarine Research Society  
Northeast Fishing Biologists

CONSULTING ACTIVITIES:

Acted as Consultant for the "University Sealab" in conjunction with the Engineering Design and Analysis Laboratory of the University of New Hampshire. Included were site surveys and inspections of the underwater habitat (EDALHAB).

Acted as Consultant to the New Jersey Power & Light Company and Westinghouse Company as to the attraction power of underwater lighting systems.

STUART J. WILK

SPECIAL PROFESSIONAL ASSIGNMENTS:

Assigned to Washington, D. C. as aid to the Office of the Director (BSF - Interior) with regard to the resources of the Atlantic Outer Continental Shelf and the possibility of offshore drilling of oil.

Acted as Vessel Supervisor-Port Captain for the Sandy Hook Marine Laboratory. (Approx. 2 years).

Acted as safety officer for the Sandy Hook Laboratory (3 years) during which time I represented the laboratory at Regional and National Safety Meetings.

Appointed as Middle Atlantic Coastal Fisheries Center's Coordinator for MARMAP - Phase III.

SPORTFISH BIOLOGICAL INVESTIGATION

PUBLICATIONS

Published

- Wilk, S. J. 1966. Sighting of the black rudderfish, *Underwater Naturalist*, 3(4): 23.
- Wilk, S. J. 1967. Two observations of predator avoidance. I. Striped mullet, *Mugil cephalus*. II. Silverside, *Menidia menidia*. *Underwater Naturalist*, 4(2): 27-28.
- Wicklund, R., S. Wilk, and L. Ogren. 1968. Observations on wintering locations of the northern pipefish and spotted seahorse. *Underwater Naturalist*, 5(2): 26-28.
- Olla, B., R. Wicklund, and S. J. Wilk. 1969. Behavior of winter flounder in a natural habitat. *Trans. Am. Fish. Soc.*, 98(4): 717-720.
- S. J. Wilk and R. Schmidt. 1971. A note on the capture of the black ruff, *Centrolophus niger* (Gmelin), in New Jersey waters. *Chesapeake Sci.*, 12(3): 185.

In Press

- Walford, L. A., S. J. Wilk, B. Olla, A. Kendall, B. Freeman, D. Deuel, and M. Silverman. The bluefish (*Pomatomus saltatrix*); A synoptic review of its biology. NMFS Fish Facts and ASMFC Leaflet.
- Wilk, S. J. 1975. The weakfish (*Cynoscion regalis*), a review of its biology and present research. Proc. 1973. Annual Meeting ASMFC.
- Wilk, S. J. 1975. Weakfish -- A wide ranging species. ASMFC Leaflet.
- Wilk, S. J. and M. Silverman. Summer benthic fish fauna of Sandy Hook Bay, New Jersey. U. S. Dept. Comm., NMFS, Spec. Sci. Rep. Fish.
- Wilk, S. J. and M. Silverman. Fish and hydrographic collections made by the research vessels *Dolphin* and *Delaware II* during 1968-72 from New York to Florida. U. S. Dept. Comm., NMFS, Spec. Sci. Rep. Fish.
- Silverman, M. Early scale development of the bluefish, (*Pomatomus saltatrix*). *Trans. Am. Fish. Soc.*

In Preparation

- Walford, L. A., S. J. Wilk, and M. Silverman. Age and growth patterns of the bluefish, Pomatomus saltatrix, on the east coast of the United States.
- Wilk, S. J. Annotated bibliography of bluefish, Pomatomus saltatrix.
- Wilk, S. J. and L. A. Walford. A morphometric study of the bluefish, Pomatomus saltatrix on the east coast of the United States.
- Walford, L. A., B. Freeman, and S. J. Wilk. Theoretical distribution of the bluefish, Pomatomus saltatrix, based on temperature.
- Wilk, S. J. Annotated list of bluefish, Pomatomus saltatrix, food items.
- Wilk, S. J. The bluefish. In: MESA New York Bight Atlas Monograph 15 - Fish Distribution.
- Wilk, S. J. The weakfish. In: MESA New York Bight Atlas Monograph 15 - Fish Distribution.
- Morse, W. W. Length, weight, spawning, and fecundity estimates of the tilefish, Lopholatilus chamaeleonticeps.
- Morse, W. W. Fecundity of the Atlantic croaker. Micropogon undulatus.
- Morse, W. W. The scup. In: MESA New York Bight Atlas Monograph 15 - Fish Distribution.

Reports

- Wilk, S. J., W. W. Morse, D. E. Ralph, and E. J. Steady. 1974. Semi-annual Report -- Life history aspects of the New York Bight finfishes. (June - November 1974). 125 pp.
- Wilk, S. J. 1968. Cruise Report -- Dolphin 68-7 (July 30-August 2, 1968); Moriches Inlet, N. Y., to Shark River Inlet, N. J. Mimeo.
- Wilk, S. J. 1968. Cruise Report -- Dolphin 68-13 (October 29-November 8, 1968); Oregon Inlet, N. C. to Bogue Inlet, N. C. Mimeo.
- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-9 (April 15-25, 1969); Cape May, N. J. to Cape Lookout area of N. C. Mimeo.
- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-15 (June 25-30, 1969); Sea Bright, N. J. to Ocean City, Md. Mimeo.
- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-21 (August 19-21, 1969); A single transect off Ocean City, Md. Mimeo.
- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-23 (September 10-18, 1969); Barnegat Inlet, N. J. to Cape Fear, N. C. Mimeo.

SPORTFISH BIOLOGICAL INVESTIGATION - Cont.

Reports (Continued)

- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-25 (September 30-October 1, 1969); Shinnecock Inlet, N. Y., to Jones Inlet, N. Y. Mimeo.
- Wilk, S. J. 1969. Cruise Report -- Dolphin 69-29 (October 28-November 6, 1969); Ocracoke Inlet, N. C., to Charleston, S. C. Mimeo.
- Wilk, S. J. 1970. Cruise Report -- Dolphin 70-7 (May 6-7, 1970);  
A single transect off Great Egg Harbor, N. J. Mimeo
- Wilk, S. J. 1970. Cruise Report -- Dolphin 70-16 (July 6-10, 1970);  
Fire Island Inlet, N. Y., to Ocean City, Md. Mimeo.
- Wilk, S. J. 1970. Cruise Report -- Dolphin 70-19 (August 3-7, 1970);  
Fire Island Inlet, N. Y. to Ocean City, Md. Mimeo.
- Wilk, S. J. 1970. Cruise Report -- Dolphin 71-3 (March 29-April 9, 1970);  
Barnegat Inlet, N. J., to New Smyrna Beach, Fla. Mimeo.
- Wilk, S. J. 1971. Cruise Report -- Dolphin 71-11 (July 12-23, 1971);  
Barnegat Inlet, N. J., to Ponce de Leon Inlet, Fla. Mimeo.
- Wilk, S. J. 1971. Cruise Report -- Dolphin 71-14 (August 23-27, 1971).  
Fire Island, N.Y. to Ocean City, Md. Mimeo.
- Wilk, S. J. 1971. Cruise Report -- Delaware 71-2 (November 2-3, 1971);  
Fire Island, N. Y., to Barnegat Inlet, N. J. Mimeo.
- Wilk, S. J. 1971. Cruise Report -- Delaware 71-3 (November 8-19, 1971);  
Assateague Island, Va., to Cape Kennedy, Fla. Mimeo.
- Wilk, S. J. 1972. Cruise Report -- Delaware 72-8 (March 20-31, 1972);  
Oregon Inlet, N. C., to Cape Kennedy, Fla. Mimeo.
- Wilk, S. J. 1972. Cruise Report -- Delaware 72-15 (May 15-26, 1972);  
Oregon Inlet, N. C., to Cape Kennedy, Fla. Mimeo.

ORGANIZATION: Resource Assessment, Life Studies Prerecruits Investigation, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Highlands, N.J.

ACTIVITY AREA: Ichthyoplankton / Distribution and Relative Abundance / Diurnal Movements / Transport / Survival / Fisheries Management

OBJECTIVE: To provide a data base for forecasting and predicting seasonal occurrence, relative abundance, and distribution of eggs and larvae of coastal fishes.

SUMMARY: The increased fishing pressures, both foreign and domestic, and the apparent diminution of suitable spawning and nursery grounds have combined to jeopardize our coastal fishery resources to the extent that some are on the brink of being depleted. To acquire the scientific and technical base to construct sound management policies, we must obtain information about living marine resources that will permit meaningful predictions of distribution, abundance, condition, and availability of these resources.

Emphasizing those species that are found near-shore, field work during the next 3 to 5 years will center around: a) continued investigations of the diurnal activities of young planktonic fishes to acquire an understanding of their associations with such environmental parameters as photoperiod, depth, temperature, salinity, and seasonal thermocline, and to estimate their dispersion rates on the basis of known coastal circulation; b) surveys of selected coastal areas, designed to monitor fluctuations in abundance of larval fishes, to determine their distribution in coastal waters, to attempt to correlate fluctuations in abundance and distribution with hydrographic features, and to learn more about environmental needs of specific fishes.

Six cruises are planned to study diurnal activities of young fishes. Collections from these cruises will contain young of the most important commercial and recreational fishes that spawn in the bight. Of the 10 most important coastal species in terms of total combined sport and commercial catch between New York and Cape Hatteras, only Atlantic mackerel and possibly bluefish are not dependent on the shallow coastal areas. The other species depend on the subtidal zone for spawning and/or nursery areas, and even young bluefish and mackerel utilize this area for foraging to some extent.

We will conduct coastal surveys to monitor fluctuations in abundance and distribution of young fishes in conjunction with ongoing finfish assessment surveys. Plankton collections will be taken at preselected stations in the Middle Atlantic Bight, chosen on the basis of previous cruises designed to study the seasonal distributions of fish eggs and larvae. We will record concomitant measurements of the marine environment on the above cruises and subsequently incorporate pertinent physical data from other sources to establish norms and ranges of variability. These data will be integrated with all available biological data to evaluate the role of the environment in terms of its effect on larval transport, geographic distribution, year-class success and, ultimately, to establish the actual role of the coastal zone in the early life history of economically important fishes.

We will operate with standard gear (as adapted for MARMAP Survey I operations) over enough years so that normal fluctuations and cycles in abundance and distribution of the species and also fluctuations in the natural environment of these species can be ascertained. This information is essential to determine the causes of population fluctuations or declines.

RESOURCES:           FY 74     155.2 K  
                      FY 75     326.8 K

SENIOR STAFF:       Wallace Smith

WALLACE G. SMITH

BIRTH DATE: September 24, 1936  
Lock Haven, Pennsylvania

## EDUCATION:

Susquehanna University, Selinsgrove, Pa. 1955-58.  
 B. S. Biology 1962, Arizona State University, Tempe, Arizona  
 M. S. Marine Science 1965, College of William & Mary, Williamsburg,  
 Virginia.

## TRAINING:

Effective Supervision. NOAA, March 1973

(Special Scientific or Technical Skills)

Design and implementation of field studies pertaining to collection of planktonic fishes and related hydrographic data.  
 Acquired skill for identifying larval fishes, especially flatfishes (Pleuronectiformes), from Atlantic coastal waters.

## EXPERIENCE BEFORE JOINING NMFS (BCF):

1963 - 1965 Research Assistant, Virginia Inst. of Marine Sciences  
 1965 - 1971 Fishery Biologist, Bureau of Sport Fisheries & Wildlife  
 1972 - Chief, Resource Assessment Investigations (Ichthyoplankton)  
 NMFS, Sandy Hook Laboratory, Highlands, N. J.

## LISTING OF PUBLICATIONS:

Published

Smith, W. G. 1965. A study of the scup (Stenotomus chrysops) based on data obtained from catches of the 1963-64 winter trawl fishery. M. A. Thesis. College of William & Mary, Williamsburg, Va., 42 p.

Smith, W. G. 1968. A neonate Atlantic loggerhead turtle, Caretta caretta caretta (L.), captured at sea. Copeia 4: 880-881.

Smith, W. G. and J. J. Norcross. 1968. The status of the scup (Stenotomus chrysops) in winter trawl fishery. Ches. Sci. 9(4): 207-216.

Clark, J. R., W. G. Smith, A. W. Kendall, Jr., and M. P. Fahay. 1969. Studies of estuarine dependence of Atlantic coastal fishes. Data Report I: Northern Section, Cape Cod to Cape Lookout. R. V. Dolphin cruises 1965-66: Zooplankton volumes, midwater trawl collections, temperatures and salinities. Bureau of Sport Fisheries and Wildlife. Technical Paper 28: 132 pp.

Clark, J. R., W. G. Smith, A. W. Kendall, Jr., and M. P. Fahay. 1970. Studies of estuarine dependence of Atlantic coastal fishes. Data Report II: Southern Section, New River, N. C. to Palm Beach, Fla. R. V. Dolphin cruises 1967-68: Zooplankton volumes, surface-meter net collections, temperatures and salinities. Bureau of Sport Fisheries and Wildlife. Technical Paper 59: 97 pp.

(Published - Cont.)

Smith, W. G. and M. P. Fahay. 1970. A description of eggs and larvae of the summer flounder, Paralichthys dentatus (Linnaeus). Bur of Sport Fish. and Wildl. Research Report 75: 21 p.

Smith, W. G. 1973. The distribution of summer flounder, Paralichthys dentatus eggs and larvae on the continental shelf Cape Cod and Cape Lookout, 1965-66. Fish. Bull., U. S. 72(2): 527-548.

Smith, W. G. 1973. The range and distribution of some estuarine fishes -- winter flounder. In: Proceedings of a Workshop on Egg, Larval and Juvenile Stages of Fish in Atlantic Coast Estuaries. MACFC. Tech. Publ. 1. (Abstract).

Smith, W. G. 1973. The range and distribution of some estuarine fishes -- summer flounder. In: Proceedings of a Workshop on Egg, Larval and Juvenile Stages of Fish in Atlantic Coast Estuaries. MACFC. Tech. Publ. 1. (Abstract).

Smith, W. G., J. D. Sibunka, and A. Wells. 1975. Seasonal distributions of larval flatfishes (Pleuronectiformes) on the continental shelf between Cape Cod, Massachusetts and Cape Lookout, North Carolina, 1965-66. NOAA, Tech. Report, SSR-F #691.

In Preparation

Smith, W. G., J. D. Sibunka and A. Wells. The diel movements of larval yellowtail flounder, Limanda ferruginea (Storer), as determined from discrete depth sampling.

Berrien, P. B., M. P. Fahay, A. W. Kendall, Jr., and W. G. Smith. Atlas of the seasonal occurrence of fish larvae of the Middle Atlantic Bight. NOAA Technical Report, SSR-F.

Smith, W. G. Synopsis of the life history and population dynamics of the striped bass, Morone saxatilis (Walbaum). In: Atlas of Mar. Resources of the New York Bight. MESA Spec. Publ.

HONORS AND AWARDS:

1967 - BSF&W Incentive Award

PAPER PRESENTATIONS BEFORE PROFESSIONAL OR SCIENTIFIC SOCIETIES:

- 1966 - Atlantic States Marine Fisheries Commission - Summer flounder Committee
- 1968 - Atlantic States Marine Fisheries Commission - Egg, Larval & Juvenile Fish Workshop
- 1970 - Atlantic States Marine Fisheries Commission - Summer Flounder Committee
- 1974 - Martin Marietta Laboratories - The identification of fish eggs and larvae of Chesapeake Bay
- 1975 - Brookhaven National Laboratory - The seasonal distribution of yellowtail flounder larvae in the Middle Atlantic Bight, with comments on their diurnal activities.

# ICHTHYOPLANKTON INVESTIGATION

## PUBLICATIONS

### Calendar 1973

- Berrien, P. L. 1973. Range and distribution of some estuarine fishes -- spot, Atlantic croaker, Atlantic mackerel. In: Proceedings of a Workshop on Egg, Larval, and Juvenile Stages of Fish in Atlantic Coast Estuaries. MACFC Tech. Publ. 1, pp. 262-264 (Abstract).
- Fahay, M. P. 1973. Range and distribution of some estuarine fishes -- bonefish, ladyfish, and tarpon. In: Proceedings of a Workshop on Egg, Larval, and Juvenile Stages of Fish in Atlantic Coast Estuaries. MACFC Tech. Publ. 1, p. 265 (Abstract).
- Kendall, A. W. 1973. Range and distribution of some estuarine fishes -- tautog, cunner, scup, sheepshead, pinfish, and butterfish. In: Proceedings of a Workshop on Egg, Larval, and Juvenile Stages of Fish in Atlantic Coast Estuaries. MACFC Tech. Publ. 1, pp. 256-261 (Abstract).
- Richards, S. W. and A. W. Kendall. 1973. Distribution of sand lance, Ammodytes sp., larvae on the continental shelf from Cape Cod to Cape Hatteras from R. V. Dolphin surveys in 1966. Fish. Bull., U. S. 71(2): 371-386.
- Smith, W. G. 1973. Range and distribution of some estuarine fishes -- winter flounder, summer flounder. In: Proceedings of a Workshop on Egg, Larval, and Juvenile Stages of Fish in Atlantic Coast Estuaries. MACFC Tech. Publ. 1, pp. 254-255 (Abstract).
- Smith, W. G. 1973. The distribution of summer flounder, Paralichthys dentatus, eggs and larvae on the continental shelf between Cape Cod and Cape Lookout, 1965-66. Fish. Bull., U. S. 71(2): 527-548.

### Calendar 1974

- Fahay, M. P. 1974. Occurrence of silver hake, Merluccius bilinearis (Mitchell) eggs and larvae along the Middle Atlantic continental shelf during 1966. Fish. Bull., U. S. 72(3): 813-834.

### Calendar 1975

- Berrien, P. L. 1975. A description of Atlantic mackerel, Scomber scombrus, eggs and early larvae. Fish. Bull., U. S. 73(1): 186-192.
- Fahay, M. P. 1975. An annotated list of larval and juvenile fishes captured with surface-towed meter net in the South Atlantic Bight during four R. V. Dolphin cruises between May 1967 and February 1968. NOAA Tech. Rept. NMFS SSRf-685, 39 p.
- Kendall, A. W., Jr. and J. W. Reintjes. 1975. Distribution of Atlantic menhaden larvae along the Middle Atlantic coast from R. V. Dolphin cruises, 1965-66. Fish. Bull., U. S. 73(2): 313-335.

Ichthyoplankton Investigation - Cont.

In Press

Fahay, M. P. Paraxenomystax sp., A muraenesocid leptocephali in the western North Atlantic. Copeia

Smith, W. G., J. D. Sibunka, and A. Wells. Seasonal distributions of larval flatfishes (Pleuronectiformes) on the continental shelf between Cape Cod, Massachusetts and Cape Lookout, North Carolina, 1965-66. NOAA Tech. Rept. NMFS SSRF-691.

In Preparation

Berrien, P. L. A comparison of larval Scomber scombrus and S. japonicus and the occurrences of their eggs and larvae in continental shelf waters between Massachusetts and Florida 1966 to 1968.

Berrien, P. L. Vertical distribution of Scomber scombrus eggs and larvae.

Berrien, P. L. and M. P. Fahay. Description of eggs, larvae and juveniles of the tilefish, Lopholatilus chamaeleonticeps.

Berrien, P. L., M. P. Fahay, A. W. Kendall, Jr., and W. G. Smith. Atlas on the seasonal occurrence and distribution of fish eggs and larvae in the Middle Atlantic Bight.

Fahay, M. P. Methods of distinguishing the postlarvae of two sympatric species of Merluccius in the western North Atlantic.

Fahay, M. P. Distribution of larval cod, pollock and haddock along the Middle Atlantic continental shelf.

Fahay, M. P. Description and distribution of larvae of the genera Phycis, Urophycis and Enchelyopus along the Middle Atlantic continental shelf.

Fahay, M. P. and C. L. deGorgue. Ophichthid leptocephali on the Atlantic continental shelf of the United States.

Kendall, A. W., Jr. Early life history of bluefish, Pomatomus saltatrix, along the Atlantic coast, deduced primarily from R. V. Dolphin surveys, 1965-68.

Kendall, A. W., Jr. Predorsal bone patterns in serranid and grammistid fishes.

Kendall, A. W., Jr. and S. C. Roberts. Description and distribution of Prionotus carolinus (Pisces: Triglidae) larvae and juveniles.

Smith, W. G. A synopsis of the life history and population dynamics of the striped bass, Morone saxatilis (Walbaum). In: Atlas of Marine Environment of the New York Bight.

Smith, W. G., J. D. Sibunka, and A. Wells. The diel movements of larval yellowtail flounder, Limanda ferruginea (Storer), as determined from discrete depth sampling.

ORGANIZATION: Fishery Analysis Investigation, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Highlands, N.J.

ACTIVITY AREA: Sportfish, Population Dynamics, Middle Atlantic Bight

OBJECTIVE: To systematically collect sportfish catch data from selected areas, deriving information on catch composition, success of fishing of various elements of the fishery to determine participation and competition within the recreational fraction and comparisons to the commercial fishery to determine total harvest.

SUMMARY: Successful management of commercial and sportfish resources requires the systematic collection and analysis of commercial and sportfish catch data. This need is being satisfied by the use of port samplers assigned to cover strategic fishing port areas along the Atlantic Bight. The sampling time is stratified by type of fishing, area of fishing and time of fishing. Appropriately expanded, these data will provide realistic estimates of catch rates of species seasonally, and variations in catch composition. Direct biological samples of the catch include size, weight and age analysis of important species. These data from the recreational segments will be contrasted to groundfish survey catch and commercial catch to determine removals and competition between the various harvesting elements. The effort is of a prototype nature anticipating a State-Federal continuing study. The techniques, recording formats and data processing programs will be applied to the cooperative study to ensure continuity and comparability of results. The ultimate goal, vitally needed is a continuous record of the total harvest for the region and for subareas within the area. The task will provide statistically reliable indices to establish a baseline level from which subsequent variations can be related. On these variations management recommendations will result in conservation strategies.

RESOURCES:           FY 74           68.3 K  
                      FY 75           80.5 K

SENIOR STAFF:       Anthony Pacheco

ANTHONY L. PACHECO

DATE OF BIRTH: September 12, 1923

EDUCATION AND TRAINING:

High School - Dartmouth High School - graduated 1950  
Dartmouth, Massachusetts  
Undergraduate - University of Massachusetts 1950-1954 - B.S., Zoology  
and Chemistry  
Graduate - College of William and Mary 1954-1956 - M.A., 1957  
Aquatic Biology

EXPERIENCE BEFORE JOINING NMFS (BCF):

9/54 - 8/56 Graduate Assistant, Virginia Inst. of Marine Science,  
Gloucester Point, Virginia  
8/56 - 7/59 Aquatic Biologist B., Virginia Inst. of Marine Science,  
Gloucester Point, Virginia  
(Federal Service)  
7/59 -11/62 Fishery Research Biologist, BCF, Biological Laboratories,  
Beaufort, North Carolina. Duty station: Millville, Del.  
11/62-10/66 Fishery Research Biologist, Bureau of Commercial Fisheries,  
Biological Laboratory, Beaufort, North Carolina  
10/66-73 Fishery Biologist (Research) NMFS, Dept. of Commerce, NOAA,  
Sandy Hook Laboratory, Highlands, N. J.  
7/73-Present Fishery Biologist, Supervisory, NMFS, Dept. of Commerce, NOAA,  
MACFC, Sandy Hook Laboratory, Highlands, N. J.

LISTING OF PUBLICATIONS:

Published

- A. L. Pacheco. 1957. The length and age composition of spot, Leiostomus xanthurus, in the pound net fishery of lower Chesapeake Bay. Unpubl. M.A. Thesis, College of William and Mary. 34 pp.
- William H. Massmann and Anthony L. Pacheco. 1957. Shad catches and water temperature in Virginia. The Journal of Wildlife Management, Vol. 21 (3): 351-352.
- W. H. Massmann, J. P. Whitcomb, and A. L. Pacheco. 1958. Distribution and abundance of gray weakfish in the York River System, Virginia. Trans. of the 23rd North Atlantic Wildl. Conference, pp. 361-369.
- J. L. McHugh, R. T. Oglesby, and A. L. Pacheco. 1959. Length, weight, and age composition of the menhaden catch in Virginia. Limnol. and Oceanogr. Vol. 4(3): 145-162.
- William H. Massmann and A. L. Pacheco. 1960. Disappearance of young Atlantic croakers from the York River, Virginia. Trans. of Am. Fish. Soc., Vol. 89 (2): 154-159.
- William H. Massmann and A. L. Pacheco. 1961. Movements of striped bass tagged in Virginia waters of Chesapeake Bay. Chesapeake Sci., Vol. 2 (1-2): 37-44.

ANTHONY L. PACHECO

Published (Continued)

- Anthony L. Pacheco and George C. Grant. 1961. A-frame used as a towing aid for small boats. *Progressive Fish-Culturist*, Vol. 23(4): 161.
- Anthony L. Pacheco. 1962. Age and growth of spot in Lower Chesapeake Bay with notes on distribution and abundances of juveniles in the New York River System. *Chesapeake Sci.* Vol. 3(1): 18-28.
- Anthony L. Pacheco. 1962. Movements of spot, Leiostomus xanthurus, in the Lower Chesapeake Bay. *Chesapeake Sci.* 3(4): 256-257.
- Anthony L. Pacheco. 1963. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina, for F.Y. 1962. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 148-17.
- Anthony L. Pacheco. 1964. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina for F.Y. 1963. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 184: 10-11.
- Anthony L. Pacheco. 1964. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina for F.Y. 1963. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 198: 12.
- Anthony L. Pacheco and George C. Grant. 1965. Studies of the early life history of Atlantic menhaden in estuarine nurseries. Part 1 - Seasonal Occurrence of juvenile menhaden and other small fishes in a tributary creek of Indian River, Delaware, 1947-1958. U. S. Fish Wildl. Serv., Spec. Sci. Report -- Fish. No. 504: iii, 1-32.
- Anthony L. Pacheco. 1966. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina for F.Y. 1965. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 240: 19-21.
- John W. Reintjes and Anthony L. Pacheco. 1966. The relation of menhaden to estuaries. Symposium on Estuaries and Estuarine Animals. Am. Fish. Soc., Spec. Publ. 3: 50-58.
- Anthony L. Pacheco. 1967. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina for F.Y. 1966. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 264: 19-20.
- Anthony L. Pacheco. (ed.). 1973. Proceedings of a Workshop on Eggs, Larvae and juvenile stages of Fishes in Atlantic Coast estuaries. June 1968, U. S. Dept. of Comm., NOAA, NMFS, MACFC., Tech. Publ. 1. 338 p.

ANTHONY L. PACHECO.

Published (Continued)

- Anthony L. Pacheco. 1973. Alewife, blueback herring and American shad. In: Proceedings of a workshop on eggs, larvae and juvenile stages of fishes in Atlantic coast estuaries. U. S. Dept. of Comm., NOAA, NMFS, MACFC Tech. Publ. 1., June 1968.p. 266, 292-295.
- Anthony L. Pacheco. 1973. Striped mullet and white mullet. In: Proceedings of a workshop on eggs, larvae and juvenile stages of fishes in Atlantic coast estuaries. U. S. Dept. of Comm., NOAA, NMFS, MACFC Tech. Publ. 1., June 1968. p. 267.
- Anthony L. Pacheco and George C. Grant. 1973. Immature fishes associated with larval Atlantic menhaden at Indian River Inlet, Delaware, 1958-61. In: Proceedings of a workshop on eggs, larvae and juvenile stages of fishes in Atlantic coast estuaries. U. S. Dept. of Comm., NOAA, NMFS, MACFC Tech. Publ. 1, June 1968. p. 78-117.
- Co-compiler of Contributions to "The United States Marine Fisheries Resource, 1971", Wise, John P. (ed.). MARMAP Contrib. 1, 1974.
- Anthony L. Pacheco. 1975. Ichthyoplankton, finfish and shellfish surveys. (In): Marine Environmental Implications of Offshore Oil and Gas Development in the Baltimore Canyon Region of the Mid-Atlantic Coast. Proceedings of Estuarine Research Federation - Outer Continental Shelf Conference and Workshop. Dec. 2-4, 1974. p. 291-296.
- Chang, S. and A. L. Pacheco. 1975. An evaluation of the summer flounder population in Subarea 5 and Statistical Area 6. ICNAF Res. Doc. 75/69, June 1975, Ann. Meeting, ICNAF.

Publications in Preparation:

- Pacheco, A. L., Kroger, R. L., and J. Guthrie. Evolution of survey methods for estimating the abundance of juvenile menhaden. Fish. Bull. U. S. Fish Wildl. Serv.
- Anthony L. Pacheco and George C. Grant. Distribution, growth and numbers of juvenile menhaden in White Creek, Delaware.
- Anthony L. Pacheco and Cynthia Joyner. Distribution of juvenile fish in estuarine waters of the United States Atlantic Coast.

PRESENTATIONS BEFORE SCIENTIFIC SOCIETIES:

- Atlantic Estuarine Res. Society: Age and growth of the spot, Lieostomus xanthurus, in lower Chesapeake Bay. 1956.
- AERS: Relation of low water temperature to the catch of young Atlantic croakers in exploratory trawls in Chesapeake Bay. 1957.
- AERS: Results of tagging croakers, spot and sea trout in lower Chesapeake Bay. 1958.
- American Fisheries Society: Estimating relative abundance of juvenile menhaden. (Symposium on Estimation Techniques): 1965.

PRESENTATIONS BEFORE SCIENTIFIC SOCIETIES (Continued):

ASMFC: Symposium of estuarine fishes: Seasonal and annual variations in catch of larval fishes at Indian River, Delaware. 1969.

Estuarine Research Federation: Ichthyoplankton, Finfish and Shellfish Survey. 1974.

AFFILIATION IN SCIENTIFIC ORGANIZATIONS AND OFFICES HELD:

(Member)

Atlantic Estuarine Research Society, Sec.-Tres., 1958  
American Institute of Fishery Research Biologists  
American Fisheries Society (Cert. Fishery Scientist)  
Atlantic Fisheries Biologists  
Gulf and Caribbean Fisheries Institute  
American Littoral Society

CONSULTING ACTIVITIES:

Research Editor, Grolier, Inc.  
Preparation of "learning packages" in marine science, Brookdale Community College

SPECIAL PROFESSIONAL ASSIGNMENTS:

Member, NMFS Status-of-Stocks Committee, Assignment April-June, 1971, Washington, D. C.  
Member, American Fisheries Society: Committee on Conservation of Estuaries, 1971.  
Member, Hudson River Technical Committee, 1973 -  
Member, Central Office - Biostatistical Needs Committee  
Reviewer, Fishery Bulletin, Chesapeake Science  
Member, Regional Office - Program Integrations and Operations Committee, 1975.

SPORTFISH ANALYSIS INVESTIGATIONS

Published

- A. L. Pacheco. 1957. The length and age composition of spot, Leiostomus xanthurus, in the pound net fishery of lower Chesapeake Bay. Unpubl. M.A. Thesis, College of William and Mary. 34 pp.
- William H. Massmann and Anthony L. Pacheco. 1957. Shad catches and water temperature in Virginia. The Journal of Wildlife Management, Vol. 21 (3): 351-352.
- W. H. Massmann, J. P. Whitcomb, and A. L. Pacheco. 1958. Distribution and abundance of gray weakfish in the York River System, Virginia. Trans. of the 23rd North Atlantic Wildl. Conference, pp. 361-369.
- J. L. McHugh, R. T. Oglesby, and A. L. Pacheco. 1959. Length, weight, and age composition of the menhaden catch in Virginia. Limnol. and Oceanogr. Vol. 4(3): 145-162.
- William H. Massmann and A. L. Pacheco. 1960. Disappearance of young Atlantic croakers from the York River, Virginia. Trans. of Am. Fish. Soc., Vol. 89 (2): 154-159.
- William H. Massmann and A. L. Pacheco. 1961. Movements of striped bass tagged in Virginia waters of Chesapeake Bay. Chesapeake Sci., Vol. 2 (1-2): 37-44.
- Anthony L. Pacheco and George C. Grant. 1961. A-frame used as a towing aid for small boats. Progressive Fish-Culturist, Vol. 23(4): 161.
- Anthony L. Pacheco. 1962. Age and growth of spot in Lower Chesapeake Bay with notes on distribution and abundances of juveniles in the New York River System. Chesapeake Sci. Vol. 3(1): 18-28.
- Anthony L. Pacheco. 1962. Movements of spot, Leiostomus xanthurus, in the Lower Chesapeake Bay. Chesapeake Sci. 3(4): 256-257.
- Anthony L. Pacheco. 1963. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina, for F.Y. 1962. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 148-17.
- Anthony L. Pacheco. 1964. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina for F.Y. 1963. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 184: 10-11.
- Anthony L. Pacheco. 1954. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina for F.Y. 1963. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 198: 12.

SPORTFISH ANALYSIS INVESTIGATION

Published:

- Anthony L. Pacheco and George C. Grant. 1965. Studies of the early life history of Atlantic menhaden in estuarine nurseries. Part 1 - Seasonal Occurrence of juvenile menhaden and other small fishes in a tributary creek of Indian River, Delaware, 1947-1958. U. S. Fish Wildl. Serv., Spec. Sci. Report -- Fish. No. 504: iii, 1-32.
- Anthony L. Pacheco. 1966. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina for F.Y. 1965. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 240: 19-21.
- John W. Reintjes and Anthony L. Pacheco. 1966. The relation of menhaden to estuaries. Symposium on Estuaries and Estuarine Animals. Am. Fish. Soc., Spec. Publ. 3: 50-58.
- Anthony L. Pacheco. 1967. Menhaden Program: Estimation of juvenile abundance. In: Annual Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, North Carolina for F.Y. 1966. U. S. Fish Wildl. Serv., Bur. Comm. Fish. Circ. 264: 19-20.
- Anthony L. Pacheco. (ed.). 1973. Proceedings of a Workshop on Eggs, Larvae and juvenile stages of Fishes in Atlantic Coast estuaries. June 1968, U. S. Dept. of Comm., NOAA, NMFS, MACFC., Tech. Publ. 1. 338 p.
- Anthony L. Pacheco. 1973. Alewife, blueback herring and American shad. In: Proceedings of a workshop on eggs, larvae and juvenile stages of fishes in Atlantic coast estuaries. U. S. Dept. of Comm, NOAA, NMFS, MACFC Tech. Publ. 1., June 1968.p. 266, 292-295.
- Anthony L. Pacheco. 1973. Striped mullet and white mullet. In: Proceedings of a workshop on eggs, larvae and juvenile stages of fishes in Atlantic coast estuaries. U. S. Dept. of Comm., NOAA, NMFS, MACFC Tech. Publ. 1., June 1968. p. 267.
- Anthony L. Pacheco and George C. Grant. 1973. Immature fishes associated with larval Atlantic menhaden at Indian River Inlet, Delaware, 1958-61. In: Proceedings of a workshop on eggs, larvae and juvenile stages of fishes in Atlantic coast estuaries. U. S. Dept. of Comm., NOAA, NMFS, MACFC Tech. Publ. 1, June 1968. p. 78-117.
- Co-compiler of Contributions to "The United States Marine Fisheries Resource, 1971", Wise, John P. (ed.). MARMAP Contrib. 1, 1974.
- Anthony L. Pacheco. 1975. Ichthyoplankton, finfish and shellfish surveys. (In): Marine Environmental Implications of Offshore Oil and Gas Development in the Baltimore Canyon Region of the Mid-Atlantic Coast. Proceedings of Estuarine Research Federation - Outer Continental Shelf Conference and Workshop. Dec. 2-4, 1974. p. 291-296.
- Chang, S. and A. L. Pacheco. 1975. An evaluation of the summer flounder population in Subarea 5 and Statistical Area 6. ICNAF Res. Doc. 75/69, June 1975, Ann. Meeting, ICNAF.

SPORTFISH ANALYSIS INVESTIGATIONS

Freeman, B. L. and L. A. Walford. 1974. Anglers' Guide to the United States Atlantic Coast Fish, Fishing Grounds and Fishing Facilities. Sections I-IV. U. S. Dept. of Comm, NOAA, NMFS Publ.

Freeman, B. L. 1975. Shaeffer Saltwater Fishing Contest. Preliminary Report for 1974. 11 p.

In Press

Freeman, B. L. and L. A. Walford. Anglers' Guide to the United States Atlantic Coast Fish, Fishing Grounds and Fishing Facilities. Sections V-VIII. U. S. Dept. of Comm., NOAA, NMFS Publ.

Publications in Preparation:

Pacheco, A. L., Kroger, R. L., and J. Guthrie. Evolution of survey methods for estimating the abundance of juvenile menhaden. Fish. Bull. U. S. Fish Wildl. Serv.

Anthony L. Pacheco and George C. Grant. Distribution, growth and numbers of juvenile menhaden in White Creek, Delaware.

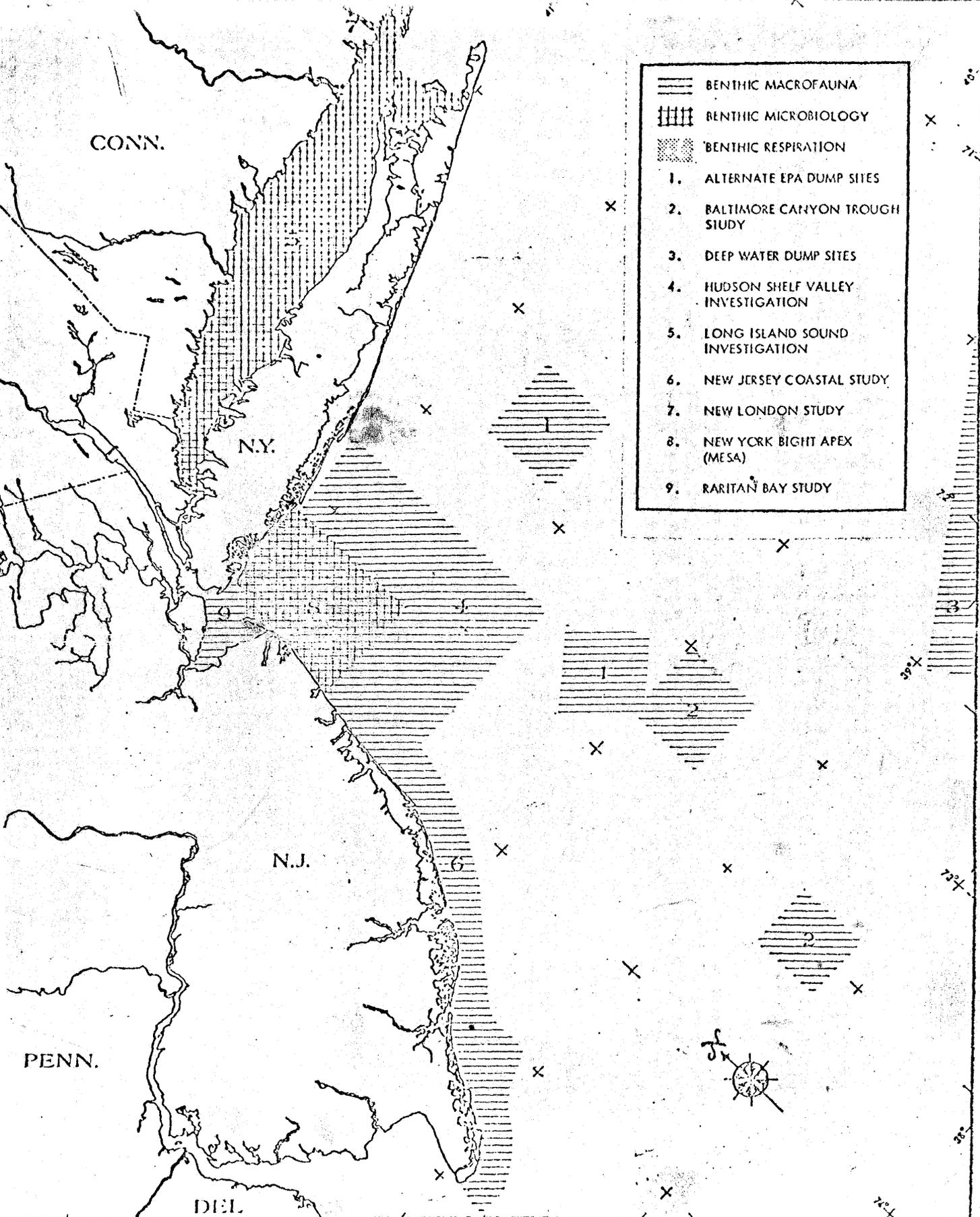
Anthony L. Pacheco and Cynthia Joyner. Distribution of juvenile fish in estuarine waters of the United States Atlantic Coast.

## ECOSYSTEMS INVESTIGATIONS

To an ever greater extent the yield of marine fisheries is dependent upon water quality in coastal marine environments. Anadromous species of fish and shellfish have traditionally been the first species affected by deteriorated coastal and estuarine waters. There seems little doubt, however, that the deterioration of coastal environments is having or will have an effect on coastal and offshore marine species which reproduce in or migrate through coastal and estuarine ecosystems.

The effects of deteriorated environments do not always impinge directly upon commercial and game finfish or shellfish; rather, polluted waters or physically disrupted environments may result in an elimination of or diminution in the standing crops of invertebrates important as forage species in marine food chains or disrupt the flora and fauna which play an important role in stabilizing marine sediments. Finally, invertebrate species, which are often attached forms unable to avoid polluted waters, are excellent indicator organisms which can be used to assess change in environmental quality.

The Ecosystems Investigations program was developed to provide data for a comprehensive overview of the coastal and estuarine environments of the Middle Atlantic Bight. This program includes a number of closely integrated investigations designed to provide data on baseline distributions and life histories of benthic, natatory and planktonic invertebrates and their relationships to marine and estuarine finfish; to determine the effects of pollution and environmental deterioration on the living resources of coastal and estuarine ecosystems; and to quantitate the distribution and abundance of marine microorganisms and of heavy metals, and to determine their effects on higher plants and animals.



- |    |                                   |
|----|-----------------------------------|
|    | BENTHIC MACROFAUNA                |
|    | BENTHIC MICROBIOLOGY              |
|    | BENTHIC RESPIRATION               |
| 1. | ALTERNATE EPA DUMP SITES          |
| 2. | BALTIMORE CANYON TROUGH STUDY     |
| 3. | DEEP WATER DUMP SITES             |
| 4. | HUDSON SHELF VALLEY INVESTIGATION |
| 5. | LONG ISLAND SOUND INVESTIGATION   |
| 6. | NEW JERSEY COASTAL STUDY          |
| 7. | NEW LONDON STUDY                  |
| 8. | NEW YORK BIGHT APEX (MESA)        |
| 9. | RARITAN BAY STUDY                 |

December 1974

NAME: John (Jack) B. Pearce

BIRTHPLACE AND DATE: Dearborn, Michigan; 20 September 1930

PERSONAL INFORMATION: Married; two children, 18 and 20.

MILITARY SERVICE: Sgt., Tank Co. - 158th regimental combat team,  
Arizona National Guard, 1951-1953  
Motor Sgt., Co. B - 95th Combat Engr. Bn.,  
Camp Desert Rock, Nev. 1953-1955

NON-ACADEMIC EMPLOYMENT: Arizona Fish and Game Commission  
Migratory waterfowl program, 1950-51,  
Summer 1955

EDUCATION:

High School: Wayne, Michigan - 1944-1948

College: Henry Ford Community College,  
Dearborn, Michigan  
1948-49

University of Arizona, Tucson  
1949-50, 1952-53 - Wildlife Mgmt.

Humboldt State College, Arcata, California  
1955-57 - B.A. degree in Conservation Education  
and General Biology

University of Washington, Seattle  
1957-1962 - M.S. and Ph.D. degrees in Zoology

Thesis Research:

M.S. degree - The biology of the mussel crab,  
Fabia subquadrata, from the waters of the San  
Juan Archipelago. 1960. 103 pp.

Ph.D. degree - The biology of some pinnotherid crabs  
from the waters of Puget Sound and the San Juan  
Archipelago. 1962. 279 pp.

Four summers in residence at the Friday Harbor  
Marine Laboratory, Friday Harbor, Washington.

COURSE WORK:

Undergraduate:

General Zoology  
Herpetology  
Ornithology  
Mammalogy  
Comparative Anatomy  
Embryology  
General Ecology  
Marine Ecology  
Mammalian Physiology  
Wildlife Management

Upland Game Bird  
Management  
Forestry and Lumbering  
Soil Science  
Plant Ecology  
Microtechnique  
General Chemistry  
Organic Chemistry  
General Geology  
Plant Taxonomy

Graduate:

Invertebrate Zoology  
Advanced Invertebrate Embryology  
General Physiology  
Advanced Invertebrate Zoology  
(C.M. Yonge on Mollusca)  
Systematic Zoology  
History of Zoology  
Advanced Mammalian Physiology  
Microscopic Anatomy (Medical School)  
Advanced Comparative Histology  
Physical Oceanography  
Advanced Ecology

Limnology  
Cellular Physiology  
Genetics  
Microbiology  
Advanced Phytoplankton  
Ecology  
Biochemistry  
Mycology  
Seminar  
Research  
Thesis

HONORS, ASSISTANTSHIPS AND FELLOWSHIPS:

Belle Vista Rod and Gun Club  
Fellowship, HSC, 1956-67

Hunt Fellowship, HSC, 1957  
Chi Sigma Epsilon, Scholastic Honorary, 1957

Valedictorian, HSC Graduating  
Class, 1957

Teaching Assistantship, University of Washington,  
1957-1959

HONORS, ASSISTANTSHIPS AND FELLOWSHIPS - Continued

Research Assistantship, Dr. Paul Illg,  
University of Washington, 1959

National Science Foundation Summer  
Cooperative Fellowship, Friday Harbor  
Marine Laboratories, 1959

National Institute of Health Predoctoral  
Fellowship, University of Washington, 1960-1962

National Institutes of Health Postdoctoral  
Fellowship, The University of Copenhagen's  
Marine Laboratory, Helsingør, Denmark,  
August-1962-August 1963

Research Associate, Systematics-Ecology Program,  
Marine Biological Laboratory, Woods Hole, Mass.,  
September 1963-June 1965

Advisory Council, American Littoral Society,  
June 1970-present

TEACHING EXPERIENCE:

Arcata, California, High School - General Biology and Education,  
1957; supervising teacher, Mr. Wally Padratti

University of Washington - Laboratory instructor:

General Biology, 1957-58; lecturers, Drs. Robert Fernald  
and Paul Illg

Embryology, 1958; lecturer Dr. Robert Fernald

General Zoology, 1958-59; lecturers, Drs. K. Osterud  
and Arthur Whitely

General Physiology; 1959; lecturer, Dr. Ernst Florey

Evolution; 1959; lecturer, Dr. Melville Hatch

Marine Biology; 1959; lecturer, Dr. Dixy L. Ray

Invertebrate Zoology, Summer, 1960; lecturers,  
Drs. Demorest Davenport and Pat Dudley

TEACHING EXPERIENCE - Continued

Woods Hole, Massachusetts - guest lecturer in Marine Ecology,  
a summer session

Humboldt State College - instructor (assistant professor) in:

General Biology, fall semester, 1965 and 1966

Invertebrate Zoology, fall semester, 1965

Marine Biology (for non-majors), spring semester, 1966

Ecology of Marine Animals, spring semester, 1966;  
this course was also given in an eight week long  
NSF supported Institute in Marine Science for high  
school and junior college instructors, summer  
sessions, 1965 and 1966

Marine Benthic Ecology, a graduate course offered fall  
semester, 1966

Advanced Marine Biology, a graduate course offered  
summer session, 1966

Graduate Seminar in Biology, offered spring semester,  
1966 and summer sessions, 1965 and 1966

Nassau College - lecturer in biological oceanography; ecology  
of the continental shelf and ecology of estuaries

Lehigh University - adjunct associate professor

Rutgers University, Livingston College - adjunct associate  
professor - marine ecology and nematology  
Ecology of Marine Animals, fall semester, 1970

Man and his Environment, 1970-1973 (guest lecturer)

ADMINISTRATIVE EXPERIENCE:

Project Leader, Sandy Hook Sport Fisheries Marine Laboratory -  
March 1967 to February 1971

Assistant Laboratory Director -  
February 1971 to May 1971

Acting Laboratory Director -  
May 1971 to August 1971

Officer-in-Charge, Sandy Hook Laboratory and Director of Ecosystems  
Investigation, Middle Atlantic Coastal Fisheries Center -  
August 1971 to present

Coordinator, Theme B (Effects of Man's Activities on the  
Marine Environment, February 1969 to present

NATIONAL AND INTERNATIONAL COMMITTEES:

Coordinator, International Biological Program (IBP) - Theme B -  
The Effects of Man's Activities on the Marine Environment,  
1969 to present. Editor, IBP - Theme B Synthesis Volume.

Member, Advisory Board, American Littoral Society, 1971-present.

Committee member, National Academy of Science, Committee on  
Aquatic Animal Health, 1972 to present.

Subcommittee member and Chairman, Interagency Scientific Advisory  
Subcommittee on Ocean Dredging and Spoiling, 1973 to present.

Committee member, Hudson River Interagency Policy Committee,  
1972 to 1973.

Member, Institut de la Vie committee on Thermal Additions and the  
Aquatic Ecosystem, Paris, 1973 to present; participated in  
Institut de la Vie symposiums, 1973 and September 1974.

Member, Board of Directors, Hudson River Environmental Society,  
January 1974 to present.

AFFILIATIONS:

American Association for the Advancement of Science  
Atlantic Estuarine Research Society  
Marine Biological Association of Scotland  
Marine Biological Association of the U.K.  
Phi Sigma Society - biological honorary  
Systematics Society, London  
Western Society of Naturalists  
American Littoral Society (member Board of Directors)  
International Biological Program (IBP) (PM) - coordinator  
Theme B, "Effects of Man's Activities on the Marine  
Environment"

MAJOR ORAL PRESENTATIONS:

- 1959 - Western Society of Naturalists; Biology of Pinnotherid Crabs
- 1961 - Friday Harbor Marine Labs; The Biology of Symbiotic Relationships
- 1962 - Danish Natural History Society; Biology of Pinnotherid Crabs
- 1963-65 - Systematics-Ecology Program (4) on Pinnotherid Crabs and Woods Hole Oceanographic Institution (2) Pinnotherid Benthic Ecology  
Bureau of Commercial Fisheries (W.H.) Pinnotherid Benthic Ecology  
Conference on Estuaries, Jekyll Isl., Ga.  
(panel discussion of benthos)
- 1964 - Marine Biological Lab joint meeting  
Invited participant in 3rd AIBS Interdisciplinary Conference on Marine Biology, Princeton, New Jersey
- 1965 - AAAS Meeting, San Francisco, California; The Effects of Pulp Mill Effluents on Marine Benthic Communities
- 1967 - Chairman of meeting on thermal pollution, held at Sandy Hook Sport Fisheries Marine Laboratory under aegis of International Biological Program, National Academy of Sciences

MAJOR ORAL PRESENTATIONS - Continued.

- 1968 - Co-chairman of Second Workshop on thermal addition, held at Chesapeake Biological Laboratory, Solomons, Md., 4-7 Nov.; presented paper concerning the effects of thermal additions on benthic fauns of Cape Cod Canal
- 1969 - Co-coordinator of International Biological Program (IBP): "Impact of Man's Activities on the Marine Environment"
- Invited participant in the National Academy of Sciences workshop on coastal wastes management, 6-12 July
- 1969 - Presented a paper on the zoogeographic distribution of epibenthic communities at the IV European Symposium on Marine Biology, Bangor, Wales, Gt. B., Sept. 1969
- Presented papers on the effects of solid waste disposal practices in the New York Bight at the International Biological Program Symposium, "Effects of Man's Activities on the Environment; Royal Society, London, Sept. 1969
- Presented seminar on solid waste disposal at the Woods Hole Oceanographic Institution evening seminar program, Oct. 1969
- 1970 - Presented paper, "Effects of solid waste disposal on benthic communities in the New York Bight" to Naval Research Laboratory (Nov., 1970) and UN-FAO Conference on Marine Pollution, Rome, Italy (Dec., 1970)
- 1971 - Invertebrate Resources of the New York Metropolitan area; seminar presented to Mayor's Oceanographic Advisory Committee and New York Institute of Ocean Resources, Nov., 1971
- 1972 - Invertebrates of the Hudson River Estuary; seminar presented to New York City College, March, 1972
- Practices, effects and impact of ocean dumping in the New York Bight; presentation to the President's Water Quality Advisory Council, Sept., 1972
- Ocean Disposal in the New York Bight; seminar presented to Dept. of Geological and Geophysical Sciences, Princeton University, Nov. 1972
- 1973 Effects of thermal-nuclear power plants on the marine environment. Institut de la Vie Symposium, Versailles, France, Oct. 1973. (paper to be printed in proceedings).

PUBLICATIONS:

- 1962 - Adaptation in symbiotic crabs of the family Pinnotheridae. The Biologist, 45(1):11-15.
- 1964 - On reproduction in Pinnotheres maculatus (Decapoda); (Pinnotheridae). Biol. Bull. 127(2):384.
- 1965 - On the distribution of Tresus capax and Tresus nuttallii in waters of Puget Sound and the San Juan Archipelago (Pelecypoda; Mactridae). The Veliger, 7(3):166-170.
- 1966 - Marine Biology, vol. 3. Ecology of the Invertebrates. W. T. Edmondson, ed. N. Y. Acad. Sciences, N. Y. C. 313 p.
- The biology of the mussel crab, Fabia subquadrata, from the waters of the San Juan Archipelago, Washington. Pacific Sci., 20(1):3-35.
- On Pinnixa faba and Pinnixa littoralis (Decapoda; Pinnotheridae) symbiotic with the clam, Tresus capax (Pelecypoda: Mactridae). In: Some contemporary studies in Marine Science, Harold Barnes, ed. George Allen and Unwin Ltd., Lond., pp. 565-589.
- On Lora trevelliiana (Turton) (Gastropoda: Turridae). Ophelia, 3:81-91.
- 1967 - The feeding and reproductive biology of the red whelk, Neptunea antiqua (L.) (Gastropoda, Prosobranchia), with Prof. Gunnar Thorson. Ophelia, 4:277-314.
- 1968 - Saucers in the sea; how do reefs increase productivity. Underwater Naturalist, 5(1):14-19.
- Oil pollution - a threat to marine resources and recreation. Underwater Naturalist, 5(2):6-10.
- Laboratory Investigation of the Effects of Thermal Additions on Marine Organisms Characteristic of Cape Cod Canal. Special Report to BSFW and New England Gas and Electric Assoc.
- 1969 - Marine Biology. In: Colliers Encyclopedia, Crowell-Collier Corp., New York, 33 pp.
- Several articles on invertebrates. In: Collier Encyclopedia, Crowell-Collier Corp., New York, approx. 40 pp.

PUBLICATIONS - Continued

1969 - Marine Biology. In: Colliers Merit Student Encyclopedia, Crowell-Collier Corp. 17 pp.

Investigations of effects of sewage sludge and acid wastes on offshore marine environments. Marine Pollution Bulletin, 7:5.

1970 - Thermal addition and the benthos, Cape Cod Canal. Chesapeake Sci., 10(3-4):227-233.

Marine Biogeography and Change. Ward's Bulletin 9(67):1-7.

Index to Issues 1-18 (old series) Marine Pollution Bulletin. Spec. Publication, Theme B, IBP-PM, 17 pp.

The effects of solid waste disposal on benthic communities in the New York Bight. Paper E-99, FAO Technical Conference on Marine Pollution and its effects on living resources, 12 pp.

IBP Report: Activities of Theme B, "The Effects of Man's Activities on the Marine Environment," 1969-70. Marine Pollution Bulletin, N.S.1(12):182.

1971 - Comparative investigations of the development of epibenthic communities from Gloucester, Massachusetts to St. Thomas, Virgin Islands. In: Proceedings, IV European Symposium on Marine Biology, Univ. North Wales, Bangor, ed. D. J. Crisp, Cambridge University Press, pp. 55-61.

The use of certain worm tubes and human artifacts as indicators of pollution by solid wastes. Marine Pollution Bulletin, N. S. 2(1):2 pp.

Analysis of larval settlement and succession. In: Studies on the effects of a steam-electric generating plant on the marine environment at Northport, New York. Technical Report #9, Marine Sciences Research Center, SUNY, Stony Brook, N. Y. pp. 75-79.

1972 - Marine Biology. In: Encyclopedia Americana Year Book, pp. 435-436.

Biological Survey of Submerged Refuse. Mar. Poll. Bull., 3(10):157-159.

Invertebrate Resources; available forms and potentials. In: Resources of the World's Oceans, ed. Henry R. Frey, New York Institute of Ocean Resources, Inc., N. Y., pp. 75-90.

## PUBLICATIONS - Continued

1973 - Marine Biology. 1973 Encyclopedia Americana Yearbook.

Trace metals in sediments of New York Bight. Marine Pollution Bulletin, 4: 132-5 (with D. Carmody and W. Yasso).

1974 - Invertebrates of the Hudson River Estuary. Ann. New York Acad. Sci. 250: 137-143.

Environmental impact of the construction phase of offshore floating or barge mounted nuclear power plants to be sited between Sandy Hook and Atlantic City, New Jersey. In: Biological Balance and Thermal Modifications. Institut de la Vie, Paris. pp. 83-96.

Regional coastal environmental consideration for offshore power plants; Sandy Hook to Atlantic City, New Jersey. In: Biological Balance and Thermal Modifications. Institut de la Vie, Paris. pp. 97-165.

## PAPERS IN PRESS:

Temperature and the distribution of Mytilus edulis. Prepared for submission to the Journal of Experimental Marine Ecology. ed. Harold Barnes.

## RECENT AND CURRENT RESEARCH:

- Denmark - Biology of marine benthic communities. Biology of the gastropods, Lora trevelliiana and Neptunea antiqua.
- Scotland - Comparative biology and marine benthic communities.
- Woods Hole - Biology of the pinnotherid crab, Pinnotheres maculatus. An investigation of an epibenthic mussel community in Quicks Hole, Elizabeth Islands, Mass.
- Humboldt College, California - An investigation of the effects of pulp mill effluent on offshore marine contaminants; a contract between the Georgia-Pacific Co., Crown-Zellerbach Corp. and Humboldt State College.
- Biology of pinnotherid crabs

## RECENT AND CURRENT RESEARCH - Continued

### Sandy Hook Laboratory, Highlands, New Jersey

- 1) The effects of temperature on the behavior, distribution, and reproduction of marine organisms.
- 2) The distribution of sessile and semi-motile epibenthic fauna. Consideration of larval ecology. Colonication, succession, and productivity in epibenthic ecosystem. Interactions of benthic invertebrates and fishes.
- 3) The effects of solid waste disposal on offshore benthic communities.
- 4) Comparative studies of selected estuaries.

### COMMUNITY ACTIVITIES:

Member, Fair Haven, N. J., Conservation Commission, 1969-72.

Advisor and instructor for Liberal Religious Youth (LRY),  
Unitarian Church of Monmouth County, N.J.

Instructor in Limnology (pond ecology) for the annual Fair Haven, N.J. public school outdoor education program held at Stokes Forest 4H camp. This is a one-week program for 6th grade students.

Guest lecturer at Brookdale Community College and the Sandy Hook State Park Nature Interpretive Center.

Merit badge advisor (Oceanography) for Boy Scout troops 24 and 25, Fair Haven, N.J.

Appointed member of Rumson-Fair Haven Regional High School Board.  
June 1971 to 1973.

ECOSYSTEMS INVESTIGATIONS

Principal Investigator: John B. Pearce, Director

PUBLICATIONS:

Carmody, D., J. Pearce and W. Yasso. 1973.

The distribution of five heavy metals in the sediments of New York Bight. Mar. Poll. Bull. 4(9):132-135.

Dean, D. 1975.

Raritan Bay macrobenthos survey, 1957-1960. NMFS Data Report 99. 51 pp.

Frame, D.W. 1973.

Biology of young winter flounder Pseudopleuronectes americanus (Walbaum); metabolism under simulated estuarine conditions. Trans. Amer. Fish. Soc. 102(2):423-430.

Frame, D.W. and S.A. Pearce. 1973.

A survey of the sea bass industry. Mar. Fish. Rev. 35(1-2): 19-26.

Koditschek, L. and P. Guyre. 1974.

Antimicrobial-resistant coliforms in New York Bight. Mar. Poll. Bull. 5(5):71-74.

Pearce, J.B. 1974.

Regional coastal environmental consideration for offshore power plants; Sandy Hook to Atlantic City, New Jersey. In: J.M. Peres (editor), Modifications thermiques et equilibres biologiques. p. 97-165. Institut de la Vie, Paris.

Pearce, J. B. 1974.

Environmental impact of the construction phase of offshore floating or barge mounted nuclear power plants to be sited between Sandy Hook and Atlantic City, New Jersey. In: J.M. Peres (editor), Modifications thermiques et equilibres biologiques. p. 83-96. Institut de la Vie, Paris.

Pearce, J.B. 1974.

Invertebrates of the Hudson River Estuary. Annals. N.Y. Acad. Sci. 250:137-143.

Pearce, J.B. 1975.

Benthic assemblages in the deeper continental shelf water of the Middle Atlantic Bight. In: Proceed. Conf. & Workshop on Mar. Environ. Implications of Offshore Oil & Gas Drilling in Baltimore Canyon of the Middle Atlantic Coast. Dec. 2-4, 1974. pp. 297-318.

ECOSYSTEMS INVESTIGATIONS

Principal Investigator: John B. Pearce, Director

IN PREPARATION:

Knatz, G.

An ecological study of the zooplankton of the Navesink River estuary before and after sewage abatement.

Pearce, J.B.

The importance of fisheries to the nonfisherman.  
For: NOAA Quarterly.  
Submitted.

Pearce, J.B.

Benthic communities and biological effects on benthic communities.  
For: New York Bight Atlas, Sections B1 and B4.

REPORTS:

Middle Atlantic Coastal Fisheries Center. 1974.

A preliminary investigation of the benthic resources at deep water disposal site 106. MACFC Informal Report No. 37. Oct. 74.

Middle Atlantic Coastal Fisheries Center. 1974.

Epibenthic and infauna baselines, alternative dump sites #1 and #2. MACFC Informal Report No. 39. Oct. 74.

ORGANIZATION: Sandy Hook Laboratory, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Highlands, N.J.

ACTIVITY AREA: Benthic baseline impact surveys and dynamics (benthic macrofauna, sediment types and contaminant burdens) in New York Bight Apex and outer Continental Shelf.

OBJECTIVE: To describe present benthic community structure in area of interest and to understand relationships between productivity of water column, benthic assemblages and demersal finfish and shellfish; to determine relationships between sediments and existing contaminant loads on macro - and meiofauna and monitor effects of new impacts and pollution abatement.

SUMMARY: Due to their sensitivity and convenience of study, benthic macrofauna are perhaps the group most suitable for use as biological indicators of environmental contamination. They are also important or dominant constituents in marine finfish food webs. Knowledge of their distribution, abundance, natural and man-induced fluctuations are of value in determining man's effects on the environment and thus are an indispensable aid in managing marine resources.

This investigation routinely uses Smith-McIntyre samplers and other devices to collect sediments, meio - and macrofauna from grids or transects of stations in the above investigation areas. Macrofauna are sieved to the 1 mm level and are identified to species whenever possible. As many as 20 replicate samples are collected per station. Statistical analyses of within-station faunal variability are used to determine the number of grabs which must be sorted to detect given differences in faunal parameters such as number of individuals, number of species, species diversity and equitability.

Effects of sediment type and constituents on macrofauna are examined using regression analysis. Clustering techniques are used to determine affinities between species and between stations. Long-term monitoring of stations selected from the cluster groups will enable detection of changes resulting from present and future impacts.

The resulting information is used to understand the relationship between contamination and stress and productivity of living marine resources, particularly cycling between the water column, benthic populations and finfish.

RESOURCES:           FY 74       70.5 K  
                      FY 75       104.8 K

SENIOR STAFF:       Dr. Kneeland McNulty

ORGANIZATION: Sandy Hook Laboratory, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Highlands, N.J.

ACTIVITY AREA: Seabed Oxygen Consumption in the New York Bight/Phytoplankton and Primary Productivity in the Lower Hudson Estuary.

OBJECTIVE: To determine and describe extant baseline conditions. To provide environmental managers with required information for proper management of the system.

SUMMARY: Seabed oxygen consumption measurements are indicative of the quantity of organic carbon (including organic carbon in sewage sludge and other waste and non-waste materials) oxidized per unit area per unit time. The measurement is also an indicator of seabed environmental conditions. Measurements have been made in March, August, December and February 1974-75. During the winter the highest rates of oxidation are associated with the waste disposal areas in the Apex. During the summer, however, the area associated with sewage sludge disposal exhibits depressed rates of oxidation (comparable to winter values) while peripheral areas are elevated. The summer measurements indicate that the area is being overstressed by present waste disposal practices. The proposed alternate waste disposal sites and continental shelf area within the New York Bight will be examined both for baselines and to assist in environmental management. The Apex area will continue to be investigated to determine regulative mechanisms and recovery rates.

In our investigations of phytoplankton and primary productivity in the Lower Hudson Estuary (Raritan, Lower, and Sandy Hook Bays) we are not only establishing baselines but are attempting to compare the distribution and abundance both seasonally and spatially of phytoplankton biomass and production with certain environmental variables to understand the regulation, significance, and contribution of phytoplankton to the New York Bight waters.

Measurements of phytoplankton biomass and production, nutrients, and other environmental variables were made each month beginning November 1973.

We found a shift in size of the phytoplankton from netplankton ( $> 20 \mu$ ), dominating during the fall, winter and spring bloom (March) periods, to nanoplankton ( $< 20 \mu$ ), dominating during the summer.

We found that the Sandy Hook, Lower, and Raritan Bays have much higher biomass and rates of primary productivity than either the rivers coming into the system or the Inner Bight to which the system overflows. We also found above average and often exceedingly high rates of release of dissolved organic carbon from phytoplankton within the system. The size shifts have particular significance to phytoplankton feeding organisms and their ability to handle particular food sources. The peculiar geographical distribution of phytoplankton production and biomass in these estuarine waters has particular significance in understanding the Inner Bight for management and regulation. The high rates of release of dissolved organic carbon from the phytoplankton have yet to be interpreted, but may have far ranging significance to the ecosystem and the living marine resources within it.

We have recently discovered evidence indicating that in the metropolitan area organic carbon imports to the system as particulate and dissolved detritus may be greater than those from primary productivity. We intend to investigate this possibility because it would mean that the detrital food chain or web would be of greater importance at lower trophic levels than the grazing food web. Such a reality would have significance in terms of understanding the system for management, including its living marine resources.

RESOURCES:           FY 74       164.5 K  
                      FY 75       326.1 K

SENIOR STAFF:       James P. Thomas

BIOLOGICAL OCEANOGRAPHY INVESTIGATIONS  
Principal Investigator: James P. Thomas

PUBLICATIONS:

- Cohn, M.S. and D. van deSande. 1974.  
Red tides in the New York-New Jersey coastal area.  
Underwater Naturalist 8(3):12-21.
- MacKenzie, Jr., C.L. 1975.  
Development of a program to rehabilitate the oyster industry  
of Prince Edward Island. Mar. Fish. Rev. 37(3):21-35.
- MacKenzie, C.L. 1974.  
Maryland's oyster seed areas in excellent condition for set.  
Commer. Fish. News (Dep. Nat. Resour., Md.) 7(5):1.
- Mahoney, J.B. 1974.  
Nutrition and physiology of Prorocentrum micans, Massartia  
rotundata, and Olisthodiscus luteus, isolated from blooms  
in New York Harbor and New Jersey coastal waters. Ph.D.  
Thesis, Fordham Univ. 113 p.
- Mahoney, J.B., F.H. Midlige and D.G. Deuel. 1973.  
A fin rot disease of marine and euryhaline fishes in the  
New York Bight. Trans. Amer. Fish. Soc. 102(3):596-605.
- Parker, R.O., R.B. Stone, C.C. Buchanan and F.W. Steimle, Jr. 1974.  
How to build marine artificial reefs. NOAA, NMFS Fishery  
Facts 10. 47 pp.
- Steimle, F. and R. Stone. 1973.  
Abundance and distribution of inshore benthic fauna off  
southwestern Long Island, New York. NOAA Tech. Rpt.  
NMFS-SSRF-673, p. 1-50. Dec. 73.
- Steimle, F. and R. B. Stone. 1973.  
Bibliography on artificial reefs. Coastal Plains Center for  
Marine Development Services. Publ. 73-2. 129 pp.
- Stone, R.B., C.C. Buchanan and F.W. Steimle, Jr. 1974.  
Scrap tires as artificial reefs. U.S. EPA Publ. (SW-119).  
33 pp.

IN PREPARATION:

- Phoel, W.C.  
The history, physics and physiology of saturation diving.

JAMES POSTLES THOMAS

Date & Place of Birth

July 28, 1939  
Washington, D. C.

Education

High School: St. Andrews School, Middletown, Delaware, 1953-58.

College: University of North Carolina, Chapel Hill, N.C. 1958-62, A.B.  
University of Georgia, Athens, Ga. 1962-70, M.S. & Ph.D.  
in Zoology

Thesis Research: M.S. Influence of the Altamaha River  
on primary production beyond the  
mouth of the river. 1966, 88 pp.

Ph.D. Release of dissolved organic matter  
from natural populations of marine  
phytoplankton. 1970, 131 pp.

Eighteen months in residence at Marine  
Institute, Univ. of Georgia,  
Sapleo Island, Georgia.

Experience prior to joining NMFS:

Research Aid under W. H. Amos, Univ. of Delaware Marine Laboratory, Lewes,  
Delaware, June-August 1958-60.  
Worked on an invertebrate faunal survey of the Delaware Estuary.  
R/V Acartia, University of Delaware, one 3-day cruise, 1958.

Research Assistant under Dr. B. J. Copeland, Univ. of Texas Institute of  
Marine Science, Port Aransas, Texas, June-August 1963. Investi-  
gated the stabilization times of industrial effluents entering  
certain Texas estuaries.

Research Assistant under Dr. L. R. Pomeroy, Dept. of Zoology, Univ. of  
Georgia, 1963-54.  
Investigated primary productivity off the Georgia coast.  
R/V Kit Jones, University of Georgia, 36 one-day cruises, 1964-65.

Teaching Assistant, Dept. of Zoology, Univ. of Georgia, 1965-66.  
Taught labs in limnology and oceanography, ichthyology, and verte-  
brate biology to graduates and undergraduates.

U.S.D.I. Aquatic Sciences Fellow, Dept. of Zoology, Univ. of Georgia, 1967-69.

Investigated the release of dissolved organic matter from natural populations of marine phytoplankton.

R/V Oregon, U.S.D.I. Bureau of Commercial Fisheries, Cruise 133, off SE coast of U. S. between Cape Hatteras and Straights of Florida 9-17 Sept. 1968.

R/V Eastward, Duke Univ., Cruises E-41-69, E-16-68, E-20-66, E-34-65, E-24-65, E-16-65, E-9-64, in the Sargasso Sea off North Carolina.

Teaching Assistant, Dept. of Zoology, Univ. of Georgia, 1969-70. Taught labs in limnology and oceanography and marine biology to graduates and undergraduates.

USNS Eltanin, National Science Foundation, U. S. Antarctic Research Program, Cruise 38, 54 days in Antarctic Ocean south of Tasmania, Australia 20 March - 13 May '69. To assist in the study of total plankton respiration in the Southern Ocean.

Georgia Power Company Postdoctoral Fellow, Dept. of Zoology, Univ. of Georgia, March-September 1970, (with Dr. E. P. Odum). Unpublished Ms.: Primary Productivity and Decomposition in the Altamaha River and the Dead River, an Oxbow of the River - the Effect of Tide Detergent and Chlorine on these Measurements. A study was conducted on the Altamaha River, Georgia, near the construction site of a nuclear plant. Directed 1 research assistant.

Research Associate, Dept. of Oceanography, Univ. of Washington, 1970-72. Awarded National Science Foundation grant GA 30880, "Release, Assimilation, and Oxidation of Phytoplankton-derived Dissolved Organic Matter". Directed one research assistant. Research accomplished on R/V Onar and R/V Hoh in Puget Sound and R/V Thompson in the North Pacific Ocean on Cruise TT-057 Seattle to Honolulu 1-15 March '71, Cruise TT-059 Hakodate (Japan) Seattle 7 May - 15 June '71, Cruise TT-060 off Washington-Oregon Coasts 6-16 July '71, and Cruise TT-070 off Washington-Oregon Coast 22 June - 12 July '72.

Was financial overseer for \$127,000 AEC grant studying the biology of the ocean off the Columbia River mouth. Organized a weekly seminar for biological oceanography; 1971-72. Taught part of a course organized by Dr. Karl Banse on methods of measuring standing crop and productivity in the marine environment.

Publications:

- 1971 The release of dissolved organic matter from natural populations of marine phytoplankton. *Marine Biology*, 11 (4):311-323.
- 1972 (with Hobbie, J. E., O. Holm-Hansen, T. T. Packard, L. R. Pomeroy, R. W. Sheldon, and W. J. Wiebe). A study of the distribution and activity of microorganisms in ocean waters. *Limnol. Oceanog.* 17 (4): 544-555.

In preparation:

(with Pomeroy, L. R. and W. J. Wiebe)

- Total metabolic processes in a transect of the Southern Ocean.  
3. Respiration of the plankton. (Submitted to *Marine Biology*).

Influence of the Altamaha River on primary productivity off the Georgia Coast, U.S.A. (prepared for submission).

Scientific Honors and Awards:

Phi Sigma Society, 1964

Teaching Assistantship, Department of Zoology, Univ. of Georgia, Athens, 1965-66, 1969-70.

U.S.D.I. Aquatic Sciences Predoctoral Fellowship, Department of Zoology, Univ. of Georgia, 1967-69.

Georgia Power Company Postdoctoral Fellowship, Dr. E. P. Odum, Univ. of Georgia, March-September 1970.

Sigma Xi Society, 1970

Research Associate, Department of Oceanography, Univ. of Washington, Seattle, 1970-72.

Awarded National Science Foundation grant GA 30880, 1971.

Major Oral Presentations:

1968. Lions Club, Athens, Georgia; Introduction to Oceanography.

1970. Department of Oceanography, Univ. of Washington, Seattle. Release of dissolved organic matter from natural populations of marine phytoplankton.

- 1971. St. Helen's School, Portland, Oregon. Career Day - Jobs in Oceanography.
- 1972. Oak Ridge National Laboratory, Environmental Sciences Division, Oak Ridge, Tennessee. Release, Assimilation and Oxidation of phytoplankton - derived dissolved organic matter.

Participation in Scientific Meetings, Technical Conferences and Workshops:

- 1964 - Conference on Estuaries, Jekyll Island, Ga.  
- American Society of Limnology and Oceanography Conf., Miami, Fla.
- 1971 - IBP Carbon cycle workshop, Seattle, Washington.
- 1972 - American Society of Limnology and Oceanography Conf., Tallahassee, Fla.  
- Biology of the Oceans Symposium, Corvallis, Oregon.  
- Benthic sampling workshop at Sandy Hook Laboratory, N. J.

Affiliations:

American Association for the Advancement of Science  
Ecological Society of America  
American Society of Limnology and Oceanography  
Sigma Xi Society  
Biological Association of the U. K. 1964-67.

Consulting Activities:

St. Helen's School, Portland,, Oregon. Career Day consultant in oceanography. 1971.

ORGANIZATION: Sandy Hook Laboratory, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Highlands, N. J.

ACTIVITY AREA: Behavior of marine fishes in the field and laboratory; Measures of environmental stress; Light and temperature.

OBJECTIVE: To observe and measure patterns of behavior as related to the normal habits of various marine fish species and to utilize these norms to measure and predict the effects of selected environmental stresses.

SUMMARY: The major aim of the program has been to study the behavior and life habits of various species of marine fish in both the field and laboratory. The results of these studies have been used to define normal environmental requirements and the effects of pollution stress on established norms of behavior.

Field studies have concentrated on observing and defining feeding habits, daily movements, relation to shelter and social interactions of benthic and demersal species including winter flounder, Pseudopleuronectes americanus, tautog, Tautoga onitis, and cunner, Tautogalabrus adspersus (see below for relevant references). Laboratory studies have centered on measuring rhythms of activity, feeding, schooling and territoriality under both normal and stress in various species including bluefish, Pomatomus saltatrix, Atlantic mackerel, Scomber scombrus, mullet, Mugil cephalus, tautog and cunner. The information gathered from the field studies on the life habits of various species has formed the basis for subsequent laboratory studies, while the laboratory studies concentrate on measuring stress by observing departures from established behavior norms. For example, the results of the field study on the life habits of tautog were largely responsible for our hypothesis regarding this species' response capability, which was subsequently tested and confirmed by experiments performed under controlled laboratory conditions. Much in the same manner results of field studies on cunner will provide the basis for laboratory research on response capability of this species, enabling us to make comparisons between two members of the same family. Comparisons among species studied have shown that the capability of each to survive stress is greatly dependent on the behavioral scope of responsiveness for that species.

Ref: See below for relevant articles and publications.

RESOURCES:           FY 74       117.5 K  
                      FY 75       117.7 K

SENIOR STAFF:       Bori L. Olla

RELEVANT ARTICLES AND PUBLICATIONS

- Olla, B.L. 1965. Rhythmic activity of bluefish, Pomatomus saltatrix, in relation to light. Amer. Zool. 5(4), (abstract).
- Olla, B.L. 1966. Biological rhythms in fishes and other aquatic animals. Underwater Naturalist 3(4):5-10.
- Olla, B.L. 1966. Studies on rhythms in a school of adult bluefish, Pomatomus saltatrix. Amer. Zool. 6(4), (abstract).
- Olla, B.L., W.W. Marchioni and H.M. Katz. 1967. A large experimental aquarium system for marine pelagic fishes. Trans. Amer. Fish. Soc., 96(2):143-150.
- Olla, B.L., and W.W. Marchioni. 1968. Rhythmic movements of cones in the retina of bluefish, Pomatomus saltatrix held in constant darkness. Biol. Bull. 135(3):530-536.
- Olla, B.L., R. Wicklund and S. Wilk. 1969. Behavior of winter flounder in a natural habitat. Trans. Amer. Fish. Soc. 98(4):717-720.
- Olla, B.L., H.M. Katz and A.L. Studholme. 1970. Prey capture and feeding motivation in the bluefish, Pomatomus saltatrix. Copeia 1970 (1):360-362.
- Olla, B.L., and A.L. Studholme. 1971. The effect of temperature on the activity of the bluefish, Pomatomus saltatrix L. Biol. Bull. 141:337-349.
- Olla, B.L. and A.L. Studholme. 1972. Daily and seasonal rhythms of activity in the bluefish, Pomatomus saltatrix. p. 303-326. In: H.E. Winn and B.L. Olla (ed.) Behavior of Marine Animals: Current Perspectives in Research. Vol. 2. Plenum Press, New York.
- Winn, H.E. and B.L. Olla (ed.). 1972. Behavior of Marine Animals: Current Perspectives in Research. Vol. 1: Invertebrates; Vol. 2: Vertebrates. Plenum Press, New York.
- Olla, B.L., C.E. Samet and A.L. Studholme. 1972. Activity and feeding behavior of the summer flounder (Paralichthys dentatus) under controlled laboratory conditions. Fish. Bull. U.S. 70(4):1127-1136.
- Olla, B.L., A.J. Bejda and A.D. Martin. 1974. Daily activity, movements, feeding and seasonal occurrence in the tautog, Tautoga onitis. Fish. Bull. U.S. 72(1):27-35.
- Olla, B.L. and C. Samet. 1974. Fish-to-fish attraction and the facilitation of feeding behavior as mediated by visual stimuli in striped mullet, Mugil cephalus. J. Fish. Res. Board Can. 31:1621-1630.

- Olla, B.L. (ed.). 1974. Behavioral Bioassays: behavioral measures of environmental stress. p. 1-31. In: G.V. Cox (Chairman). Proceedings of a Workshop on Marine Bioassays. Marine Technology Society, Washington, D. C.
- Olla, B.L. 1974 (review)
- Cairns, John Jr. and K.L. Dickson (ed.). 1973. Biological Methods for the Assessment of Water Quality. American Society for Testing and Materials. Philadelphia. review in press in Trans. Amer. Fish. Soc.
- Olla, B.L. and C. Samet. 1975. Behavior of marine organisms as a measure of petroleum contamination. p. 437-450. In: Proceedings of the Conference and Workshop on Marine Environmental Implications of Offshore Oil and Gas Development in the Baltimore Canyon Region of the Middle Atlantic Coast. Dec. 2-4, 1974, held in College Park, Maryland.
- Olla, B.L., A.J. Bejda, and A.D. Martin. Activity, movements, and feeding behavior of the cunner, Tautogolabrus adspersus, and comparison of food habits with young tautog, Tautoga onitis off Long Island, New York. In press. Fish. Bull. 1975.
- Olla, B.L. and A.L. Studholme. The effect of temperature on the behavior of young tautog, Tautoga onitis (L.). (In Press). Proc. 9th Europ. mar. biol. Symp. 1975. p. 75-93.
- Olla, B.L., A.L. Studholme, A.J. Bejda, C. Samet and A.D. Martin. The effect of temperature on the behavior of marine fishes: A comparison among Atlantic mackerel, Scomber scombrus, bluefish, Pomatomus saltatrix, and tautog, Tautoga onitis. For publication in: Proceedings of IAEA Symposium on the Combined Effects on the Environment of Radioactive, Chemical and Thermal Releases from the Nuclear Industry, Stockholm, Sweden, June 2-6, 1975.
- Fine, M.L., H.E. Winn and B.L. Olla. (In Press). Communication in fishes. In: T. A. Sebeok (ed.). Animal Communication: Techniques of Study and Results of Research. Indiana University Press, Bloomington.

Bori L. Olla

BIRTH DATE: January 22, 1937  
Jersey City, New Jersey

EDUCATION AND TRAINING:

Undergraduate - B.S. in Biology, 1959, Fairleigh Dickinson University,  
Rutherford, N. J. Major: Biology. Minor: Chemistry & English.

Graduate - 3½ years

1962 - M.S. in Marine Zoology, University of Hawaii, Honolulu, Hawaii.

1962-63 - Graduate studies in Zoology, University of Maryland,  
College Park, Maryland.

1963 - Graduate studies in Neurology, Seton Hall Medical School,  
Jersey City, N. J.

EXPERIENCE BEFORE JOINING NMFS:

2/59 - 6/59 Teacher, Newark Public Schools, Newark, New Jersey.

9/59 - 6/60 Biology and Advanced Biology Teacher, Long Branch High School,  
Long Branch, New Jersey.

2/62 - 8/62 Instructor in Biology, Chaminade College of Honolulu,  
Honolulu, Hawaii.

12/63 to present - Sandy Hook Sport Fisheries Marine Laboratory, National  
Marine Fisheries Service, Highlands, New Jersey 07732.

FELLOWSHIPS, RESEARCH AND TEACHING ASSISTANTSHIPS:

6/61 - 9/61 Research Assistant, University of Hawaii, Shark Behavior,  
Honolulu, Hawaii.

9/61 - 2/62 Bureau of Commercial Fisheries, Research Assistantship,  
supported for the completion of Masters Thesis, Honolulu,  
Hawaii.

9/62 - 6/63 Teaching Assistantship - Zoology Department, University of  
Maryland, College Park, Maryland.

6/63 - 9/63 Training Fellowship (Summer) National Institutes of Health  
(NINDB) Maryland, (Fish Neurology).

9/63 -12/63 Research Assistantship - (Neurology) Seton Hall College of  
Medicine, Jersey City, New Jersey.

ARTICLES AND PUBLICATIONS:

1962 The perception of sound in small hammerhead sharks, Sphyrna lewini.  
(Masters Thesis).

1965 Rhythmic activity of bluefish, Pomatomus saltatrix, in relation to  
light. Amer. Zool. 5(4), (abstract).

- 1966 Biological rhythms in fishes and other aquatic animals. Underwater Naturalist 3(4):5-10.
- 1966 Studies on rhythms in a school of adult bluefish, Pomatomus saltatrix. Amer. Zool. 6(4), (abstract).
- 1967 A large experimental aquarium system for marine pelagic fishes. Trans. Amer. Fish. Soc. 96(2):143-150. (Published with W. Marchioni and H. Katz).
- 1967 Daily and seasonal rhythms of activity in bluefish, Pomatomus saltatrix. Proc. 12th Inter. Gamefish Conf., p. 64-65.
- 1968 Rhythmic movements of cones in the retina of bluefish, Pomatomus saltatrix, held in constant darkness. Biol. Bull. 135(3):530-536. (published with W. Marchioni).
- 1969 Behavior of winter flounder in a natural habitat. Trans. Amer. Fish. Soc. 98(4):7, 7-720. (published with R. Wicklund and S. Wilk).
- 1970 Prey capture and feeding motivation in the bluefish, Pomatomus saltatrix. Copeia 1970(2):360-362. (published with H. Katz and A. Studholme).

ARTICLES IN PRESS:

- 1971 The effect of temperature on the activity of bluefish, Pomatomus saltatrix L. To be published in Biol. Bull. (Oct.). (published with A. Studholme).
- 1972 Daily and seasonal rhythms of activity in the bluefish, Pomatomus saltatrix. In: Behavior of Marine Animals--Recent Advances. (Winn and Olla, eds.) Plenum Press, N. Y. (Published with A. Studholme).
- 1972 Behavior of Marine Animals--Recent Advances. H.E. Winn and B. L. Olla, editors. Plenum Press, N. Y.

Manuscripts in Preparation:

- 1971 Activity and feeding of summer flounder, Paralichthys dentatus.
- 1971 The effect of temperature on the activity of Atlantic mackerel, Scomber scombrus.

PAPERS PRESENTED BEFORE SCIENTIFIC SOCIETIES:

"Rhythmic Activity of Bluefish, Pomatomus saltatrix, in Relation to Light." Given at the annual meeting of the American Association for the Advancement of Science, Berkeley, California. (1965).

Presiding chairman at a special symposium on biological rhythms at the New Jersey Academy of Sciences annual meeting. Presented a paper entitled "Activity Rhythms in the Bluefish, Pomatomus saltatrix." (1966).

Invited participant at the International Conference on Lateral Receptors held under the auspices of the American Museum and Yeshiva University. Member of a panel discussing "Conjectural Aspects on Behavior and the Lateral Line." (1966).

Participant at a special symposium entitled "Current Advances in the Study of Marine Animal Behavior," held in conjunction with the American Association for the Advancement of Science annual meeting in Washington, D. C. Presented a paper entitled "Studies on Rhythms in a School of Adult Bluefish, Pomatomus saltatrix." (1966).

Invited participant at the Annual Game Fish Conference in San Juan, Puerto Rico, November 1967. Paper presented was entitled "Daily and Seasonal Rhythms of Activity in Bluefish."

Attended International Gamefish Conference in Miami, Florida and chaired a panel discussion on gamefish biology. (1968).

Invited attendee at 11th Annual Ethological Conference in Rennes, France. Participated in discussions on schooling behavior and feeding motivation. (1969).

Invited participant at the Bureau of Sport Fisheries and Wildlife Physiology Workshop in La Crosse, Wisconsin. (1969).

AFFILIATION IN SCIENTIFIC ORGANIZATIONS AND OFFICES HELD:

New York Academy of Sciences  
American Association for the Advancement of Science  
Animal Behavior Society

ORGANIZATION: Sandy Hook Laboratory, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Highlands, N. J.

ACTIVITY AREA: Benthic baseline impact surveys (sediment types and constituents, benthic macrofauna) in Raritan Bay, Long Island Sound, New Jersey Coast and contiguous Outer Continental Shelf.

OBJECTIVE: To describe present benthic conditions throughout the above areas, determine effects of sediment type and existing contaminant loads on macrofauna, and monitor effects of new impacts.

SUMMARY: Due to their sensitivity and convenience of study, benthic macrofauna are perhaps the group most suitable for use as biological indicators of environmental contamination. They are also often important constituents in marine food webs. Knowledge of their distribution, abundance, natural and man-induced fluctuations are of value in determining man's effects on the environment and thus are an aid in managing marine resources.

This investigation routinely uses Smith-McIntyre samplers to collect sediments and macrofauna from grids or transects of stations in the above survey areas. Macrofauna are sieved to the 1 mm level and are identified to species whenever possible. As many as ten replicate samples are collected per station. Statistical analyses of within-station faunal variability are used to determine the number of grabs which must be sorted to detect given differences in faunal parameters such as number of individuals, number of species, species diversity and equitability.

Effects of sediment type and constituents on macrofauna are examined using regression analysis. Clustering techniques are used to determine affinities between species and between stations. Long-term monitoring of stations selected from the cluster groups will enable detection of changes resulting from present and future impacts.

RESOURCES:           FY 74       135.0 K  
                      FY 75       492.9 K

SENIOR STAFF:       Robert N. Reid

COASTAL ECOSYSTEMS INVESTIGATIONS:  
Principal Investigator: Robert Reid

PUBLICATIONS:

McGrath, R.A. and J.P. Thomas. 1973.  
Requiem for a heavy weight; A call to action. Underwater  
Naturalist 8(2):4-13.

McGrath, R.A. 1974.  
Benthic macrofaunal census of Raritan Bay - preliminary  
results. Pap. No. 24; Proc. 3rd Symp. Hudson R. Ecol.;  
Mar. 22-23, 1973. Bear Mt., N.Y.; Hudson R. Environ. Soc.

REPORTS:

Middle Atlantic Coastal Fisheries Center. 1974.  
Preliminary draft. A proposal for an environmental survey of  
effects of dredging and spoil disposal in the Thames River  
and New London dumping ground. MACFC Informal Report No. 25.  
6 May 74.

Middle Atlantic Coastal Fisheries Center. 1974.  
A proposal for an environmental survey of effects of dredging  
and spoil disposal in the Thames River and New London Dumping  
Ground. MACFC Informal Report No. 25-A. 21 May 74.

Middle Atlantic Coastal Fisheries Center. 1974.  
An environmental survey of effects of dredging and spoil  
disposal, New London, Connecticut: 1st quarterly report.  
MACFC Informal Report No. 40. 1 Nov. 74.

Middle Atlantic Coastal Fisheries Center. 1974.  
Environmental baselines in Long Island Sound, 1972-1973.  
MACFC Informal Report No. 42. Dec. 74.

Middle Atlantic Coastal Fisheries Center. 1975.  
An environmental survey of effects of dredging and spoil  
disposal, New London, Connecticut: 2nd quarterly report.  
MACFC Informal Report No. 49. 7 Feb. 75.

Middle Atlantic Coastal Fisheries Center. 1975.  
A proposal for biological survey of an alternate site for  
disposal of dredging spoils from Thames River, Connecticut.  
MACFC Informal Report No. 50. 28 Feb. 75.

Middle Atlantic Coastal Fisheries Center. 1975.  
An environmental survey of effects of dredging and spoil  
disposal, New London, Connecticut: 3rd quarterly report.  
MACFC Informal Report No. 62. 5 May 75.

Robert N. Reid

BIRTH DATE:

17 July 1945

BIRTH PLACE:

Plainfield, New Jersey

#### EDUCATION AND TRAINING:

Undergraduate: B.A., Biology, 1967, Dartmouth College, Hanover, New Hampshire

Graduate: Duke University, Durham, North Carolina, 1967-68 and 1970-71.

Approximately 40 graduate credits including advanced courses in mathematics, physics, cytology, genetics, invertebrate biology and marine physiological ecology.

#### HONORS:

Biology honors at Dartmouth, 1963-67.

#### FELLOWSHIPS:

NSF Traineeship at Duke, 1967-68.

#### EXPERIENCE BEFORE JOINING NMGS:

4/71-present: Fishery Biologist (Research), NMFS, Dept. of Commerce, NOAA, Sandy Hook Laboratory, Highlands, New Jersey.

12/68-9/70: Military service (Army-interpreter-translator).

6/67-9/67: Assistant Biologist, New Jersey State Fish Hatchery, Hackettstown, New Jersey.

#### LISTING OF REPORTS AND PUBLICATIONS:

NMFS, MACFC, 1972. Davids Island Phase I: A short-term ecological survey of western Long Island Sound. Informal Report No. 7. 32 pp. (with C. Gibson, L. Rogers and N. Eisele).

Robert N. Reid

- 2 -

REPORTS AND PUBLICATIONS IN PREPARATION:

Environmental baselines in Long Island Sound, 1972-73. 63 pp. (in review; for MACFC Informal Report series).

Benthic macrofauna of Long Island Sound, Summer 1972. (for Journal of Marine Research.

ORAL PRESENTATIONS:

Fifth Annual Long Island Sound Conference. January 1973. White Plains, New York. "Baseline survey of Long Island Sound, Summer 1972."

Nassau-Suffolk Subsection, American Chemical Society, Conference on Contaminants in Marine Waters of Long Island. April 1974. Hempstead, New York. "Environmental Survey of Western Long Island Sound, 1971-72."

AFFILIATION IN SCIENTIFIC ORGANIZATIONS:

Estuarine Research Federation  
New England Estuarine Research Society

ACADEMIC LIAISONS:

Contract Monitor for the following investigations: Sediment Distributions in Long Island Sound (Dr. James Parks, Lehigh University - 1973-74); Sublittoral Meiobenthos of Long Island Sound (Dr. John Tietjen, City University of New York - 1973-74); Effects of Dredging on the Thames River, Connecticut (University of Connecticut - 1974-76); Effects of Spoil Disposal at the New London Dumping Ground (New York Ocean Science Laboratory - 1974-76).

Judge, New Jersey Junior Academy of Science Projects, 1973, 1974.

ORGANIZATION : Sandy Hook Laboratory, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Highlands, New Jersey.

ACTIVITY AREA: Pollutant heavy metals; metal-organic interactions; effects of metals and metal-organic combinations on living marine resources and on physiological and biochemical subsystems thereof.

SUMMARY : Many of the marine and estuarine environments of the Middle Atlantic coastal area are considerably contaminated with organics and heavy metals resulting from sewage sludge, dredge spoil and chemical dumping which has occurred for more than fifty years (MACFC, Sandy Hook Lab report to Army Corps of Engineers, 1972). Although some quantitative information is available concerning the amounts of metals in marine environments, especially in sediments, far too little is known about binding or chelation to organics, adsorption on particulate material or even inorganic combinations and states of the metals. Knowledge of the forms and combinations of contaminant metals is crucial in understanding their effects upon marine animals.

We are investigating several aspects of this problem, including metal determination in the water column by the sensitive method of anodic stripping polarography, by use of ultraviolet irradiation (220 nm) to destroy organic moieties, by use of ion exchange, filtration, equilibrium dialysis and chromatographic methods to study binding.

The second thrust of our investigation involves analysis of effects of metals, and of their organically bound forms, on living organisms and on biochemical systems within marine animals. Such studies include assays of effects of contaminants on the enzymes, ATPase and glutamic dehydrogenase, and on such physiological mechanisms as osmoregulation, respiration, and metabolism in crabs, lobster, and shrimp.

By combining our chemical studies of metal-organic interactions with investigations of effects on organisms we hope to gain a better understanding of the real role of these contaminants in the marine ecosystem.

RESOURCES : FY 74 89.5 K  
FY 75 111.1 K

SENIOR STAFF : Robert K. Tucker

BIOCHEMICAL MODELING INVESTIGATION

Principal Investigator: Robert K. Tucker

PUBLICATIONS:

Tucker, R.K. and J.D. Costlow, Jr. 1975.  
Free amino acid changes in normal and eyestalkless megalopa larvae of the blue crab, Callinectes sapidus, during the course of the molt cycle. Comp. Biochem. Physiol. Vol. 51A, pp. 75-78.

Young, J.S. 1973.  
A marine kill in New Jersey coastal waters. Mar. Poll. Bull. 4(5): p. 70.

Young, J.S. and C.I. Gibson. 1973.  
Effect of thermal effluent on migrating menhaden. Mar. Poll. Bull. 4(6):94-96.

Young, J. 1974.  
Menhaden and power plants - a growing concern. Mar. Fish. Rev. 36(10):19-23.

IN PREPARATION:

Gopalan, U.K. and J.S. Young.  
Incidence of shell disease in the caridean shrimp Crangon septemspinosa Say in the New York Bight.

Young, J.S. and A. Frame.  
The effects of a power plant effluent on estuarine epibenthic organisms.  
For: Internationale Revue der Gesamten Hydrobiologie. Hamburg, Germany.  
Accepted.

Young, J.S. and J.B. Pearce.  
Shell disease in crabs and lobsters collected from the New York Bight.  
For: Mar. Poll. Bull.  
Accepted.

REPORTS:

Middle Atlantic Coastal Fisheries Center. 1974.  
Proposal (to U.S. Army Corps of Engineers) for study of availability of sediments adsorbed heavy metals to benthos with particular emphasis on deposit feeding infauna (DMRP No. Y132-1D06). MACFC Informal Report No. 31. 15 Jul. 74.

QUALIFICATIONS AND SCIENTIFIC CONTRIBUTIONS:

## A. Education

B.A., Biochemistry, University of California, Berkeley, California 1963.

M.A., Biology, Humboldt State College, Arcata, California 1967.

Thesis: Changes in the Crystalline Style of Mytilus californianus.

Ph.D., Zoology, Duke University, Durham, North Carolina 1971.

Thesis: Developmental and Environmental Effects on Free Amino Acids in Larvae of the Stone Crab, Menippe mercenaria (Say).

Research projects: Endocrinology and amino acid metabolism of blue

crab larvae (with Dr. John Costlow). Whole animal calorimetry and

anaerobic metabolism of toadfish (under direction of Dr. Knut Schmidt-Nielsen).

## B. Experience prior to joining NMFS

1. Research Assistant, Duke University Marine Laboratory 1970-71.

2. Investigator, North Carolina Board of Science & Technology 1969-70.

3. Predoctoral Fellow, U. S. Public Health Service 1967-69.

4. Instructor in Marine Biology for National Science Foundation Summer Program for gifted High School Students, Humboldt State College 1967.

5. Instructor in Biology, Humboldt State College 1967.

6. Teaching Assistant, Biology, Humboldt State College 1966.

7. Research Technician for Dr. R.L. Lyman, Department of Nutritional Sciences, University of California 1963-65. Research in amino acid, protein and lipid metabolism, pancreatic secretion, and enzyme biochemistry.

8. Laboratory Technician, FMC Corporation, Newark, California 1960-62. Research project on use of sea-water derived magnesium and laboratory testing of phosphate chemicals.

9. Laboratory Technician, Holly Sugar Corporation, Tracy, California 1958-60. Research project on enzyme (invertase) hydrolyzing sugar and laboratory testing of sugar during processing.

## C. Oral Presentations and Participation in Scientific Meetings

Oral Presentations:

1. Institute of Electrical and Electronic Engineers, Newark, N. J. May 1972. The Measurement of Effects of Pollution on Marine Life.

2. Oak Ridge National Laboratory, Oak Ridge, Tennessee June 1972. Amino Acid Metabolism in Crustacean Larvae.

3. City University of New York February 1973. Osmoregulation in Marine Invertebrates.

4. American Chemical Society, Long Branch, N. J. February 1972. Effects of Pollution on Marine Organisms in the New York Bight.

5. Marine Technology Seminar, Montauk, New York May 1972. Careers in the Marine Sciences.

Meetings:

1. Federation of American Societies for Experimental Biology  
Atlantic City, N. J. April 1972.
2. Symposium - Pollution and the Physiological Ecology of Estuarine  
and Coastal Water Organisms, Georgetown, South Carolina. Nov. 1973.
3. Symposium - Properties and Functions of Na+K+ ATPase, New York  
Academy of Sciences, New York. Nov. 1973.

D. Publications

Tucker, R. and Costlow, J.D.Jr., 1974. Free Amino Acid Changes in Normal and Eyestalkless Megalopa Larvae of the Blue Crab, Callinectes sapidus During the Course of the Molt Cycle. Comp. Biochem. Physiol. (in press).

Tucker, R. Developmental and Environmental Effects on Free Amino Acids in Larvae of the Stone Crab, Menippe mercenaria (Say). (in prep.).

R. L. Lyman, Shirley Thenen, and R. Tucker. 1965. Pancreatic enzymes in rats fed DL-ethionine with and without ATP. Federation Proc. 24: 246.

R. L. Lyman, Shirley Thenen, and R. Tucker. 1966. Effect on the rat pancreas of feeding DL-ethionine, with and without adenosine triphosphate for 1 to 10 days. Canadian J. Biochem. 44: 1345-1355.

E. Academic Liaisons

1. Presently serving on doctoral committee of Angela Cantelmo at City University of New York and supervising her research at Sandy Hook Laboratory.
2. Supervision of several other students in special school projects carried out at the Sandy Hook Laboratory (Howard Ostran, Christopher Green, Stephen Swartz).

F. Organizations

Marine Biological Association of the United Kingdom.  
American Association for the Advancement of Science.  
International Association for Ecology.

ORGANIZATION: Milford Laboratory, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Milford, Conn.

ACTIVITY AREA: Environmental Chemistry and Microbiology, Mid-Atlantic Coastal and Offshore Area

OBJECTIVE: To identify and quantify major microbial communities and heavy metal pollutants in marine animals and their environs.

SUMMARY: Contamination and organic loading of the fisheries environment by ocean dumping (dredge and sewage), discharges and runoffs from contiguous land masses results in increase in chemical pollutants, bacterial numbers and types. These pollutants can affect the viability of the fisheries as well as place limitations on their utilization. Thus the identification and quantitation of these pollutants are important for the proper management and expansion (aquaculture) of the fisheries, particularly the inshore areas.

In this investigation the areas of the Mid-Atlantic Coastal Offshore regions are being examined for several select heavy metals and bacterial types in the fisheries, food chain organisms and bottom sediments. Although the activity is primarily concerned with the inshore environs, offshore areas are not excluded.

Precedent for the chemical studies of this investigation was established by the mercury problem in the fisheries which surfaced several years ago. Many fish species and marine animals have been examined for the presence of this element. In addition, a survey of over 2,000 individual animals of 40 species of finfish from North Atlantic waters have been examined for mercury. Except for the levels in spiny dogfish, levels of mercury in these fish species were shown to be less than the action level proposed by the F.D.A. The mercury survey has been extended to include the capability of analysis for other elemental chemical species (Cd, Ag, Pb, Sn, Cu, Ni, Sb, Zn, Cr, Fe) as well as in other marine food chain organisms and bottom sediments from select fisheries environments. Areas of the Mid-Atlantic region most thoroughly studied to date, are the New York Bight and Long Island Sound. Sediments from some 160 stations in Long Island have been examined for 11 heavy metals, fecal coliforms and other select pathogenic and toxicogenic bacteria. Studies in

the New York Bight are related to the ocean dumping of sewage and associated problems (migration, alternate sites). New York Bight studies are in cooperation with the MESA project. In addition to obtaining baseline data, uptake and clearance studies of select metals in several animal species are being performed in the laboratory. These are in cooperation with other investigations studying additional aspects of metal toxicities in marine animals.

The microbiological activity of the task is related to outlining areas of fecal contamination of the inshore fisheries environment and looking for the presence of select groups of bacteria. As indicators of fecal pollution, thus the possible presence of pathogenic bacteria, fecal coliforms distribution in the top layer of sediments has been determined in Long Island Sound and New York Bight area.

In addition to fecal coliforms, studies included are total bacterial numbers, both aerobic and anaerobic, presence of certain biochemical types and those organisms which belong to the genus Clostridium and Vibrio. The former genus include perfringens, another indicator of fecal contamination, as well as other toxin producing types - i.e. botulinum. The Vibrio group of organisms are of importance since species belonging to this genus have been implicated in fish diseases, (fin rot) (anguillarum) and diseases in man (parahaemolyticus). Fin rot disease has been shown to occur in the New York Bight fisheries. Results obtained to date show various degrees of fecal pollution in inshore areas as well as variability of numbers of those select groups of bacterial being examined.

RESOURCES:           FY 74       194.0 K  
                      FY 75       156.7 K

SENIOR STAFF:       John T. Graiksoki, Ph.D.

## BIOGRAPHICAL SKETCH

JOHN THOMAS GRAIKOSKI

Born: June 7, 1924, Wakefield, Michigan.  
Married, 4 children.

Education:

- (a) Graduate - Wakefield Township High School, 1942.
- (b) College of City of New York, 6 months, 1943.
- (c) Gogebic Junior College - 946-47.
- (d) B. S. Zoology - University of Michigan, 1949.
- (e) M. S. Bacteriology - University of Michigan, 1952.
- (f) Ph.D. Bacteriology - University of Michigan, 1961.

Military Service:

S/Sgt, 3 years, 1 year, ETO, Airborne Infantry.

Positions Held:

- (a) June 1950-September 1953, Research Assistant, Department of Bacteriology, Fission Products Laboratory, University of Michigan.
- (b) September 1953-July 1957, Graduate Research Assistant, Department of Bacteriology, University of Michigan.
- (c) 1957-1961, Assistant Research Bacteriologist, Department of Bacteriology, University of Michigan.
- (d) 1961-1964, Associate Research Bacteriologist, Department of Chemical Engineering, University of Michigan.
- (e) 1964-1971, Microbiologist GS-12 and Supervisory Microbiologist GS-13, U. S. Department of Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, Ann Arbor, Michigan.
- (f) 1971-present, Supervisory Microbiologist, GS-13, National Marine Fisheries Service, NOAA, Milford, Connecticut.

Resume' of Research Experience

Research experience has been in the following areas:

- (a) Evaluation of new antiseptics, disinfectants and antibiotics for use in hospital laboratories.
- (b) Effect of ultra-violet radiation on media constituents needed for growth of Lactobacillus arabinosus.
- (c) Effect of electromagnetic radiation (ultraviolet, X-ray, and gamma radiation from Cobalt-60) on microorganisms (bacteria, yeasts, molds, and viruses).
- (d) Evaluation of high intensity gamma radiation for the sterilization and pasteurization of foods and other heat sensitive material and substances. Extensive studies, mostly of survey type, were made to determine the effect of gamma radiation on the color, odor, taste and keeping quality of a wide variety of fruits, vegetables, grains, meats, fish and dairy products. More detailed studies were made on the determination of the optimal radiation dose for preservation. The sterilization of grafts, bone and aortas, as well as materials used in human surgery, was evaluated. A procedure for the sterilization of human bone was developed which is being used routinely at present. The use of gamma radiation for the sterilization of media constituents used in tissue culture work, as well as antibiotics and vitamin preparation was evaluated.

- (e) Studies on the evaluation and development of dosimetric procedures for the measurement of high intensity gamma radiation.
- (f) The effect of gamma radiation on the spores of C. botulinum types A and B and putrefactive anaerobes in phosphate buffer and representative food products. Extensive studies were conducted on determination of the destruction of botulinum spores by heat and gamma radiation and the factors which affect the resistance of the spores to radiation. The following types of investigations were carried out:
1. Studies on the factors affecting the growth, sporulation, and toxin production of C. botulinum types A and B. Methodology in reference to the enumeration of anaerobic spores.
  2. The effect of gamma radiation and heat when applied independently, in combination, and simultaneously on the destruction of botulinum spores in phosphate buffer was determined. Application of this technique was evaluated in food products in an extensive series of experiments.
  3. Using known number of spores, the radiation sterilization dosage was determined for raw and cooked meat.

4. The use of radiation for the sterilization of cured meat products, as well as the effect of the curing ingredients--i.e., NaCl, NaNO<sub>2</sub>-- on the outgrowth of botulinum spores was determined. As a corollary to the latter experiments, the effect of metal ions for reversing the inhibitory effect of nitrite was studied.

(g) The more recent studies were concerned with the physiological factors which affect growth and toxin formation of various strains of C. botulinum type E. These included the determination of the outgrowth potential in fishery products at low temperatures of incubation, as well as the heat and radiation resistance of spores from various strains.

1. The inhibition of Clostridium botulinum type E in smoked fish by the salts, sodium chloride and nitrite.
2. Outgrowth of Clostridium botulinum type E spores in radiation pasteurized marine and fresh water fish.
3. Thermal Resistance and outgrowth potential of type E spores in Blue crab meats.

(h) Ecology of Clostridium botulinum in the Great Lakes and of Marine Environment (North Atlantic and Chesapeake Bay).

1. Relationship of Environmental Factors (fish mortalities

as related to waterfowl die-offs on the Great Lakes.

- (i) Use of Goldfish for the detection and assay of botulinum toxin.
- (j) Fluorescent antibody technique for the identification of Clostridium botulinum.
- (l) Problems related to the outgrowth of Salmonella and spoilage bacteria on smoked fish.

Present position description:

Is responsible for the design, negotiation, supervision, and coordination of contract research effected with universities and private research firms. Develops the broad research program and determines those portions most effectively prosecuted by contract research. By keeping abreast with the research field, is able to offer constructive suggestions to the contractors research. Reviews, correlates, and summarizes contract status and prepares reports as necessary for the supervisor and for publication in various journals or at scientific meetings. Is responsible for the design and conduct of the laboratory program of microbiology and its correlation with other laboratory programs. The laboratory microbiology program deals generally with anaerobic bacteriology, particularly of the Clostridium type, emphasizing basic methodology development for culture techniques, identification of the various states of specific bacterial strains and their toxins and protoxins, physiological and biochemical characteristics, and various measurement techniques for characteristics of the bacterial cultures and their toxins, including biochemical, immunological, serological, and microscopic techniques. Establishes suitable safety protocol for the laboratory and personnel who are working with, or may come in contact with, pathogenic or toxicogenic bacteria.

Conducts examinations as appropriate of the aquatic environment and related ecological factors of microorganisms to the biomass, as well as of fishery plants and products, relating to product quality, safety, and regulatory and consumer acceptance. Investigates the effect of particular and specific processing and handling techniques for fishery products as related to bacterial destruction, lag, outgrowth potential, and sporulation characteristics, such as (but not limited to) the effects of gamma irradiation on in vivo and in vitro cultures of C. botulinum as affected by synergistic agents of various chemical and physical agents.

Presentation of Papers Before Scientific Societies :

1. Factors affecting the toxin production by Clostridium botulinum type E, American Society for Microbiology, Cleveland, Ohio, May 5-9, 1963. Bacteriol. Proceed. 1963, P. 8.
2. Factors affecting the production of toxin by Clostridium botulinum Michigan Branch, Society American Microbiologists, May 1963.
3. Heat resistance of Clostridium botulinum type E spores, Michigan Branch, Society American Microbiologists, December 7, 1963.
4. Heat resistance of Clostridium botulinum type E, American Society for Microbiology, Washington, D. C., 1964. Bacteriol. Proceed. 1964, P. 3.
5. General characteristics of Clostridium botulinum type E. Michigan Association of Sanitarians Annual Conference, East Lansing, Michigan, March 18, 1964.
6. Characteristics of C. botulinum type E. Winter Meeting, Great Lakes Section, Institute of Food Technologists, February 14, 1964, Ann Arbor, Michigan.

7. Microbiology studies on Lake Ontario. Eighth Conference on Great Lakes Research, Ann Arbor, Michigan, March 29-30, 1965.
8. Processing variables as related to smoked fish. Annual Meeting, National Fisheries Institute, Washington, D. C., April 30, 1965.
9. Heat and radiation resistance of C. botulinum type E. spores. Atlantic Fisheries Technologists Conference, Charlottetown, Prince Edward Island, October 4, 1965.

Membership in Professional and Scientific Societies:

- (a) Phi Sigma
- (b) Sigma Xi
- (c) Society of American Microbiologists
- (d) Wildlife Disease Association

Participation in Technical Conferences and Workshops :

1. GMC Contractors Meeting "Microbiological Aspects of Our Radiation Preservation of Foods Project," June 22-23, 1960, Chicago, Illinois, Also, National Research Council Advisory Committee to U. S. Army--Microbiological Aspects of Radiation Sterilization, June 23, Chicago, Illinois.
2. United States Atomic Energy Commission Contractors Conference, "Radiopasteurization of Fish and Fresh Fruits and Vegetables," October 1962, 1963, 1964, and 1965, Washington, D. C.
3. Dosimetry Workshop, January 15-16, 1962; April 22-24, 1964, Brookhaven National Laboratory, Upton, New York.
4. Interagency Botulism Research Coordinating Committee Meetings, Washington, D. C., February 1964, July 1964, and October 1964. March 15-16, 1965, October 25-26, 1965.
5. Meetings of Governor's Committee on Botulism Control, October, December 1963, February 1964, Lansing, Michigan.
6. "Management for Supervisors" course given by BCF training officer, Paul E. Vaniman, March 1965, Ann Arbor, Michigan.

Special Assignments:

Acting Secretary - Interagency Botulism Research Coordinating  
Committee, February - 1965-1971.

Member - Panel on Toxic Microorganisms of the Joint U.S.-Japan  
Cooperation on the Development of Natural Resources, 1964-present.

Travel to Japan in connection with the above program. 1966, 1969,  
1971.

Consultant Activities:

Member - Governor's Committee on Botulism Control, State of Michigan  
December 1963-1965.

Lecturer - NSF Summer Course, University of Michigan, Handling of  
High Intensity Radiation Sources and Biological Effects of Radiation. 1963.

Visiting Lecturer - Department of Wildlife and Fisheries, University of  
Michigan, Course: Fisheries Technology and Economics, 1966.

Committee Doctoral- Dr. R. A. Robohm, Thesis.

Publications of John T. Graikoski

- Effect of Cobalt-60 Gamma Radiation on Microorganisms (with C. A. Lawrence, and L. E. Brownell), *Nucleonics* 11, 9-11 (1953).
- Sterilizing Food by Cold Gamma Rays (with L. E. Brownell and C. A. Lawrence), *Refrigerating Engineering* 61, 55 (1953).
- Ray-Sterilizing Food Wrappers (with L. L. Kempe and L. E. Brownell), *Food Engineering* 25, 55 (1953).
- Gamma Ray Sterilization of Canned Meat Previously Inoculated with Anaerobic Bacterial Spores (with L. L. Kempe and R. A. Gillies), *J. Applied Microbiol.* 2, 330 (1953).
- Use of Tissue Culture Mediums Sterilized with Gamma Radiation from Cobalt-60 (with Donald Merchant, Richard Stewart, and L. L. Kempe), *Proceed. Soc. for Expt'l. Biol. and Med.* 86, 128-131 (1954).
- Increasing Refrigerated Storage Life of Fresh Foods by Gamma Irradiation (with L. E. Brownell, R. C. Dennis and L. L. Kempe), *Refrigeration Engineering*, March 3-8 (1955).
- Bacteriological Aspects of Ionizing Radiation in Food Processing (with L. L. Kempe, P. F. Bonventre and N. Williams), TID 7512, U. S. Govt. Printing Office, 256-263 (Jan. 1956).
- Combined Irradiation-Heat Processing of Canned Foods. I. Cooked Ground Beef Inoculated with *Clostridium botulinum* Spores (with L. L. Kempe and P. F. Bonventre), *Applied Microbiol.* 5, 292-295 (1957).
- Combined Irradiation-Heat Processing of Canned Foods. II. Raw Ground Beef Inoculated with Spores of *Clostridium botulinum* (with L. L. Kempe and P. F. Bonventre), *Applied Microbiol.* 6, 261-263 (1958).
- Combined Irradiation-Heat Processing of Canned Foods. III. Cooked Ground Beef Inoculated with Spores of a Putrefactive Anaerobe (with L. L. Kempe and P. F. Bonventre), *Applied Microbiol.* 7, 131-134 (1959).
- Combined Irradiation-Heat Processing of Canned Foods: Green Peas Inoculated with Anaerobic Bacterial Spores (with L. L. Kempe and P. F. Bonventre), *J. Biochem. and Microbiol. Tech. and Engr.* 2, 1-8 (1960).
- Effect of Metallic Iron on the Spoilage of Canned Pork Luncheon Meat (with L. L. Kempe), *Food Tech.* 13, 650-651 (1959).
- The Simultaneous Lethal Effect of Temperature and Gamma Radiation on Bacterial Spores. Ph.D. Thesis, University of Michigan, Ann Arbor, Michigan (1961).

Effects of Field-Strength, Beam Energy and Intermittent Irradiation on the Lethality of Gamma Radiation for Spores of Clostridium botulinum (with L. L. Kempe), Atom praxis, Copy 12, 467-470 (Dec. 1962).

Gamma-ray Sterilization and Residual Toxicity Studies of Ground Beef Inoculated with Spores of Clostridium botulinum (with L. L. Kempe), Applied Microbiol. 18, 102-104 (1962).

Sterilization of Barley Malt with Gamma Radiation (with L. L. Kempe, J. R. Stratton, H. H. Day), Agric. and Food Chem. 12, 98-100 (1964).

Effect of Gamma Irradiation on the Spoilage of Canned Pork Luncheon Meat (with L. L. Kempe), Food Tech. 18, 134-136 (1964).

Metals for Food Containers: The Electro-motive Series and Clostridium botulinum (with L. L. Kempe), Food Tech. 18, 102-104 (1964).

Publications:

Graikoski, J. T. and L. L. Kempe (1962).

A Study of the Effect of Ionizing Radiation on Resistance Germination, and Toxin Synthesis of Clostridium botulinum spores, Types A, B and E. TID - 25178, Clearing House for Federal Scientific and Technical Information, National Bureau Standards, U. S. Department of Commerce, Springfield, Virginia 22151

Graikoski, J. T. and L. L. Kempe, 1963, TID 25179, IBID.

Robohm, R. A., and Graikoski, J. T., (1966) Variables Affecting Enumeration of bacteria in Lake Michigan Waters and Sediments. Proceedings Conference on Great Lakes Research, 15 140-146, University of Michigan.

Graikoski, J. T. (1969), Seafoods and Botulism. Proceed. Technical Conference on Fish Inspection and Quality Control, 1969, Halifax, Canada, Food and Agriculture Organization of the United Nations, Rome, Italy.

Graikoski, J. T., E. W. Bowman, R. A. Robohm, and R. A. Koch (1969). Distribution of Clostridium botulinum in the EcoSystem of the Great Lakes, 271-278. Proceed. of the First U. S.-Japan Conference on Toxic Microorganisms, Honolulu, Hawaii, 1968. Superintendent of Documents, U. S. Government, Printing Office, Washington, D. C. 20402.

Graikoski, J. T. (1969) Outgrowth of Clostridium botulinum type E in Radiation-Pasteurized Fish. IBID, 450-453.

Graikoski, J. T., (1970) Microbiology of Cured and Fermented Fishery Products; Proceedings of the Conference on the Sanitary Quality and Microbiol Safety of Fishery Products. San Juan, Puerto Rico, 1969, In Microbiol Aspects of Food Safety (In Press), Academic Press, Inc., N. Y. 10003.

Petition to Permit the Addition of Sodium Nitrite in Smoked Chub. To Food and Drug Administration, Filed April, 1969, Accepted December, 1969, 21-CFR-121-1230.

Petition to the Food and Rug Administration, as amendment to 21-CFR-121 1230. Filed August 26, 1971.

ENVIRONMENTAL CHEMISTRY & MICROBIOLOGY INVESTIGATIONS  
Principal Investigator: John T. Graikoski

PUBLICATIONS:

- Dudley, S., J.T. Graikoski, H.L. Seagran and P.M. Earl. 1973.  
Sportsman's guide to handling, smoking, and preserving coho  
salmon. NMFS Extension Publication. Fishery Facts-5.  
28 pp.
- Graikoski, J. 1973.  
Microbiology of cured and fermented fish. In: Microbial  
Safety of Fish Products. Acad. Press, N.Y. (C.O. Chicestre  
and H.D. Graham, Eds.) p. 99-110.
- Greig, R.A., A.E. Adams, and B.A. Nelson. 1974.  
Physiological response of the cunner, Tautogolabrus adspersus,  
to cadmium. II. Uptake of cadmium by organs and tissues  
NOAA Tech. Rpt. NMFS SSRF-681:5-9.
- Greig, R.A., B.A. Nelson and B.A. Nelson. 1975.  
Trace metals in the American oyster. Mar. Poll. Bull.  
6(5):72-73.
- Robohm, R.A. 1974.  
Different pH optima in the two steps of an indirect  
fluorescent antibody reaction for Clostridium botulinum  
type E. Applied Microbiol. 27:179-184.
- Robohm, R.A. 1974.  
Gradient technique to test the effects of substances on  
fluorescent antibody reactions. Applied Microbiol. 27:259-261.
- Robohm, R.A. and M.F. Nitkowski. 1974.  
Physiological response of the cunner, Tautogolabrus adspersus,  
to cadmium. IV. Effects on the immune response. NOAA  
Tech. Rpt. NMFS SSRF 681.
- IN PREPARATION:
- Babinchak, J. and J.T. Graikoski.  
Fecal coliform in marine sediments. Abstract. Amer. Soc.  
Limnol. and Oceanography. Paper presented June 1974.
- Greig, R.A.  
Comparison of atomic absorption and neutron activation  
analyses for the determination of silver, chromium, and  
zinc in various marine organisms.  
For: Analytical Chemistry.  
In press.
- Greig, R.  
Trace metal concentrations in fish and shellfish collected  
from three ocean dump site areas in inshore waters of the  
Middle Atlantic Bight.  
In lab review.

ENVIRONMENTAL CHEMISTRY & MICROBIOLOGY INVESTIGATIONS  
Principal Investigator: John T. Graikoski

IN PREPARATION: (cont'd)

Greig, R.A. and J. Jones.

Nondestructive neutron activation analysis of marine organisms collected from ocean dump sites of the middle eastern United States.

For: Dept. of Agric. Biochem., U. of Hawaii. Arch. Env. Cont. & Toxic.

Accepted.

Greig, R.A. and J. Krzynowek.

Mercury concentrations in three species of tuna collected from various oceanic waters.

For: Bull. Environ. Contamination and Toxicology.

In lab review.

Greig, R.A., D. Wenzloff and C. Shelpuk.

A survey of mercury concentrations in fish from North Atlantic offshore waters.

For: Pesticides Monitoring Journal

Submitted.

Greig, R.A., D. Wenzloff, C. Shelpuk and A. Adams.

Mercury concentrations in three species of fish from North Atlantic offshore waters.

For: J. Fish Res. Board Canada.

Submitted.

Thurberg, S.P., M.A. Dawson, W.D. Cable, J.R. MacInnes and D.R. Wenzloff.

Physiological effects of silver on larval juveniels and adult surf clams, Spisula solidissima.

For: Symposium on Marine Respiration.

In press.

REPORTS:

Middle Atlantic Coastal Fisheries Center. 1972.

Cooperative study of contaminants in the coastal environment and their effects on living marine resources: Summary report, 1971-1972. MACFC Informal Report No. 5. pp. 5-25 and 45-75.

Middle Atlantic Coastal Fisheries Center. 1974.

Coliform and metal concentrations in sediments from the Atlantic and Long Beach area - New York Bight, January 15-17, 1974. MACFC Informal Report No. 22. 15 Mar. 74.

ENVIRONMENTAL CHEMISTRY & MICROBIOLOGY INVESTIGATIONS  
Principal Investigator: John T. Graikoski

REPORTS: (cont'd)

Middle Atlantic Coastal Fisheries Center. 1974.

A multilaboratory cooperative study of contaminants in the coastal environment and their effects on living marine resources: Summary report on operations from May 1, 1972 to December 31, 1973. MACFC Informal Report No. 26. May 74. pp. 40-90.

Middle Atlantic Coastal Fisheries Center. 1974.

Distribution of five metals in sediments from the New York Bight. MACFC Informal Report No. 36. Sep. 74.

Middle Atlantic Coastal Fisheries Center. 1974.

Trace metals in marine biota and sediments collected from offshore waters of New York Bight. MACFC Informal Report No. 38. Oct. 74.

Middle Atlantic Coastal Fisheries Center. 1974.

Distribution of fecal coliforms in sediments and water from the Thames River and New London dumpsite - Long Island Sound. MACFC Informal Report No. 43. Dec. 74.

Middle Atlantic Coastal Fisheries Center. 1975.

Ratios of metals in sediments collected from the New York Bight. MACFC Informal Report No. 44. Jan. 75.

Middle Atlantic Coastal Fisheries Center. 1975.

Further analyses of heavy metals in sediments collected from the outer New York Bight. MACFC Informal Report No. 63. May 75.

REPORT IN PREPARATION:

Middle Atlantic Coastal Fisheries Center.

Distribution of trace metals in bottom sediments of Long Island Sound. MACFC Informal Report No. 47.

## EXPERIMENTAL BIOLOGY INVESTIGATIONS

There exists, at all levels of both the public and the private sectors, considerable alarm that the living marine resources of the estuarine, coastal and offshore waters of the Middle Atlantic Bight are being adversely affected by extensive offshore dumping of untreated wastes and by run-offs of highly polluted waters. The mode and intensity of such adverse physiological effects is largely unknown. Baseline findings of marine environmental quality cannot be interpreted without such knowledge nor can rational water quality standards be established or enforced when such knowledge is lacking. Quantitative, controlled exposure experiments, both static and chronic, on living organisms, and involving all stages in their life histories, followed by a battery of analytical tests are necessary to permit evaluation, standards development, successful enforcement, and resource conservation. Present programs are designed to (1) determine lethal effects of a large variety of known pollutants on the larval, juvenile and adult stages of molluscs, crustaceans, and finfish as well as on marine phytoplankton and benthic fauna inasmuch as these form the base of the food chain for all living marine organisms; (2) determine the long-term sub-acute effects of exposure to a large variety of known pollutants on the larval, juvenile and adult stages of molluscs, crustaceans and shellfish; (3) define the physiological and biochemical pathways affected and relate them to the metabolic disorders, tissue abnormalities, etc., which result in death or permanent damage to the living marine organisms; (4) determine effects of marine pollutants on the chromosomes, and genetic development of the American oyster, *C. virginica*, initially, and on other fish and shellfish; and (5) evaluate findings in terms of specific pollutants and of population genetics. Effective March 1, 1975, funds were reprogrammed within the Center to begin aquaculture studies in genetics, nutrition, and disease, reinstating aquaculture as a major research area of the Center after a hiatus of five years.

Emphasis in the reestablished aquaculture investigations will be placed on molluscan genetics, nutrition, and disease control. Initially, genetics will concentrate on selective breeding of oysters; nutrition will concentrate on definition of algal nutrients for oysters, and disease work will concentrate on hatchery diseases of molluscan larvae. Longer term research, with expected additional funding, will encompass broader objectives, but will continue to emphasize molluscan aquaculture research and development.

JAMES ELDEN HANKS

<u>Date &amp; Place of Birth</u>	<u>Local Residence</u>	<u>Marital Status</u>
April 24, 1924 Augusta, Maine	Cottage Street Fort Trumbull Beach Milford, Conn. 06460	Margaret V. Brown Gregory M. Hanks

Education

	<u>Years</u>	<u>Degree</u>	<u>Major</u>	<u>Minor</u>
<u>Secondary</u>				
High School of Commerce Springfield, Massachusetts	1939-1942	Diploma	--	--
<u>College</u>				
American International College Springfield, Massachusetts	1948-1950	--	Biology	--
University of New Hampshire Durham, New Hampshire	1950-1952	B. A.	Zoology	Chemistry
University of New Hampshire Durham, New Hampshire	1952-1953	M. S.	Marine Zoology	Botany
University of Hawaii Honolulu, Hawaii	1953-1955	--	Marine Zoology	--
Marine Biological Laboratory Woods Hole, Massachusetts	1957 (summer)	--	Marine Embryology	
University of New Hampshire Durham, New Hampshire (Major Adviser - Dr. George M. Moore)	1957-1960	Ph. D.	Marine Zoology	Botany

Post-Doctoral (Administration)

January- May 1962	Division of Biological Research, Bureau of Commercial Fisheries Training Program, Washington, D. C.
January 22- 26, 1962	U. S. Civil Service Commission, Middle Management Institute, Washington, D. C.

Post-Doctoral (Administration) (Cont'd)

February- George Washington University, Washington, D. C.  
May 1962 Administrative Management

February- American University, Washington, D. C.  
May 1962 Research Management

Feb. 28- U. S. Civil Service Commission, Executive Seminar Center,  
March 11, Kings Point, New York  
1966 International Affairs and Federal Operations

Military Service

U. S. Army Signal Corps - 1942-1948 (Pacific Theatre - 1943-1946)  
Staff Sergeant, Communications and Cryptographic Chief

Present Position

Career - 482 Title of position - Fishery Biologist  
Date - October 23, 1966 (Res. Administration), GS-15

Experience Prior to Appointment to Present Position

Research

1952-1953 Research Assistant in Marine Biology, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts.  
Field-survey study of shellfish resources in Massachusetts waters and experimental studies of shellfish predation by boring gastropods.

1954 Research Assistant, Hawaii Marine Laboratory, University of Hawaii. (summer)  
Faunal survey of Kaneohe Bay, Oahu.

1955-1956 Fishery Research Biologist, GS-9, Bureau of Commercial Fisheries, Biological Laboratory, Milford, Connecticut.  
Project Leader for biological study of shellfish predators and development of predator control methods.

1957-1960 Graduate Fellow/Employee, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts.

Studies of reproduction, larval development and early life history of shellfish predators and development of propagation techniques for commercial bivalve molluscs. (1957-1959)

Experience Prior to Appointment to Present Position (Cont'd)

Research (Cont'd)

Research Associate on National Science Foundation Grant 8905 for the study of environmental factors influencing the reproductive cycles of benthic marine invertebrates. (1959-1960)

Research Administration

- 1960-1962 Assistant Laboratory Director and Program Chief, GS-12, Bureau of Commercial Fisheries, Biological Laboratory, Oxford, Maryland.  
Ecology and physiology of shellfish.
- Oct. 1962- Supervisory Fishery Biologist (Res. Administration), GS-13,  
Nov. 1963 Bureau of Commercial Fisheries, Biological Laboratory, Milford, Connecticut.
- Nov. 1963- Fishery Biologist (Res. Administration), GS-14, Bureau of  
Oct. 1966 Commercial Fisheries, Biological Laboratory, Milford, Connecticut.

Teaching

- 1953-1955 Teaching Assistant in Zoology, University of Hawaii.  
Conducted laboratories with lectures in General Zoology, Histology and Parasitology.
- 1958 & 1959 Guest Lecturer, Marine Ecology Course. (summers)  
Marine Biological Laboratory, Woods Hole, Massachusetts.
- 1968-1969 Ph. D. Committee Member, Graduate School, University of Connecticut, Storrs, Connecticut.
- 1971- Adjunct Professor, Department of Biology, Fairfield University, Fairfield, Connecticut.

Editorial

- 1965-1967 Associate Editor, Proceedings National Shellfisheries Association.
- 1966-1967 Associate Editor, Transactions American Fisheries Society.

Experience Prior to Appointment to Present Position (Cont'd)

Committee Assignments

- 1971 Panel Member, Marine Aquatic Life and Wildlife, Water Quality Criteria Committee, National Academy of Sciences, Washington, D. C.
- June 1968 Evaluation Committee, Master of Science/Biology Program, Graduate School, Southern Connecticut State College, New Haven, Connecticut.
- 1967-1969 Member-at-Large, Executive Committee, National Shellfisheries Association.

Sabbatical Leave Assignment

- April 1969- Liaison Scientist in Marine Biology, Office of Naval Research,  
May 1970 U. S. Navy, London, England.

Honors and Professional Affiliations

- 1951 Phi Sigma National Honorary Biological Society, University of New Hampshire Chapter
- 1952 Phi Sigma Prize (Research), University of New Hampshire
- 1957 George F. Dwinnell Memorial Fellow, University of New Hampshire
- 1960 The Society of the Sigma Xi, University of New Hampshire Chapter
- 1961 American Institute of Fishery Research Biologists
- Fellow, 1963 American Association for the Advancement of Science
- 1967 and 1968 Outstanding Performance Award, Bureau of Commercial Fisheries, U. S. Department of the Interior
- American Fisheries Society
- American Association for the Advancement of Science
- American Institute of Biological Sciences

Honors and Professional Affiliations (Cont'd)

American Institute of Fishery Research Biologists

American Society of Limnology and Oceanography

American Society of Zoologists

Atlantic Fisheries Biologists

Ecological Society of America

Marine Biological Association of the United Kingdom

National Shellfisheries Association

ORGANIZATION: Milford Laboratory, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Milford, Conn.

ACTIVITY AREA: Bivalve aquaculture - basic methodology

OBJECTIVE: To develop economically and biologically sound methods for rearing various species of bivalves of present or potential economic value in controlled environments.

SUMMARY: This is a new program initiated April 1, 1975. Its major objective is to develop the basic methodology for rearing bivalves of commercial value not now being reared as aquaculture species; in effect, the program seeks to anticipate the future interest of the shellfish industry in new bivalve aquaculture candidates. Two species have been chosen for study initially; they are the bay scallop, Argopecten irradians, and the surf clam, Spisula solidissima. Some work has already been started to develop methods for stimulating gametogenesis and spawning out of season so that subsequent studies of embryological development, larval survival and growth and metamorphosis need not be confined to the natural reproductive season, which is summer for both species. Modest success in promoting early gametogenesis in the bay scallop has been achieved and studies of the environmental factors influencing larval development have been initiated. As a result of previous studies on surf clam culture, in connection with a program now defunct, considerably more is known of the requirements for successful rearing of this species than for the bay scallop. Many groups of larvae have been reared to metamorphosis and beyond. Future work in this area will emphasize refinement of the culture methods to improve the dependability of the techniques and the consistency of the results.

Much work is planned which will lead to the development of methods for rearing the juvenile stages of the two bivalve species to market; the so-called "grow-out" period. The literature on bivalve culture shows clearly that rapid growth of the animals during this period is the sign of a healthy environment. The goal of the program at this stage, consequently, is to determine the optimum value of each environmental factor for maximum survival and growth of the animals being reared. Many of the studies will be carried out in a tank-farm facility where the environment is under partial control of the culturist. Later studies of growth just prior to marketing will be done with animals transplanted to the field, the only environment where the large amounts of water, space and food necessary for rapid growth of commercial numbers of near-adult size are available.

Ref: See below for relevant publications.

RESOURCES: FY 74 148.6 K  
FY 75 106.1 K

SENIOR STAFF: Warren S. Landers

## PUBLICATIONS

Landers, Warren S., 1973.

Early development in the ocean quahog, Arctica islandica (L.). Proc. Natl. Shellfish. Assoc., 63: 3 (abstract). Full text in press in The Nautilus.

Rhodes, E. W., and W. S. Landers, 1973.

Growth of oyster larvae, Crassostrea virginica, of various sizes in different concentrations of the chrysophyte, Isochrysis galbana. Proc. Natl. Shellfish. Assoc., 63: 53-59.

Rhodes, E. W., A. Calabrese, W. D. Cable and W. S. Landers, 1975.

The development of methods for rearing the coot clam, Mulinia lateralis, and three species of coastal bivalves in the laboratory. In: Culture of Marine Invertebrate Animals. W. L. Smith and M. H. Chanley (eds.), Plenum Press, New York and London, pp. 273-282.

Calabrese, A., and E. W. Rhodes.

Culture of M. lateralis and C. fornicata embryos and larvae for studies of pollution effects. Thalassia Jugoslavica. (In press)

Cable, Wayne D., 1973.

The valvular membrane in young mactrid clams, Spisula solidissima. The Nautilus, 87(4): 110-111.

Cable, W. D., and W. S. Landers, 1974.

Development of eggs and embryos of the surf clam, Spisula solidissima, in synthetic seawater. Fish. Bull., 72(1): 247-249.

## BIOGRAPHICAL RESUME

1. Name: LANDERS, WARREN S. Date: March 28, 1973
2. Organization & Address: SSN: 016-16-6448  
National Marine Fisheries Service, Milford Laboratory, Milford, Conn. 06460
3. Date and Place of Birth: March 27, 1918, Brockton, Mass.
4. Personal Data:  
Marital Status: Married Children: 2 Sex and Birth Year:  
Spouse: Barbara Female - 1949, 1952
5. Education: (High School and University by Degree)  
Lawrence High School, Falmouth, Mass.  
Brown University, Providence, Rhode Island - BA (Biology)  
Rhode Island State College, Kingston, Rhode Island - MS (Marine Biology)
6. Military Service: (Branch & Dates)  
U. S. Army, Medical Department, 1944-1946
7. Work Experience: (Dates, Organization, Location, Title & Duties)  
1941-1944 - Bureau of Commercial Fisheries, Cambridge, Mass.  
Junior Aquatic Biologist - Finfish research (mostly yellowtail flounder)  
1946-1949 - Marine Biological Laboratory, Woods Hole, Mass.  
Biological Collector - Collecting biological specimens for educational institutions.  
1949-1959 - Bureau of Commercial Fisheries, Kingston, Rhode Island.  
Project Leader - Field ecology of hard clam.  
1959-present - National Marine Fisheries Service, Milford, Conn.  
Investigation Chief - Field biology of hard clam; salt water pond studies; culture methods for bivalves.
8. Professional Interests:  
Culture of marine invertebrates.
9. Professional Societies, Affiliations & Awards:  
National Shellfisheries Association
10. Committees and Assignments:  
Chairman, Safety Committee, National Marine Fisheries Service, Milford, Conn.
11. Civic Affiliations: None
12. Avocation/Hobbies: Gardening

ORGANIZATION: Milford Laboratory, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Milford, Conn.

ACTIVITY AREA: Aquacultural Genetics; breeding-oriented studies on commercial oysters and related species.

OBJECTIVE: To obtain the kinds of genetic information about oyster breeding (selection and inbreeding) that commercial growers and breeders need for their own breeding and planting programs; also, to work on the development of some difficult-to-come-by hybrids, and on reliable easy methods to obtain these. A limited amount of experimental mutation breeding will be conducted with commercial needs in mind.

SUMMARY: Prior work of this Investigation established a basic cyto-genetic understanding of the oyster and a small amount of such work continues. Inbreeding studies demonstrated the existence in the commercial American oyster, Crassostrea virginica, of some gamete incompatibility barrier, and significant inbreeding depression. Methods were worked out for mass selection and heritability studies but these were suspended when work of the laboratory was re-programmed away from aquaculture. The mutation breeding approach was explored for the oyster, and data at the same time obtained on radiation sensitivity of this shellfish.

Ref. See below for relevant publications.

RESOURCES: FY 75 23.1 K

SENIOR STAFF: Arlene C. Longwell

## PUBLICATIONS

- Daniels, E. W., A. C. Longwell, J. M. McNiff and R. W. Wolfgang, 1973.  
Ultrastructure of oocytes from the American oyster Crassostrea virginica Gmelin. Trans. Amer. Micros. Soc., 92(3): 337-349.
- Longwell, A. Crosby, and S. S. Stiles, 1973.  
Oyster genetics and the probable future role of genetics in aquaculture. Bull. American Malacological Union, Inc., p. 36. (abstract)
- Longwell, A. Crosby, and S. S. Stiles, 1973.  
Oyster genetics and the probable future role of genetics in aquaculture. Malacological Review, 6(2): 151-177.
- Longwell, A. Crosby, and S. S. Stiles, 1973.  
Gamete cross incompatibility and inbreeding in the commercial American oyster, Crassostrea virginica Gmelin. Cytologia, 38: 521-533.
- Longwell, A. Crosby, 1974.  
Genetics of the American oyster, Crassostrea virginica Gmelin. Proc. 1st U.S.-Japan Meeting on Aquaculture at Tokyo, Japan, Oct. 18-19, 1971. NOAA Tech. Rept. NMFS Circular-388, pp. 75-87.
- Longwell, A. Crosby, 1974.  
Some impressions regarding genetics and the fisheries of Japan. Proc. 1st U.S.-Japan Meeting on Aquaculture at Tokyo, Japan, Oct. 18-19, 1971. NOAA Tech. Rept. NMFS Circular-388, pp. 123-133.
- Hughes, James B., 1973.  
An examination of eggs challenged with cryopreserved spermatozoa of the American oyster, Crassostrea virginica. Cryobiology, Vol. 10, No. 4, pp. 342-344.
- Stiles, S. S., 1973.  
Cytogenetic analysis of an attempted inter-species hybridization of the oyster. Incompatibility Newsletter No. 3, pp. 41-45.

ORGANIZATION: Milford Laboratory, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Milford, Conn.

ACTIVITY AREA: Mutagenic Effects of Pollutants

OBJECTIVE: To determine whether and at what levels several important marine pollutants are mutagenic for important commercial fish species and key food-chain species. How genetic damage reduces recruitment into the fisheries is the focal point of the research.

SUMMARY: Experimental and field-sampled materials alike are being utilized. Three related approaches are being taken: a genetic test with larval culture, the dominant lethal gene test; a cyto-genetic test of spawned, fertilized eggs; a combined cytological-cyto-genetic study of gametogenesis. Acute short-term and chronic longer-term contaminant exposures are being given, and history of exposure in nature is considered as well. The mutagenicity of some heavy metal contaminants has been established for the commercial American oyster, Crassostrea virginica.

Ref: See below for relevant publications.

RESOURCES:       FY 74       61.9 K  
                  FY 75       40.6 K

SENIOR STAFF:   Arlene C. Longwell

#### PUBLICATIONS

- MacLean, S. A., A. Crosby Longwell and W. J. Blogoslawski, 1973.  
Effects of ozone-treated seawater on the spawned, fertilized, meiotic, and cleaving eggs of the commercial American oyster. *Mutation Research*, 21: 283-285.
- Stiles, S. S., and A. Crosby Longwell, 1973.  
Fertilization, meiosis and cleavage in eggs from large mass spawnings of Crassostrea virginica Gmelin, the commercial American oyster. *Caryologia*, 26(2): 253-262.
- Longwell, A. Crosby, 1974.  
Evaluation of the mutagenicity of marine contaminants for marine species as affecting in-shore and off-shore fisheries. Informal Report, pp. 1-54.

VITA

1. Name: MAZZONE, ARLENE (LONGWELL) Date: May 14, 1975
2. Organization & Address:  
National Marine Fisheries Service, Middle Atlantic Coastal  
Fisheries Center, Milford Laboratory, Milford, Conn. 06460
3. Date and Place of Birth: November 26, 1930, Buffalo, New York
4. Personal Data:  
Marital Status: Married Children: 1 Sex and Birth Year:  
Spouse: Horace Female - 1971
5. Education: (High School and University by Degree)  
St. Agnes High School, Springfield, Missouri - 1949  
Southwest Missouri State College, Springfield, Missouri - BA (Biology) - 1953  
University of Missouri, Columbia, Missouri - Ph.D. (Genetics) - 1957
6. Work Experience: (Dates, Organization, Location, Title & Duties)  
1957-1959 - Argonne National (AEC) Laboratory, Argonne, Illinois  
Research Associate - Genetic Research  
1959-1960 - Genetics Institute, Lund University, Lund, Sweden  
Research Associate - Genetic Research  
1960-1965 - Harvard Medical School, Pathology Dept., Children's Cancer  
Research Foundation, Children's Hospital, Pathology Dept.,  
Boston, Massachusetts  
Research Associate - Genetic Research  
1966-present - National Marine Fisheries Service, Milford, Conn.  
Research Geneticist - Genetic Research  
Investigation Chief, Mutagenic Effects of Pollutants, and  
Aquacultural Genetics
7. Professional Interests:  
Genetics, breeding, cytogenetics, cytology, cyto-pathology
8. Professional Societies, Affiliations & Awards:  
Radiation Research Society  
Environmental Mutagenesis  
Canadian Genetics Society  
AEC Fellowship  
American Cancer Society Fellowship  
Scholarship to college  
Teaching Assistantships in University  
Research Assistantships (NSF) in University  
Listed in several "Who's Who"  
Permanent museum display made of some earlier cyto-genetic work

MAZZONE (LONGWELL), ARLENE - VITA (Cont'd)

9. Committees and Assignments:

Aquaculture Panel, US-Japan Natural Resources Council

10. Civic Affiliations:

Historical Society, Easton, Conn.

11. Avocation/Hobbies:

Rearing marsupial animals with non-profit cooperation with professionally paid zoologists and veterinarian researchers; loan of material for museum, science and technology displays, and for textbook displays, and book cover illustrations; non-paid genetic consulting with dog breeding associations; gardening

12. Publications:

Longwell, A. Crosby, S. S. Stiles and D. G. Smith, 1967.

Chromosome complement of the American oyster Crassostrea virginica, as seen in meiotic and cleaving eggs. Can. J. Genet. Cytol., Vol. 9, No. 4, pp. 845-856.

Longwell, A. Crosby, and S. S. Stiles, 1968.

Removal of yolk from oyster eggs by Soxhlet extraction for clear chromosome preparations. Stain Technology, Vol. 43, No. 2, pp. 63-68.

Longwell, A. Crosby, and S. S. Stiles, 1968.

Fertilization and completion of meiosis in spawned eggs of the American oyster, Crassostrea virginica Gmelin. Caryologia, Vol. 21, No. 1, pp. 65-73.

Longwell, A. Crosby, 1969.

Oyster genetics: Research and commercial applications. Proc. Conf. on Shellfish Culture, Suffolk County Community College, April 1968, pp. 91-103.

Longwell, A. Crosby, and S. S. Stiles, 1970.

The genetic system and breeding potential of the commercial American oyster. Endeavour, Vol. XXIX, No. 107, pp. 94-99.

Daniels, E. W., A. C. Longwell, J. M. McNiff and R. W. Wolfgang, 1971.

Ultrastructure of spermatozoa from the American oyster Crassostrea virginica. Trans. Amer. Micros. Soc., Vol. 90, No. 3, pp. 275-282.

Longwell, A. Crosby, and S. S. Stiles, 1972.

Cross incompatibility and inbreeding in the American oyster, Crassostrea virginica. Proc. Natl. Shellfish. Assoc., Vol. 62, p. 4.(abstract)

12. Publications: (Cont'd)

Longwell, A. Crosby, and S. S. Stiles, 1972.

Breeding response of the commercial American oyster to ionizing radiation  
Radiation Research, Vol. 51, No. 2. (abstract)

Longwell, A. Crosby, and S. S. Stiles, 1972.

Inbreeding and gamete incompatibility genes in the commercial  
American oyster, Crassostrea virginica. Incompatibility Newsletter.

Daniels, E. W., A. C. Longwell, J. M. McNiff and R. W. Wolfgang, 1973.

Ultrastructure of oocytes from the American oyster Crassostrea  
virginica Gmelin. Trans. Amer. Micros. Soc., Vol. 92, No. 3,  
pp. 337-349.

Longwell, A. Crosby, and S. S. Stiles, 1973.

Oyster genetics and the probable future role of genetics in aquaculture.  
Bull. American Malacological Union, Inc., p. 36. (abstract)

Longwell, A. Crosby, and S. S. Stiles, 1973.

Oyster genetics and the probable future role of genetics in aquaculture.  
Malacological Review, Vol. 6, No. 2, pp. 151-177.

Longwell, A. Crosby, and S. S. Stiles, 1973.

Gamete cross incompatibility and inbreeding in the commercial American  
oyster, Crassostrea virginica Gmelin. Cytologia, Vol. 38, pp. 521-533.

MacLean, S. A., A. Crosby Longwell and W. J. Blogoslawski, 1973.

Effects of ozone-treated seawater on the spawned, fertilized, meiotic,  
and cleaving eggs of the commercial American oyster. Mutation Research,  
Vol. 21, pp. 283-285.

Stiles, Sheila S., and A. Crosby Longwell, 1973.

Fertilization, meiosis and cleavage in eggs from large mass spawnings  
of Crassostrea virginica Gmelin, the commercial American oyster.  
Caryologia, Vol. 26, No. 2, pp. 253-262.

Longwell, A. Crosby, 1974.

Genetics of the American oyster, Crassostrea virginica Gmelin. Proc.  
1st U.S.-Japan Meeting on Aquaculture at Tokyo, Japan, Oct. 18-19, 1971.  
NOAA Tech. Rept. NMFS Circular-388, pp. 75-87.

Longwell, A. Crosby, 1974.

Some impressions regarding genetics and the fisheries of Japan. Proc.  
1st U.S.-Japan Meeting on Aquaculture at Tokyo, Japan, Oct. 18-19, 1971.  
NOAA Tech. Rept. NMFS Circular-388, pp. 123-133.

Longwell, A. Crosby, 1974.

Evaluation of the mutagenicity of marine contaminants for marine species  
as affecting in-shore and off-shore fisheries. Informal Report, pp. 1-54

ORGANIZATION: Milford Laboratory, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Milford, Conn.

ACTIVITY AREA: Laboratory culture of microscopic marine algae; Effects of pollutants on growth of marine microscopic algae; Role of microscopic algae in the nutritional support of molluscs in aquaculture systems.

OBJECTIVE: To conduct research on the chemical and physical factors affecting the productivity of phytoplankters in laboratory culture, as well as the natural environment, particularly polluted areas; to determine the role of the phytoplankters in fulfilling the dietary requirements of molluscan species reared in aquaculture.

SUMMARY: An extensive collection of unicellular marine and estuarine microscopic algal strains is being maintained in the laboratory. These cultures serve as sources of standardized material for use in research of this Investigation and are also available to other investigators as a courtesy nationally and internationally. Cultures are maintained on several media formulations and efforts are made to bring and keep all strains in the axenic condition. A simple inexpensive method for the cultivation of large volumes of algae in pure culture was designed and is now in continuous operation to provide food organisms for molluscan research and aquaculture projects at the Milford laboratory. This system has served as the prototype for development of commercial and university aquaculture systems. Experimental studies have recently concentrated on studies of bacterial-algal interaction; the role of organic compounds and the elements, selenium and lithium, potential pollutants, on algal growth. New methods are being tried in efforts to design appropriate systems for critical studies on the nutrition of oyster veliger larvae.

Ref: See below for relevant publications.

RESOURCES:       FY 74       57.8 K  
                  FY 75       59.7 K

SENIOR STAFF:   Ravenna Ukeles

## PUBLICATIONS

Ukeles, R., 1971.

Nutritional requirements in shellfish culture. A Review. In: Proc. Conf. on Artificial Propagation of Commercially Valuable Shellfish. K. Price and D. Maurer (eds.), 43-64.

Ukeles, R., 1972.

NMFS Milford scientists develop algae culture for shellfish food. NOAA Week, Vol. 3, p. 6.

Ukeles, R., 1973.

Continuous culture - a method for the production of unicellular algal foods. In: Handbook of Phycological Methods. J. R. Stein (ed.), Cambridge Univ. Press, pp. 233-254.

Ukeles, R., 1975.

Cultivation of marine unicellular algae. A Review. Treatise on Marine Ecology, Vol. III. O. Kinne (ed.). (In press)

Ukeles, R., and J. Bishop, 1975.

Enhancement of phytoplankton growth by marine bacteria. J. Phycol., Vol. 11. (In press)

Ukeles, R., and W. Rose, 1975.

Carbon heterotrophy in marine microscopic algae. (Final draft prepared)

## VITA

1. Name: UKELES, RAVENNA Date: May 12, 1975
2. Organization & Address:  
National Marine Fisheries Service, Middle Atlantic Coastal  
Fisheries Center, Milford Laboratory, Milford, Conn. 06460
3. Date and Place of Birth: August 1, 1929, New York, N. Y.
4. Personal Data:  
Marital Status: Single
5. Education: (High School and University by Degree)  
Walton High School, New York, N. Y.  
Hunter College, New York, N. Y. - BA (Biology)  
New York University, New York, N. Y. - MS (Protozoology)  
New York University, New York, N. Y. - Ph.D. (Protozoology)
6. Military Service: (Branch & Dates) - None
7. Work Experience: (Dates, Organization, Location, Title & Duties):  
1955-1956 - New York University, New York, N. Y.  
Teaching Assistant - Bacteriology Program  
1956-1958 - New York University, New York, N. Y.  
Research Assistant - Protozoology  
1959-present - National Marine Fisheries Service, Milford, Conn.  
Investigation Chief, Aspects of Nutritional Require-  
ments of Molluscs.
8. Professional Interests:  
Aquaculture, microbiology, biochemistry and cell physiology,  
environment pollutants, phycology, protozoology.
9. Professional Societies, Affiliations:  
Phycological Society of America  
Society of Protozoology  
Society for Industrial Microbiology  
American Society for Cell Biology  
American Association for the Advancement of Science  
New York Academy of Sciences  
American Society for Microbiology  
National Shellfisheries Association

UKELES, RAVENNA - VITA (Cont'd)

10. Awards:

Beta Lambda Sigma Society - Undergraduate biology honor society  
Phi Sigma Society - Graduate biology honor society  
The Society of the Sigma Xi - Professional biology honor society  
Fellow - New York Academy of Sciences  
Post-doctoral research fellow - Yale University, New Haven -  
biology department  
U. S. Department of Commerce - Certificate of Training in  
Effective Supervision  
Cornell University - Certificate in Introductory Electron  
Microscopy

11. Committees and Assignments:

Member of Committee for arrangements of the 1977 International  
Meeting of the Protozoological Society.

12. Civic Affiliations:

Arts Council Greater New Haven

13. Avocation/Hobbies:

Oil and water color painting, photography

## Publications

- Ukeles, R., 1959. The effect of several toxicants on five genera of marine phytoplankton. Proc. Natl. Shellfish. Assoc. (abstract)
- Ukeles, R., 1961. The effect of temperature on the growth and survival of several marine algal species. Biol. Bull., 120, 255-264.
- Davis, H., and R. Ukeles, 1961. Mass culture of phytoplankton as foods for metazoans. Science, 134, 562-564.
- Ukeles, R., 1962. Growth of pure cultures of marine phytoplankton in the presence of toxicants. Appl. Microbiol., 10, 532-537.
- Hidu, H., and R. Ukeles, 1962. Dried unicellular algae as food for larvae of the hard shell clam, Mercenaria mercenaria. Proc. Natl. Shellfish. Assoc., 53, 85-101.
- Ukeles, R., 1963. The effect of surface active agents on the growth of marine phytoplankton. J. Protozool., Suppl. 10, 10.
- Ukeles, R., 1965. Inhibition of unicellular algae by synthetic surface active agents. J. Phycol., 1, 102-110.
- Ukeles, R., 1965. A simple method for the mass culture of marine algae. Limnol. Oceanog., 10, 492-495.
- Ukeles, R., 1968. Sulfonamide inhibition in Monochrysis lutheri. J. Protozool., Suppl. 15, 28. (abstract)
- Ukeles, R., 1968. Sulfonamide inhibition in Monochrysis lutheri. J. Phycol., 4, 341-346.
- Ukeles, R., and B. Sweeney, 1969. Influence of dinoflagellate trichocysts and other factors on the feeding of Crassostrea virginica larvae on Monochrysis lutheri. Limnol. Oceanog., 14, 403-410.
- Ukeles, R., 1970. Effect of hexose analogs on growth of Chilomonas paramecium. J. Protozool., 17, 220-223.
- Ukeles, R., 1971. Nutritional requirements in shellfish culture. A Review. In Proc. of the Conference on Artificial Propagation of Commercially Valuable Shellfish. K. Price and D. Maurer (eds.), 43-64.
- Ukeles, R., 1972. NMFS Milford scientists develop algae culture for shellfish food. NOAA Week, Vol. 3, p. 6.
- Ukeles, R., 1973. Adaptation of a fresh water flagellate to a salt water medium. Proc. Soc. Protozoologists, 20, 90. (abstract)

Ukeles, R., 1973. Continuous culture - a method for the production of unicellular algal foods. In Handbook of Phycological Methods, J. H. Stein (ed.), Cambridge Univ. Press, pp. 233-254.

Ukeles, R., 1975. Cultivation of marine unicellular algae. A Review. Treatise on Marine Ecology, Vol. III. O. Kinne (ed.). (in press)

Ukeles, R., and J. Bishop, 1975. Enhancement of phytoplankton growth by marine bacteria. J. Phycol., Vol. 11. (in press)

Ukeles, R., and W. Rose, 1975. Induced adhesion in Crassostrea virginica larvae. Science. (in press)

Ukeles, R., and W. Rose, 1975. Carbon heterotrophy in marine microscopic algae. (Final draft prepared)

ORGANIZATION: Milford Laboratory, Middle Atlantic Coastal Fisheries Center, NMFS, NOAA, Milford, Conn.

ACTIVITY AREA: Assessment of physiological changes in various species of marine molluscs, crustaceans, and fish exposed to heavy metals in the laboratory.

OBJECTIVE: To examine in the laboratory, using bioassay, physiological, and biochemical techniques, a selected group of Middle Atlantic Bight coastal animals, to determine the effect of contaminants on their normal life functions. These laboratory experiments, when correlated with contaminant levels in the environment, may indicate that some marine animals are extremely sensitive to minute amounts of pollutants, and that subtle sublethal physiological changes do occur.

SUMMARY: This Investigation has been concerned with the effect of heavy metals on various marine molluscs, crustaceans, and finfish, including various life stages of certain species. Embryos and larvae of hard clams, Mercenaria mercenaria, and oysters, Crassostrea virginica, are being exposed to metal ions through in vivo experiments to determine concentrations that affect normal development of embryos and survival and growth of larvae. Similar studies are under way with larvae of the lobster, Homarus americanus.

A chronic exposure laboratory has been fabricated at this facility to enable us to expose marine animals to sublethal levels of pollutants for varying lengths of time. Various animals, including the lobster, winter flounder (Pseudopleuronectes americanus), striped bass (Morone saxatilis), cunner (Tautoglabrus adspersus), American oyster, hard clam, and surf clam (Spisula solidissima), are currently under study. Both short-term (4 days) and long-term (1-3 months) studies are being conducted to determine physiological and biochemical changes. These studies include respiratory and osmoregulatory changes in larval through adult stages where feasible. Also under examination are changes in key enzyme systems and blood chemistry. Currently under study are magnesium-linked oxidoreductases, enzymes of glycogen and of amino-acid metabolism, and some metallo-enzymes, all of which have shown, in some degree, property changes ascribable to the animals' exposure to cadmium, mercury, or silver.

Ref: See below for relevant publications.

RESOURCES: FY 74 150.7 K  
FY 75 165.9 K

SENIOR STAFF: Anthony Calabrese

## PUBLICATIONS

- Calabrese, A., R. S. Collier, D. A. Nelson and J. R. MacInnes, 1973.  
The toxicity of heavy metals to embryos of the American oyster, Crassostrea virginica. Mar. Biol., 18(3): 162-166.
- Calabrese, A., and D. A. Nelson, 1974.  
Inhibition of embryonic development of the hard clam, Mercenaria mercenaria, by heavy metals. Bull. Environ. Contam. Toxicol., 11(1): 92-97.
- Calabrese, A., R. S. Collier and J. E. Miller, 1974.  
Physiological response of the cunner, Tautogolabrus adspersus, to cadmium. I. Introduction and experimental design. In: Physiological response of the cunner, Tautogolabrus adspersus, to cadmium, pp. 1-3. NOAA Tech. Rep. NMFS SSRF-681.
- Calabrese, A., and E. W. Rhodes  
Culture of M. lateralis and C. fornicata embryos and larvae for studies of pollution effects. To be published in a special symposium on Marine Invertebrate Larvae by Thalassia Jugoslavica.
- Collier, R. S., J. E. Miller, M. A. Dawson and F. P. Thurberg, 1973.  
Physiological response of the mud crab, Eurypanopeus depressus to cadmium. Bull. Environ. Contam. Toxicol., 10(6): 378-382.
- Cross, F. A. R. Huggett, E. Davey, A. Calabrese and C. Jelinek, 1974.  
Contamination of marine resources for human consumption - trace metals, pp. 76-93. In: Cox, G. (Convener), Proc. Workshop on Marine Bioassays, 308 pp. Mar. Tech. Soc.
- Gould, E., and J. Karolus, 1974.  
Physiological response of the cunner, Tautogolabrus adspersus, to cadmium. V. Observations on the biochemistry. In: Physiological response of the cunner, Tautogolabrus adspersus, to cadmium, pp. 21-25. NOAA Tech. Rep. NMFS SSRF-681.
- Gould, E., and J. J. Karolus, 1975.  
A new stain for copper-protein complexes: its use with crustacean hemocyanins. To be published in Analytical Biochemistry. (In press)
- MacInnes, J. R., and F. P. Thurberg, 1973.  
A new technique for measuring the oxygen consumption of larvae of the American oyster, Crassostrea virginica. Proc. Natl. Shellfish. Assoc., 63: 60-62.
- MacInnes, J. R., and F. P. Thurberg, 1973.  
Effects of metals on the behaviour and oxygen consumption of the mud snail. Mar. Pollut. Bull., 4: 185-186.

Pauley, G. B., M. W. Newman and E. Gould, 1975.

Serum changes in the blue crab, Callinectes sapidus, associated with Paramoeba pernicioso, the causative agent of gray crab disease. Mar. Fish. Rev., 37: 34-38.

Thurberg, F. P., A. Calabrese and M. A. Dawson, 1974.

Effects of silver on oxygen consumption of bivalves at various salinities. In: Vernberg, F. J., and W. B. Vernberg (eds.), Pollution and Physiology of Marine Organisms, pp. 67-78. Academic Press, N. Y.

Thurberg, F. P., and M. A. Dawson, 1974.

Physiological response of the cunner, Tautogolabrus adspersus, to cadmium. III. Changes in osmoregulation and oxygen consumption. In: Physiological response of the cunner, Tautogolabrus adspersus, to cadmium, pp. 11-13. NOAA Tech. Rep. NMFS SSRF-681.

Thurberg, F. P., M. A. Dawson, W. D. Cable, J. R. MacInnes and D. Wenzloff.

Physiological effects of silver on larval, juvenile and adult surf clams, Spisula solidissima. Symposium on Marine Respiration to be published by TRIGOM. (In press).

Thurberg, F. P., M. A. Dawson and R. S. Collier, 1973.

Effects of copper and cadmium on osmoregulation and oxygen consumption in two species of estuarine crabs. Mar. Biol., 23: 171-175.

#### REPORTS

Calabrese, Anthony, et al. 1972

Cooperative Study of Contaminants in the Coastal Environment and Their Effects on Living Marine Resources: Summary Report. 1971-72, pp. 158. MACFC Informal Report #5. October, 1972.

Calabrese, Anthony, et al. 1974.

A Multilaboratory Cooperative Study of Contaminants in the Coastal Environment and Their Effects on Living Marine Resources: Summary Report of Operations, 1 May 1972 to 31 December 1973. pp. 202. MACFC Informal Report #26.

Calabrese, Anthony, et al. 1975.

A Multilaboratory Cooperative Study of Contaminants in the Coastal Environment and Their Effects on Living Marine Resources: Summary Report of Operations, 1 January 1974 to 31 December 1974. In Press.

## VITA

Dr. Anthony Calabrese  
Fishery Biologist (Research)

Born: Providence, Rhode Island, February 25, 1937  
Marital Status: Married (Velma Amato) September 21, 1963  
Children: Tonya Ann - July 24, 1966  
Anthony William - May 16, 1968  
Military Service: U. S. Army Medical Corps, May 1962-November 1962  
U. S. Army Reserves, April 1962-April 1968

### Education

<u>Institution</u>	<u>Dates Attended</u>	<u>Degree</u>
University of Rhode Island, Kingston	1955-59	B.S.
Auburn University, Auburn, Alabama	1959-62	M.S.
University of Connecticut, Storrs	1964-69	Ph.D.
Marine Biological Laboratory Woods Hole, Massachusetts	1965	None

### Teaching Experience

1957-58 Assistant Laboratory Assistant, University of Rhode Island.  
Assisted in general zoology laboratory.

### Research Experience

1961-62 Research Assistant in fish culture, Auburn University, Auburn, Alabama. Field study of fish populations in large impoundments and study of channel catfish spawning and production. Study of survival of large-mouth bass and bluegill sunfish in waters which were changed in hydrogen-ion concentration by the addition of various chemicals.

Nov. 1962- Fishery Biologist (Research), National Marine Fisheries Service, Milford Laboratory, Milford, Connecticut. Chief, Physiological Effects of Pollutant Stress Investigation (see attached job description).

Vita - Anthony Calabrese

Research Experience (contd)

- Sept. 1964- Aug. 1965 One year leave of absence from Milford Laboratory to attain residence requirements for doctoral program at University of Connecticut.
- M.S. thesis The effect of the manipulation of hydrogen-ion concentration in water upon survival of bluegill sunfish (Lepomis macrochirus Rafinesque) and large-mouth bass (Micropterus salmoides Lacepede)
- Ph.D. dissertation The early life history and larval ecology of the coot clam, Mulinia lateralis (Say) (Mactridae: Pelecypoda)

Professional Societies

American Fisheries Society  
American Society of Limnology and Oceanography  
Atlantic Fisheries Biologists - President, 1972-1973  
National Shellfisheries Association - Secretary-Treasurer, 1974-1976  
New England Estuarine Research Society

Professional Certification

Certified by American Fisheries Society as Fishery Scientist

Honor Societies

Sigma Xi

Editorships

Associate Editor: Proceedings National Shellfisheries Association, 1970-present  
Associate Editor: Chesapeake Science, 1971-1975

Management Training

U. S. Civil Service Training Course - Basic Management Techniques II, Boston, Massachusetts, October 19-23, 1970

U. S. Civil Service Training Course - Middle Management Institute, Boston, Massachusetts, November 1-5, 1971

## Vita - Anthony Calabrese

### Committee Assignments

Technical Committee (Chairman) - Davids Island Nuclear Power Plant Research Project.

NMFS Task Force on the Physiological Effects of Marine Contaminants, Baltimore, Maryland, April 13-15, 1971.

NMFS Task Force for review of EPA-NAS Water Quality Criteria, 2nd Edition.

NOAA Task Force for Preparation of Marine Ecosystems Analysis Program for New York Bight Study.

Middle Atlantic Coastal Fisheries Center Task Force (Chairman) to Prepare Summary Reports of Contaminant Study and to Prepare Research Planning Document for Future Studies of the Center.

Co-chairman of a "Bioassay Techniques - Macro-organisms" section of a Dredge Spoil Workshop sponsored by Marine Technology Society, EPA, NOAA/NMFS, U. S. Navy and Corps of Engineers. The intent was to publish a Handbook on Methodologies for Dredging and Disposal.

Subcommittee on Mollusks of the Standard Bioassay Committee for the 14th edition of Standard Methods for the Analysis of Water and Wastewater.

Subcommittee on Methods for Toxicity Tests with Marine Invertebrates and Zooplankton for the Committee on Methods for Toxicity Tests with Aquatic Organisms.

Consultant to the Panel on Arsenic of the Committee on Medical and Biologic Effects of Environmental Pollutants of the National Research Council of the National Academy of Sciences, 1974-1975.

### Special Assignments

Appointed to the Special Studies Unit of the Middle Atlantic Coastal Fisheries Center as Marine Contaminants Study Coordinator effective March 1, 1972.

Assigned to Central Office, NMFS, April 1-August 24, 1973.

### Listed in

American Men and Women of Science  
Food and Agricultural Organization's World List of Experts on Marine Pollution

### Other

Adjunct Assistant Professor of Biology - Fairfield University

### Awards

Cash Award - 1972 - National Marine Fisheries Service

Vita - Anthony Calabrese

Publications

- Davis, H. C., and A. Calabrese, 1964. Combined effects of temperature and salinity on development of eggs and growth of larvae of M. mercenaria and C. virginica. Fish. Bull., 63(3): 643-655.
- Calabrese, A., and H. C. Davis, 1966. The pH tolerance of embryos and larvae of Mercenaria mercenaria and Crassostrea virginica. Biol. Bull., 131(3): 427-436.
- Calabrese, A., and H. C. Davis, 1967. Effects of "soft" detergents on embryos and larvae of the American oyster (Crassostrea virginica). Proc. Nat. Shellfish. Assoc., 57: 11-16.
- Calabrese, A., and H. C. Davis, 1969. Spawning of the American oyster, Crassostrea virginica, at extreme pH levels. The Veliger, 11(3): 235-236.
- Davis, H. C., and A. Calabrese, 1969. Survival and growth of larvae of the European oyster (Ostrea edulis L.) at different temperatures. Biol. Bull., 136(2): 193-199.
- Calabrese, A., 1969. Individual and combined effects of salinity and temperature on embryos and larvae of the coot clam, Mulinia lateralis (Say). Biol. Bull., 137(3): 417-428.
- Calabrese, A., 1969. Mulinia lateralis: Molluscan fruit fly? Proc. Nat. Shellfish. Assoc., 58: 65-66.
- Brenko, M., and A. Calabrese, 1969. The combined effects of salinity and temperature on larvae of the mussel, Mytilus edulis (L.). Marine Biology, 4(3): 224-226.
- Calabrese, A., 1969. Effect of acids and alkalies on survival of bluegills (Lepomis macrochirus) and largemouth bass (Micropterus salmoides). Tech. Rept. No. 42, U. S. Fish and Wildl. Ser., 1-10.
- Calabrese, A., 1970. Reproductive cycle of the coot clam, Mulinia lateralis (Say), in Long Island Sound. The Veliger, 12(3): 265-269.
- Calabrese, A., and H. C. Davis, 1970. Tolerances and requirements of embryos and larvae of bivalve mollusks. Helgoländer wissenschaftliche Meeresuntersuchungen, 20(1-4): 553-564.
- Calabrese, A., 1970. The pH tolerance of embryos and larvae of the coot clam, Mulinia lateralis (Say). The Veliger, 13(2): 122-126.

Publications (contd)

- Calabrese, A., 1972. Reproduction and larval ecology of the coot clam, Mulinia lateralis. Am. Zool., 12(4): 722-723. Abstract No. 612.
- Calabrese, A., 1972. How some pollutants affect embryos and larvae of American oyster and hard-shell clam. Marine Fisheries Review, 34(11-12): 66-77.
- Manzi, J. J., A. Calabrese and D. M. Rawlins, 1972. A note on gametogenesis in the oyster drills, Urosalpinx cinerea (Say) and Eupleura caudata (Say). The Veliger, 14(3): 271-273.
- Calabrese, A., R. Collier, D. Nelson and J. R. MacInnes, 1973. The toxicity of heavy metals to embryos of the American oyster, Crassostrea virginica. Mar. Biol., 18(3): 162-166.
- Calabrese, A., and D. A. Nelson, 1974. Inhibition of embryonic development of the hard clam, Mercenaria mercenaria, by heavy metals. Bull. Environ. Contam. Toxicol., 11(1): 92-97.
- Calabrese, A., R. S. Collier and J. E. Miller, 1974. Physiological response of the cunner, Tautogolabrus adspersus, to cadmium. I. Introduction and experimental design. In: Physiological Response of the Cunner, Tautogolabrus adspersus, to Cadmium, pp. 1-3. NOAA Tech. Rept. NMFS SSRF-681.
- Cross, F. A., R. Huggett, E. Davey, A. Calabrese and C. Jelinek, 1974. Contamination of marine resources for human consumption - trace metals, pp. 76-93. In: Cox, G. (Convener). Proc. Workshop on Marine Bioassays, 308 pp. Marine Technology Society.
- MacInnes, J. R., E. W. Rhodes and A. Calabrese, 1974. A new electronic system for counting and measuring bivalve larvae. Chesapeake Science, 15(3): 174-176.
- Thurberg, F. P., A. Calabrese and M. A. Dawson, 1974. Effects of silver on oxygen consumption of bivalves at various salinities. In: Vernberg, F. J. and W. B. Vernberg (Eds.), Pollution and Physiology of Marine Organisms, pp. 67-78. Academic Press, N. Y.
- Rhodes, E. W., A. Calabrese, W. D. Cable and W. S. Landers, 1975. The development of methods for rearing the coot clam, Mulinia lateralis, and three species of coastal bivalves in the laboratory. In: Smith, W. L. and M. H. Chanley (Eds.), Culture of Marine Invertebrate Animals, pp. 273-282. Plenum Press, New York and London.
- Butler, P. A., E. Berry, W. P. Breese, A. Calabrese, J. I. Lowe, G. E. Morrison and H. van der Schalie. Contribution to the Development of Acute and Long-term Standard Bioassay Methods for the Fourteenth Edition of Standard Methods for the Analysis of Water and Wastewater. (In press)

Vita - Anthony Calabrese

Publications (contd)

- Calabrese, A., and E. W. Rhodes. Culture of M. lateralis and C. fornicata embryos and larvae for studies of pollution effects. To be published in a special symposium on marine invertebrate larvae by Thalassia Jugoslavica. (In press).
- Calabrese, A., et al. Tentative methods for studies of the effects of dredge spoil on macro-organisms. In: Handbook of Methods for Monitoring the Effects of Dredging and Disposal in the Marine Environment. (In press).
- Calabrese, A., D. A. Nelson, J. R. MacInnes and J. E. Miller. Inhibitory effects of heavy metals on marine bivalve larvae under culture conditions. (September 1975)
- Calabrese, A., F. P. Thurberg and M. A. Dawson. Sublethal physiological stress induced by cadmium and mercury on two marine teleosts. (September 1975)
- Nelson, D. A., A. Calabrese, B. A. Nelson, and J. R. MacInnes. Biological effects of heavy metals on juvenile bay scallops, Argopecten irradians, in short-term exposures. (September 1975)
- Dawson, M. A., E. Gould, R. A. Greig, F. P. Thurberg and A. Calabrese. Physiological response of juvenile striped bass, Morone saxatilis, to low levels of cadmium and mercury. (November 1975)
- Thurberg, F. P., A. Calabrese, E. Gould, R. A. Greig, M. A. Dawson and R. Tucker. Response of the lobster, Homarus americanus, to sublethal levels of cadmium and mercury. (November 1975)
- Longwell, A. Crosby, D. A. Nelson, A. Calabrese and J. R. MacInnes. Mutagenic effects of heavy metals on embryos of the American oyster, Crassostrea virginica.

Vita - Anthony Calabrese

Scientific Research Papers - Presented at following scientific society meetings:

- 1964 National Shellfisheries Association, New Orleans, Louisiana
- 1966 National Shellfisheries Association, Norfolk, Virginia
- 1967 New England Water Pollution Control Association, Chicopee, Mass.
- 1968 American Fisheries Society, Bedford, New Hampshire
- Massachusetts Shellfish Officers Association, Boston, Mass.
- National Shellfisheries Association, Arlington, Virginia
- 1969 \*Culture of Marine Organisms and Its Importance for Marine Biology, Helgoland, Germany
- American Association for the Advancement of Science, Boston, Mass.
- 1970 Represented the National Marine Fisheries Service at the FAO Technical Conference on Marine Pollution and Its Effects on Living Resources and Fishing, Rome, Italy
- 1971 American Chemical Society - Symposium on Bioassay Techniques and Environmental Chemistry, Washington, D. C.
- 1972 Atlantic Fisheries Biologists Meeting. Panel discussion on Marine Contaminants, Sag Harbor, Long Island
- American Association for the Advancement of Science, Washington, D. C.
- 1973 Conference on Marine Invertebrate Larvae - Invited Speaker, Rovinj, Yugoslavia
- Atlantic Fisheries Biologists Meeting - President, Mystic, Conn.
- 1975 International Colloquium on Applied Marine Malacology - Invited Speaker, La Rochelle, France

\* Paper presented in absentia

## PATHOBIOLOGY INVESTIGATIONS

Disease- and parasite-induced mortalities are among the paramount factors limiting the abundance of marine fish, crustaceans, and molluscs. Mass mortality of aquatic animals grown under intensive controlled culture conditions is often a consequence of disease. Host susceptibility to disease is directly influenced by environmental stress and there are no ways of knowing what stresses are significant in limiting populations without studying their effects upon the animals themselves. Adequate knowledge of disease prevalence, whether nutritionally, genetically or environmentally induced, is fundamental to the success of resource assessment, prediction and management and, where necessary, for preventative legislation.

One must recognize that it is the exception rather than the rule for abnormalities (pathoses) or mortalities (during any stage of the animal's life history) to be caused by any single extrinsic or intrinsic factor acting alone. Rather, it is usually a combination of infectious and/or noninfectious factors acting competitively, sequentially, complementarily, or synergistically on or in these animals to modify their behavior, physiology, growth, development, reproduction or to render them more susceptible to the same or still other infectious and non-infectious agents or predators.

The Pathobiology Investigations at the Oxford Laboratory have long recognized the need to study the causes of mortalities of all marine animals, and have been pioneers in disease studies. Originally with molluscs, recently with crustaceans, and presently with fish, the Investigations will continually expand their research efforts to effect a multispecies approach to the study of disease. A multispecies study of disease has been substantially more productive than limiting the research effort to only a single species, since from the aspect of comparative and experimental pathology, invaluable basic information has been acquired on both disease processes and defense mechanisms.

PATHOBIOLOGY INVESTIGATIONS  
A. ROSENFELD, DIRECTOR

The Pathobiology Investigations have long recognized the need to study the causes of mortalities and abnormalities of marine animals, and have been a pioneer in disease studies. Originally with mollusks, then with crustaceans, and presently with fish, the Investigations have expanded their research efforts to effect a multispecies approach to the study of disease. A multispecies study of disease has been substantially more productive than limiting the research effort to only a single species, since from the aspect of comparative and experimental pathology invaluable information has now been acquired on both disease processes and defense mechanisms for fishery management purposes.

By employing both comparative observational and experimental studies with team approaches, disease research on marine organisms has been conducted within the present Pathobiology Investigations primarily at the Oxford facility. Other projects under Pathobiology Investigations have recently been undertaken at other Center facilities and teams of specialists from Oxford, Milford, and Sandy Hook have conducted "fire-fighting" research at other locations throughout the country.

Research emphasis continues to be placed on studies of problems related to infectious disease. However, the Pathobiology Investigations' staff has long and broad experience in recognizing pathological conditions in cells, tissues, and organs of marine animals. Therefore, we shall continue, in cooperation with other Federal, State, university, and industry laboratories, to examine, diagnose, and describe pathological (abnormal) manifestations in marine animals from nature or under culture conditions that may be attributable to noninfectious agents or combinations of infective and noninfective factors. Furthermore, the Pathobiology Investigations, when deemed advisable and feasible, will award as it has in the past, Investigation and Center supervised contracts to carry out the research necessary to assist in accomplishing our objectives.

The Pathobiology Investigations consist of two research tasks:

1. Comparative Pathobiology with the following subtasks:
  - a. Molluscan Pathology - C. A. Farley, Oxford
  - b. Crustacean Pathology - P. T. Johnson, Oxford
  - c. Fish Pathology - M. W. Newman, Oxford
  - d. Control of Larval Mollusk Diseases - W. J. Blogoslawski, Milford
2. Diseases of Environmental Stress with the following subtasks:
  - a. Fin Rot Disease in the New York Bight - R. A. Murchelano, Oxford
  - b. Microfauna of New York Bight Fish & Benthos - T. K. Sawyer, Oxford
  - c. Ultrastructure Studies - J. E. Bodammer, Oxford
  - d. Immunity in Marine Fish - R. A. Robohm, Milford
  - e. Registry of Marine Pathology - H. S. Tubiash, Oxford

In addition to the above projects, the Pathobiology Investigations during these past few years have been deeply involved in cooperative research projects with several Federal, State, and university laboratories, have maintained an outstanding library for the benefit of all researchers, students, and industry personnel in the area; participated in many workshops, meetings, and discussion seminars; staff members have served on several panels, committees, and program review teams and have published several papers and reports and submitted additional papers to scientific journals for future publication.

## PERSONNEL RESUME

Name: Aaron Rosenfield

Place and Date of Birth: Boston, Massachusetts, October 14, 1924

### 1. Education and Training

#### a. Degrees

B.S., 1950 - University of Massachusetts at Amherst; Microbiology, Public Health  
M.S., 1951 - University of Massachusetts at Amherst; Microbiology, Food Technology  
Ph.D., 1960 - University of Texas; Plant Physiology, Biochemistry

#### b. Other courses

Boston University, 1952-56, Part-time, Zoology (24 credit hours)  
University of Wisconsin, summer 1962, Tissue Culture Course  
U. S. Civil Service Commission, 1965, Supervision and Management Course  
Georgetown University, spring 1968, Electron Microscopy Course  
U.S. Bureau of Commercial Fisheries, December 1968, Executive Training School  
U.S. Bureau of Commercial Fisheries, 11/4/63-4/1/69, Central Office Training  
Assignment, Acting Branch Chief-Shellfisheries, Washington, D. C.  
University of Colorado, Aspen, Colorado, August 1969, Comparative Pathobiology  
U.S. Bureau of Commercial Fisheries, Oxford, Maryland, January 1970, Supervision  
and Managers Training Course

### 2. Experience

Oct. 1969-Present	U.S. Bureau of Commercial Fisheries and National Marine Fisheries Service, Oxford, Maryland, GS-14, Assistant Laboratory Director
Jan. 1965-Oct. 1969	U.S. Bureau of Commercial Fisheries, Oxford, Maryland, GS-13, Program Leader, Shellfish Mortality
Oct. 1962-Jan. 1965	U.S. Bureau of Commercial Fisheries, Oxford, Maryland GS-12, Program Leader, Shellfish Mortality
Dec. 1960-Oct. 1962	U.S. Bureau of Commercial Fisheries, Boothbay Harbor, Maine GS-11, Project Leader, Invertebrate Tissue Culture, Serology
June 1960-Dec. 1960	Post Doctoral Research Fellow, University of Texas, Austin, Texas
1956-1960	Graduate Teaching Fellow, University of Texas, Austin, Texas
1953-1956	Research Associate in Microbiology, Parasitology, Maine Department of Sea and Shore Fisheries, Boothbay Harbor, Maine, summer of 1953, 1954, and 1956
1951-1956	Biology Instructor, Brandeis University, Waltham, Massachusetts
June 1951-Sept. 1951	Chemist, Multiple Breaker Company, Malden, Massachusetts
1943-1946	U.S. Navy, QMB/C, Motor Torpedo Boat Squadrons, Panama, South Pacific, Philippine Islands

### 3. Chronological Listing of Publications

#### a. Published

Rosenfield, A. 1951. Bacterial spoilage of home canned foods. M.S. Thesis, University of Massachusetts at Amherst, Mass.

Sindermann, C. and A. Rosenfield. 1954. Diseases of fishes of the western North Atlantic. I. Diseases of the sea herring (Clupea harengus). Maine Dep. Sea and Shore Fish. Res. Bull. No. 18: 1-23.

Sindermann, C. and A. Rosenfield. 1954. Diseases of fishes of the western North Atlantic. III. Mortalities of sea herring caused by larval trematode invasion. Maine Dep. Sea and Shore Fish. Res. Bull. No. 21: 1-16.

Sindermann, C., A. Rosenfield, and L. Strom. 1957. The ecology of marine dermatitis-producing schistosomes. II. Effects of certain environmental factors on emergence of cercariae of Austrobilharzia variglandis. J. Parasitol. 43: 382.

Sindermann, C. and A. Rosenfield. 1957. The ecology of marine dermatitis-producing schistosomes. III. Oxygen consumption of normal and parasitized Nassarius obsoletus (Nassa obsoleta) under varying conditions of salinity. Abstract. J. Parasitol. 43(5, Sect. 2, Suppl.): 28.

Rosenfield, A. 1960. Respiration, growth and development in the maize root apex. Ph.D. Dissertation, University of Texas, Austin, Texas. Dissertation Abstracts.

Engle, J. B. and A. Rosenfield. 1963. Progress on oyster mortality studies. Proc. Gulf Carib. Fish. Inst. 15th Annu. Sess: 116-124.

Rosenfield, A. 1964. Studies of oyster microparasites. U. S. Fish & Wildl. Serv., Cir. 200: 30-37.

Rosenfield, A. 1965. Maintenance of oyster tissue in vitro. Amer. Malacol. Union Annu. Bull. 32: 30.

Rosenfield, A. and C. J. Sindermann. 1965. Starch-gel electrophoresis of oyster serum. Amer. Malacol. Union Annu. Bull. 32: 8-9.

Couch, J. A., C. A. Farley, and A. Rosenfield. 1966. Sporulation of Minchinia nelsoni (Haplosporida, Haplosporidiidae) in Crassostrea virginica (Gmelin). Science 153: 1529-1531.

Otto, Sara V., H. S. Tubiash, and A. Rosenfield. 1966. Improved destaining tube for use in disk electrophoresis. Chemical Analyst 55: 93.

Rosenfield, A. and C. J. Sindermann. 1966. The distribution of "MSX" in middle Chesapeake Bay. Abstract. Proc. Nat. Shellfish. Ass. 56: 6.

Sindermann, C. J. and A. Rosenfield. 1967. Diseases in marine mollusca and crustacea. U. S. Fish Wildl Serv. Fish. Bull. 66: 335-385.

Eble, A. F. and A. Rosenfield. 1968. The enzyme histochemistry of the sporulation of Minchinia nelsoni in Crassostrea virginica. Abstract. Proc. Nat. Shellfish. Ass. 58: 3.

Couch, J. A. and A. Rosenfield. Epizootiology of Minchinia costalis and Minchinia nelsoni in oysters introduced into Chincoteague Bay, Virginia. Proc. Nat. Shellfish. Ass. 58: 51-59.

Rosenfield, A., L. R. Buchanan, and G. W. Chapman. 1969. Comparison of the fine structure of three species of Minchinia spores. (Haplosporida, Haplosporidiidae). J. Parasitol. 55: 921-941.

Sieling, F. W., S. V. Otto, and A. Rosenfield. 1969. Distribution of some microparasites in oysters from Chesapeake Bay, 1963-1968. Abstract. Proc. Nat. Shellfish. Ass. 59: 8-9.

Rosenfield, A. 1971. Oyster diseases in North America and some methods for their control. In Symposium, 1969, Artificial Propagation of Commercially Valuable Shellfish, University of Delaware, p. 67-78.

b. In Press

None

c. In Preparation

Eble, A. F. and A. Rosenfield. Enzyme histochemistry of sporulation of Minchinia nelsoni in the American oyster. J. Invertebr. Pathol.

4. Scientific Honors and Awards

Society of Sigma Xi (Honorary Scientific Society)

Listed - American Men of Science

U. S. Bureau of Commercial Fisheries - Incentive Award \$100, 1966

U. S. Bureau of Commercial Fisheries - Incentive Award 10 year service, 1967

Member Editorial Board - Proceedings National Shellfisheries Association

Selected as Program Chairman, Wildlife Disease Association, AIBS meeting 1966

Selected to organize and chair special symposium - Invertebrate Defense

Mechanisms - Society of Invertebrate Pathology, AIBS meeting 1968.

Commendation - Honorable Rogers C. Morton - assistance rendered to the oyster industry, 1965

Selected as program chairman - International Symposium on Tumors in Lower Animals - Smithsonian Institute 1968  
Selected to organize and chair Molluscan and Crustacean Disease Workshop, Society of Invertebrate Pathology, AIBS meeting 1970  
Commendation - Regional Director - Committee on Scientific Contributions 1971  
Selected as member of Committee on Comparative Oncology, Union Internationale Contre Le Cancer, 1970-71  
Listed F.A.O. of U.N. as expert on aquaculture and marine fish diseases.

5. Paper Presentations before Scientific Societies

"Some chemical and cytological characteristics of the Ostridae", National Shellfisheries Association, 1963  
"U.S. Bureau of Commercial Fisheries oyster mortality studies", National Shellfisheries Association, 1963  
"Shellfish disease studies - a demonstration", International Congress of Zoology, 1963  
"Some biochemical approaches to oyster taxonomy", Atlantic Estuarine Research Society, 1964  
"The distribution of 'MSX' in middle Chesapeake Bay", National Shellfisheries Association, 1965  
"Maintenance of oyster tissue in vitro", American Malacological Union, 1965  
"Starch-gel electrophoresis of oyster serum", American Malacological Union, 1965  
"Diseases in commercially important mollusca and crustacea", Wildlife Disease Association, 1966  
"Uses of aquatic animals in research, tissue culture and genetic aspects", American Association Laboratory Animal Science, 1967  
"Distribution of some microparasites in oysters from Chesapeake Bay", National Shellfisheries Association, 1968  
"Minchinia spores in mud crabs", Atlantic Estuarine Research Society, 1968  
"Shellfish diseases in North America and some methods for their control", Invited Paper, University of Delaware Symposium on Aquaculture, 1969  
"Microparasites of commercially important shellfish", Helminthological Society, Washington, D. C., 1969  
"The control of shellfish diseases". Invited Paper, University of Washington Symposium on Mariculture, 1970  
"Infectious and non-infectious diseases of shellfish", Atlantic Fisheries Biologists, 1970  
"Parasite tags of marine invertebrates", International Congress of Protozoology, 1970

6. Affiliation in Scientific Organizations and Offices Held

Tissue Culture Association, Special Education Committee, 1969-70  
Atlantic Estuarine Research Society  
Atlantic Fisheries Biologists  
Sigma Xi  
Society for Invertebrate Pathology, Organization Committee  
National Shellfisheries Association, Editorial Board  
International Union Against Cancer, Committee on Comparative Oncology

## 7. Consulting Activities

Adjunct Associate Professor, Biology, Georgetown University, Washington, D. C., present lectures, classroom exercises, serve on thesis committees Review, evaluate, recommend action on non-laboratory contract and grant proposals and progress reports (Ex., National Science Foundation Sea Grant, National Institute of Health, National Cancer Institute, North Atlantic Treaty Organization, Corps of Engineers, Atomic Energy Commission, Federal Aid.)

Serve as consultant to university investigators and conservation agents in areas where mass mortalities of marine organisms occur and advise course of action and types of cooperative research (Ex., with Massachusetts, New York, Connecticut, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, California, Oregon, Washington, British Columbia Armed Forces Institute of Pathology, National Cancer Institute, etc.)

Serve on editorial boards and as a reviewer for scientific journals; such as, Science, Journal of Parasitology, Journal of Protozoology, Proceedings of National Shellfisheries Association, Proceedings of American Malacological Union.

Plan, organize, chair, and present lectures and seminars; otherwise participate in scientific symposia, meetings, workshops, and conferences as may be associated with professional societies, Federal and State agencies, universities, research institutions, and foundation laboratories.

## 8. Special Professional Assignments

Current position - Assistant Laboratory Director with duties and responsibilities incumbent, 1969-present.

Acting Laboratory Director, unofficial, intermittent basis 1969-71 with duties and responsibilities incumbent.

Plan, organize, write, edit and otherwise prepare in-house laboratory research and administrative reports, program review and briefing documents, annual and biennial reports and brochures.

Formulate and prepare research proposals and cooperative study project documents for contract and grant support (Ex., laboratory contracts to Hiram College, Howard University, Georgetown University, Brooklyn College, Trenton State College, University of Washington, and University of Delaware)

Prepare laboratory budgets, summaries of activities and progress, justifications for laboratory programs and projects.

Plan, conduct, supervise, evaluate, and expedite broad studies of research in comparative and experimental pathology of marine poikilotherm organisms.

Organize, arrange, serve on committees and host scientific workshops, conferences and meetings held at the laboratory or at nearby institutions (Ex., Atlantic Estuarine Research Society, Shellfish Pathology Conference, Federal Aid Workshops, Helminthological Society, Society of Invertebrate Pathology).

Present lectures, tours, hold consultations and discussion sessions with members of academic, school, industry, civic, conservation, foundation, and museum organizations.

Serve as a member on Central Office, Center, and Regional Office committees and task forces; such as, Scientific Contribution Review Committee, Aquaculture Issue Paper Group, Special Study Unit Group.

DISEASES OF ENVIRONMENTAL STRESS INVESTIGATIONS  
R. A. MURCHELANO, CHIEF

- ORGANIZATION: Oxford, Milford, and Sandy Hook Laboratories, Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Oxford, Maryland, Milford, Connecticut, and Highlands, New Jersey.
- ACTIVITY AREA: Field and laboratory studies of the diseases of estuarine and marine fishes and crustaceans inhabiting stressed environments.
- OBJECTIVE: The major objective of the task is to study disease -- infectious, noninfectious, and environmentally induced -- in marine fishes and crustaceans. Although diagnostic histopathology is employed initially to determine etiology, other biomedical disciplines (bacteriology, cytopathology, immunology, parasitology) are utilized whenever appropriate. Knowledge acquired is of substantial importance in 1) assessing the effects of environmental alterations on economically important aquatic resources (including the role of disease in the limitation of stock size) and 2) countering the impact of disease as a limiting factor in the aquaculture of marine species.
- SUMMARY: Field studies have focused on the prevalence of disease in fishes and crustaceans from the New York Bight, an area which has been altered substantially as a consequence of the disposal of sewage sludge, harbor dredge spoils and acid industrial wastes. Laboratory bacteriologic, histologic, and immunologic studies in progress are attempting to determine the etiology of fin rot disease of fishes and gill fouling or "black gill" disease of crustaceans. Both of these diseases are prevalent in the New York Bight and may cause significant mortality. Light and transmission and scanning electron microscopy are being utilized to assess histopathology and cytopathology. A Registry of Marine Pathology (ROMP) has been established to catalog the diseases of marine fishes, crustaceans, and mollusks.

Fin Rot Disease in the New York Bight: Determine the prevalence of fin rot disease in winter and summer flounder from the New York Bight. Determine the etiology of fin rot disease employing bacteriologic, histopathologic, and immunologic studies. Attempt to induce fin rot disease in apparently disease-free winter flounder by the placement of entrapped fish in the New York Bight.

Microfauna of New York Bight Fish and Benthos: Isolate, culture, and identify protozoa in water column and sediments of the New York Bight and in or on tissues of benthic crustaceans. Determine the etiology of "black gill" disease of crabs and lobsters from the Bight apex. Prepare species lists of amoeboid and ciliate protozoa inhabiting the sewage sludge, dredge spoil, and acid waste areas of the New York Bight.

Ultrastructural Studies of Normal and Physiologically Stressed Fish, Crustaceans, and Mollusks: Establish a functional and accessible electron microscope facility. Utilize transmission and scanning electron microscopy to elucidate the pathogenesis of fin rot disease in winter and summer flounder from the New York Bight. Conduct cytologic studies on the phagocytic cells of fishes that have been exposed to heavy metals.

Immunity in Marine Fish: Determine whether environmental pollutants reduce immunity to bacterial diseases. Determine bacterial agglutinin levels in winter flounder with fin rot disease from the New York Bight. Examine the effects of cadmium stress -- short term, high dose and long term, low dose -- on antibody production and phagocytosis in two economically important marine fishes.

Registry of Marine Pathology: Establish a Registry of Marine Pathology at the Oxford Laboratory. To solicit, catalog, and maintain accessions representative of pathology in marine and estuarine fishes, crustaceans, and mollusks. Accessions will include reprints, fixed tissues, and prepared slides.

RESOURCES:

FY 80.0 K  
FY 119.7 K

SENIOR STAFF:

MURCHELANO, ROBERT ADRIAN, b. Providence, R.I., Feb. 7, 34; m. 58; c. 2. BIOLOGICAL OCEANOGRAPHY. B.A., Brown Univ, 55; M.S., Univ. of R.I., 57; Ph.D., (biol. oceanogr.) Univ. of R.I., 67. Fish. Biol. (Res.), B.C.F., U.S.D.I., 67-70; SUP. FISH. BIOL. (RES.), N.M.F.S., U.S.D.C., 70- U.S.A., 57-60. Wildlife Dis. Assoc, Am. Fish. Soc, Biological Oceanography; Pathobiology; Diseases of Fishes. Address: Oxford Laboratory, Middle Atlantic Coastal Fisheries Center, Oxford, Maryland 21654.

Publications

Cleverdon, R. C., Leifson, E. and R. Murchelano. 1961. Morphological and physiological types of Gram negative stenohaline marine bacteria. In Proceedings of the First National Coastal and Shallow Water Research Conference, ed. by D.S. Gorsline, pp. 127-130.

Leifson, E., Cosenza, B. J., Murchelano, R. and R. C. Cleverdon. 1964. Motile marine bacteria. I. Techniques, ecology, and general characteristics. J. Bacteriol. 87: 652-666.

- Murchelano, R. A. and C. Brown. 1968. Bacteriological study of the natural flora of the Eastern oyster, Crassostrea virginica. J. Invertebr. Pathol. 11: 520-521.
- Murchelano, R. A. and J. L. Bishop. 1969. Bacteriological study of laboratory-reared juvenile American oysters, Crassostrea virginica. J. Invertebr. Pathol. 14: 321-327.
- Murchelano, R. A. and C. Brown. 1969. Bacteriological flora of some algal foods used for rearing bivalve larvae. J. Fish. Res. Board Can. 26: 2760-2764.
- Murchelano, R. A. and C. Brown. 1970. Heterotrophic bacteria in Long Island Sound. Marine Biology 7: 1-6.
- Combs, T. J., Murchelano, R. A. and F. Jurgen. 1971. Yeasts isolated from Long Island Sound. Mycologia 63: 178-181.
- Murchelano, R. A. 1971. Diseases of Marine Animals. Maritimes 15: 7-9.
- Ziskowski, J. and R. Murchelano. 1975. Fin erosion in winter flounder, Pseudopleuronectes americanus, from the New York Bight. Mar. Poll. Bull. 6: 26-28.
- Murchelano, R. 1975. The histopathology of fin rot disease in the winter flounder, Pseudopleuronectes americanus, from the New York Bight. J. Wildl. Dis. 11: 263-268.
- Murchelano, R. A., Brown, C. and J. Bishop. 1975. Quantitative and qualitative studies of bacteria isolated from seawater utilized in the laboratory-culture of the American oyster, Crassostrea virginica. J. Fish. Res. Board Can. 32: 739-745.
- SAWYER, THOMAS K(NOWLTON), b. Phoenix, Ariz, May 11, 29; m. 45; c. 3. PROTOZOOLOGY, PARASITOLOGY, IN VITRO CULTIVATION. B.S, American Univ, 53; M.S, Geo. Wash. Univ, 60; Ph.D. (zool), Univ. Md, 73. FISH. BIOL. (RES.), NMFS, 64-, PARASITOL, NIH, 59-64, BIOLOGIST, NIH, USDA, WRAIR, 53-59. In vitro cultivation of helminths, wildlife rabies, polio res, rickettsial dis, canine heartworm diagnosis and cultivation, protozoan parasites of fish and shellfish. Helm. Soc. Wash, Pres, 74, Amer. Micro. Soc, Soc Protozool, Sigma Xi, Phi Sigma - Pres, 73. Address: Oxford Laboratory, Middle Atlantic Coastal Fisheries Center, Oxford, Maryland 21654

#### Publications.

- Sawyer, T. K. 1958. Metagonimoides oregonensis from a Georgia raccoon, with a note on Sellacotylyl mustelae. J. Parasitol. 44: 63.
- Darnell, J., R. Lockart, and T. K. Sawyer. 1958. The effect of neutral red on plaque formation of two virus-cell systems. Virology 6: 567-573.

Cohn, Z., M. Bozeman, J. Campbell, J. Humphries, and T. K. Sawyer. 1959. Studies on the growth of *Rickettsiae*. V. Penetration of *Rickettsia tsutsugamushi* into mammalian cells in vitro. *J. Exp. Med.* 109: 271-292.

Darnell, J., and T. K. Sawyer. 1959. Variation in plaque-forming ability among parental and clonal strains of the HeLa cell. *Virology* 8: 223-229.

Darnell, J., H. Eagle, and T. K. Sawyer. 1959. The effect of cell population density on the amino acid requirements for poliovirus synthesis in HeLa cells. *J. Exp. Med.* 110: 445-450.

Darnell, J., and T. K. Sawyer. 1960. The basis for variation in susceptibility of poliovirus in HeLa cells. *Virology* 11: 665-675.

Sawyer, T. K. 1960. Variation in plaque-forming ability of clonal strains fo HeLa cells selected by exposure to poliovirus. M.S. Thesis, Geo. Wash. Univ., Washington, D.C.

Sawyer, T. K. 1961. The American otter, *Lutra canadensis vaga*, as a host for two species of trematodes previously unreported from North America. *Proc. Helminthol. Soc. Wash.* 28: 175-176.

Sawyer, T. K., and A. Cheever. 1962. Some internal parasites of the cottontopped Pinché (Columbian marmoset), *Oedipomidas oedipus*, with a note on the survival in vitro, of microfilariae of one of the parasites. *Proc. Helminthol. Soc. Wash.*, 29: 159-162.

von Brand, T., I. B. R. Bowman, P. Weinstein, and T. K. Sawyer. 1963. Observations on the metabolism of *Dirofilaria uniformis*. *Exp. Parasitol.* 13: 128-133.

Sawyer, T. K., and P. Weinstein. 1963. Studies on the microfilariae of the dog heartworm, *Dirofilaria immitis*: separation of parasites from whole blood. *J. Parasitol.* 49: 39-45.

Sawyer, T. K., and P. Weinstein. 1963. The in vitro development of microfilariae of the dog heartworm, *Dirofilaria immitis* to the "sausage form". *J. Parasitol.* 49: 218-224..

Sawyer, T. K., P. Weinstein, and J. Block. 1963. Canine filariasis - the influence of the method of treatment on measurements of microfilariae in blood samples. *Am. J. Vet. Res.* 24: 395-401.

Sawyer, T. K., and P. Weinstein. 1963. Morphologic changes occurring in canine microfilariae maintained in whole blood cultures. *Am. J. Vet. Res.* 24: 402-407.

Weinstein, P., L. Rosen, G. Laquer, and T. K. Sawyer. 1963. Angiostrongylus cantonensis infection in rats and Rhesus monkeys, and observations on the survival of the parasites in vitro. *Am. J. Trop. Med. Hyg.* 12: 358-377.

Sawyer, T. K., and P. Weinstein. 1963. Experimentally induced canine dirofilariasis. *J. Am. Vet. Med. Assoc.* 143: 975-978.

Hawking, F., T. K. Sawyer, and M. Worms. 1963. Transport of Dirofilaria immitis across the Atlantic and successful reimplantation into dogs. *J. Parasitol.* 49: 1035-1036.

Sawyer, T. K., E. F. Rubin, and R. F. Jackson. 1965. The cephalic hook in microfilariae of Dipethaltonema reconditum in the differentiation of canine microfilariae. *Proc. Helm. Soc. Wash.* 32: 15-20.

Sawyer, T. K. 1965. Molting and exsheathment in vitro of third stage Dirofilaria immitis. *J. Parasitol.* 51: 1016-1017.

Sawyer, T. K., E. F. Rubin, and R. F. Jackson. 1966. Differentiation of canine microfilariae with brilliant cresyl blue. *J. Am. Vet. Med. Assoc.* 149: 752.

Sprague, V., R. L. Beckett, and T. K. Sawyer. 1969. A new species of Paramoeba (Paramoebidae) from the blue crab, Callinectes sapidus. *J. Invertebr. Pathol.* 14: 167-174.

Sawyer, T. K. 1969. A preliminary study on the epizootiology and host-parasite relationship of Paramoeba sp. in the blue crab, Callinectes sapidus. *Proc. Natl. Shellfish. Assoc.* 59: 60-64.

Weinstein, P. P., W. L. Newton, T. K. Sawyer, and R. I. Sommerville. 1969. Nematospiroides dubius: Development and passage in the germfree mouse, and a comparative study of the free-living stages in germfree feces and conventional cultures. *Trans. Am. Microsc. Soc.* 88: 95-117.

Sawyer, T. K., R. Cox, and M. Higginbottom. 1970. Observations on the hemolymph and hemocytes of healthy blue crabs, Callinectes sapidus, and crabs infected with Paramoeba perniciosus. *J. Invertebr. Pathol.* 15: 440-446.

Sawyer, T. K. 1970. The influence of seawater media on growth and encystment of Acanthamoeba polyphaga. *Proc. Helm. Soc. Wash.* 37: 182-188.

Sawyer, T. K. 1971. Isolation and identification of free-living marine amoebae from upper Chesapeake Bay, Maryland. *Trans. Am. Microsc. Soc.* 90: 43-51.

Sawyer, T. K., and J. L. Griffin. 1971. Acanthamoeba commandoni and A. astronyxis: Taxonomic characteristics of mitotic nuclei, "centrosomes" and cysts. *J. Protozool.* 18: 382-388.

Sawyer, T. K., and L. Buchanan. 1971. Cysts of Acanthamoeba as contaminants on tissue sections of the American oyster, Crassostrea virginica. *J. Invertebr. Pathol.* 18: 300.

Sawyer, T. K. 1971. Acanthamoeba griffini, a new species of marine amoeba. *J. Protozool.* 18: 650-654.

Sawyer, T. K., J. G. Hnath, and J. F. Conrad. 1974. Thecamoeba hoffmani n. sp. (Amoebida: Thecamoebidae) from gills of hatchery-reared salmonid fish. *J. Parasitol.* 60: 677-682.

Sawyer, T. K. 1975. Marine amoebae from surface waters of Chincoteague Bay, Virginia: two new genera and nine new species within the families Mayorellidae, Flabellulidae, and Stereomyxidae. *Trans. Am. Microsc. Soc.* 94: 71-92.

Sawyer, T. K., and J. L. Griffin. 1975. A proposed new family, Acanthamoebidae n. fam. (Order Amoebida), for certain cyst-forming filose amoebae. *Trans. Am. Microsc. Soc.* 94: 93-98.

Sawyer, T. K., Martin W. Newman, and Sara V. Otto. A gregarine-like parasite associated with pathology in the digestive tract of the American oyster, Crassostrea virginica. *Proc. Natl. Shellfish. Assoc.*, June 1975.

Sawyer, T. K. Marine amoebae from surface water of Chincoteague Bay, Virginia. II. Eleven new species within the families Thecamoebidae Schaeffer, 1926 and Hyalodiscidae Poche, 1913. *Trans. Am. Microsc. Soc.* 94: July, 1975.

Sawyer, T. K. Clydonella n. gen., (Amoebida: Thecamoebidae), a proposed new taxon to replace the defunct genus Rugipes Schaeffer, 1926. *Trans. Am. Microsc. Soc.*, July, 1975.

## NOTICE OF RESEARCH PROJECT

SUPPORTING AGENCY:

U.S. Department of Commerce  
National Oceanic and Atmospheric Administration

AGENCY'S NUMBER(S):

Contract No:

and/or

Control No:

TITLE OF PROJECT:

Task: Diseases in Stressed Environments  
Subtask: Fin Rot Disease in the New York Bight

PRINCIPAL INVESTIGATOR, ASSOCIATES School or Division

Department

Dr. Robert A. Murchelano - Principal Investigator  
Mr. John Ziskowski - Associate Investigator

RECIPIENT INSTITUTION:

PERIOD FOR THIS NRP:

Name and Address: National Marine Fisheries Service  
Middle Atlantic Coastal Fisheries Center  
Including Oxford Laboratory  
Zip Code. Oxford, Maryland 21654

Start Date: July 1, 1974  
End Date: June 30, 1975

Annual Funding:

SUMMARY OF PROJECT: Be brief-200 word maximum: (Include Objective, Approach  
Current Plans and/or Progress)

The objective of the research is to determine the prevalence and incidence of fin erosion in demersal and pelagic fish inhabiting the New York Bight. Trawl surveys will be used to assess fish abundance and disease prevalence. Histopathological examinations will be conducted on fish with significant lesions. Winter flounder (Pseudopleuronectes americanus) will be made to determine seasonal incidence of fin erosion in summer flounder (Paralichthys dentatus). Diseased fish will be held in laboratory aquaria to follow disease progression. Entrapped fish will be placed in sewage sludge, acid waste, and dredge spoils areas of the Bight in attempts to induce the disease.

# NOTICE OF RESEARCH PROJECT

SUPPORTING AGENCY:

U.S. Department of Commerce  
National Oceanic and Atmospheric Administration

AGENCY'S NUMBER(S):

Contract No:  
and/or  
Control No:

TITLE OF PROJECT:

Task: Disease and Environmental Stress  
Subtask: Microfauna of New York Bight Fish & Benthos

PRINCIPAL INVESTIGATOR, ASSOCIATES

School or Division

Department

Dr. Thomas K. Sawyer, Principal Investigator

RECIPIENT INSTITUTION:

Name and Address: National Marine Fisheries Service  
Middle Atlantic Coastal Fisheries Center  
Including Oxford Laboratory  
Zip Code: Oxford, Maryland 21654

PERIOD FOR THIS NRP:

Start Date: July 1, 1974

End Date: June 30, 1975

Annual Funding:

SUMMARY OF PROJECT:

Be brief-200 word maximum: (Include Objective, Approach  
Current Plans and/or Progress)

Conduct histological examinations of tissues from crabs and lobsters to determine the types of microfauna associated with gill fouling. Animals are collected quarterly from Sandy Hook Bay, New Jersey, and the New York Bight and differences are noted in the histopathology of gills in animals from the two areas. Studies are in progress to detect the species composition of microfauna found on lobsters (Homarus), swimming crabs (Ovalipes, Callinectes), and Cancer crabs. Over 200 animals have been processed to date and a goal is set for 500. Final analysis of the data will determine host differences in microfauna and their relative prevalence in both Bay and ocean sites.

# NOTICE OF RESEARCH PROJECT

<b>SUPPORTING AGENCY:</b> U.S. Department of Commerce National Oceanic and Atmospheric Administration	<b>AGENCY'S NUMBER(S):</b> <b>Contract No:</b> and/or <b>Control No:</b>
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<b>TITLE OF PROJECT:</b> Task: Diseases in Stressed Environments Subtask: Ultrastructural studies of normal & physiologically stressed crabs, fish &
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<b>PRINCIPAL INVESTIGATOR, ASSOCIATES School or Division Department</b> Dr. Joel E. Bodammer - Principal Investigator Dr. Phyllis T. Johnson - Associate Investigator Dr. Richard A. Robohm - Associate Investigator Dr. Thomas K. Sawyer - Associate Investigator Mr. John J. Ziskowski - Associate Investigator
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<b>RECIPIENT INSTITUTION:</b> Name and National Marine Fisheries Service Address: Middle Atlantic Coastal Fisheries Center Including Oxford Laboratory Zip Code. Oxford, Maryland 21654	<b>PERIOD FOR THIS NRP:</b> <b>Start Date:</b> July 1, 1974 <b>End Date:</b> June 30, 1975 <b>Annual Funding:</b>
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**SUMMARY OF PROJECT** Be brief-200 word maximum: (Include Objective, Approach Current Plans and/or Progress)

The current research objectives of this laboratory are to carry out routine fine structural studies on a variety of normal and diseased marine animals with the hope of documenting the cytopathological changes that occur during the course of infection. Presently, research is being conducted on the following subjects: 1) viral disease in the blue crab (C. sapidus); 2) wound repair processes and fin erosion disease in the winter (P. americanus) and summer (P. dentatus) flounder; 3) cytological studies on the phagocytic cells of the striped bass (M. saxatilis) and winter flounder (P. americanus) where the responses of these cells from fish that have been exposed to heavy metals will be compared with those from normal animals; and 4) investigations of mackerel (S. scombrus) blood cells that have been parasitized by an intra-erythrocytic, hemogregarine parasite are also planned for this year when this species becomes available.

# NOTICE OF RESEARCH PROJECT

<b>SUPPORTING AGENCY:</b> U.S. Department of Commerce National Oceanic and Atmospheric Administration		<b>AGENCY'S NUMBER(S):</b> Contract No: and/or Control No:
<b>TITLE OF PROJECT:</b> Task: Disease and Environmental Stress Subtask: Immunity in Marine Fish		
<b>PRINCIPAL INVESTIGATOR, ASSOCIATES</b> Dr. Richard A. Robohm - Principal Investigator Ms. Carolyn Brown - Associate Investigator		<b>School or Division</b>          <b>Department</b>
<b>RECIPIENT INSTITUTION:</b> Name and Address: Including Zip Code.	National Marine Fisheries Service Middle Atlantic Coastal Fisheries Center Milford Laboratory Milford, Connecticut 06460	<b>PERIOD FOR THIS NRP:</b> Start Date: July 1, 1974 End Date: June 30, 1975 Annual Funding:

**SUMMARY OF PROJECT** Be brief-200 word maximum: (include Objective, Approach, Current Plans and/or Progress)

The objectives of this research project are to 1) determine whether pollutants reduce immunity to bacterial disease agents in fish and 2) attempt to link fish diseases to raised serum antibody titers against specific bacteria. This will be accomplished by examination of antibody response and cellular defenses of fish in environmental and laboratory settings. A variety of immunological and cytochemical tests will be applied to analyze fish immune systems under synergistic stress of pollutants and exposure to bacterial pathogens.

We are in the process of examining cadmium stress (both short-term, high-dose and long-term, low-dose) on antibody production and phagocytosis in several fish species. We are also examining antibody titers to bacterial pathogens in flounder taken from the highly polluted New York Bight area and from a clean control area.

# NOTICE OF RESEARCH PROJECT

SUPPORTING AGENCY:

U.S. Department of Commerce  
National Oceanic & Atmospheric Administration  
National Marine Fisheries Service

AGENCY'S NUMBER(S):

Contract No:  
and/or  
Control No:

TITLE OF PROJECT:

Task: Disease and Environmental Stress  
Subtask: Registry of Marine Pathology

PRINCIPAL INVESTIGATOR, ASSOCIATES

School or Division

Department

Haskell S. Tubiash

RECIPIENT INSTITUTION:

Name and Address: National Marine Fisheries Service  
Middle Atlantic Coastal Fisheries Center  
Including Oxford Laboratory  
Zip Code. Oxford, Maryland 21654

PERIOD FOR THIS NRP:

Start Date: July 1, 1974  
End Date: June 30, 1975  
Annual Funding:

SUMMARY OF PROJECT: Be brief-200 word maximum: (Include Objective, Approach, Current Plans and/or Progress)

The need for registries and repositories for pathologic specimens, microbial agents, somatic and germ cells related to human and veterinary medicine, agriculture and industry has been internationally recognized and met by the establishment of renowned registries of pathology, type culture collections of bacteria, fungi, viruses, cells, tissues; and sperm banks. The Registry of Marine Pathology is designed to offer the growing community of marine and estuarine biologists and pathologists a counterpart to some of the reference services so abundantly available to their land-locked colleagues.

ROMP consists basically of three slide collections illustrating pathology, parasitism or anomalies in 9 species of bivalve mollusks, 11 fishes and 1 decapod crustacean representing domestic and exotic diseases of bivalve mollusks and helminth parasites in fishes from Raritan Bay, New Jersey.

It is premature to predict the ultimate form and function of ROMP, but the initial intention is to solicit, catalogue, and maintain accessions representative of pathology and abnormality in marine and estuarine biota. However, it is not the function of ROMP to serve as a museum of commensals unrelated to pathology.

Qualified investigators are invited both to donate suitable material to ROMP and avail themselves of its facilities.

May, 1975

Personnel Resume

Name: Robert A. Murchelano

Place and Date of Birth: Providence, R. I., February 7, 1934

Education and Training:

1. Degrees

B.A., 1955, Brown University/Biology

M.S., 1957, University of Rhode Island/Microbiology

Ph.D., 1967, University of Rhode Island/Biological Oceanography

2. Other Courses

Commerce Managerial Course, February 5-9, 1973

Supervision and Group Performance (CSC), October 14-20, 1973

Positions Held:

July 10, 1967 Fishery Biologist (Res.) GS/11, BCF, Biological Laboratory, Milford, Connecticut

July 13, 1969 Fishery Biologist (Res.) GS/12, BCF, Biological Laboratory, Milford, Connecticut

October 11, 1970 Supervisory Fishery Biologist (Res.) GS/13, NMFS, Oxford Laboratory, Oxford, Maryland

(See Attachment # 1)

Chronological Listing of Publications: (See Attachment # 2)

Scientific Honors and Awards:

Tuition Scholarship - Brown University

Phi Sigma Society

Society of Sigma Xi

Paper Presentations Before Scientific Societies:

1. American Society of Limnology and Oceanography, La Jolla, California, September 11, 1969, "Heterotrophic Bacteria in Long Island Sound"

2. National Shellfisheries Association, Seattle, Washington, June 22, 1971, "Bivalve Larval Culture at the NMFS, Milford Laboratory, Milford, Connecticut" and Member, Oyster Mortality Panel

3. International Association for Aquatic Animal Medicine, Orlando, Florida, April 30, 1974, "Fin Rot - A Possible Symptom of Environmental Deterioration"

4. Wildlife Disease Association, Pacific Grove, California, August 1, 1974, "A Fin Rot Disease of Winter Flounder"

Seminars Presented:

1. Systematics Ecology Program, Marine Biological Laboratory, Woods Hole, Massachusetts, February 18, 1969, "Bacteriological Aspects of Bivalve Larval Culture"

2. College of Marine Studies, University of Delaware, Lewes, Delaware, March 21, 1973, "Disease Research at the Oxford Laboratory, NMFS, Oxford, Maryland"
3. Southern California Coastal Water Research Project, Los Angeles, California, August 5, 1974, "Studies of the Prevalence, Histopathology, Bacteriology, and Immunology of Fin Rot Disease of Winter Flounder, Pseudopleuronectes americanus, from the New York Bight"
4. Helminthological Society of Washington, Beltsville, Maryland, December 13, 1974, "Fin Rot Disease in Winter Flounder, Pseudopleuronectes americanus, from the New York Bight"

#### Consulting Activities:

1. Consultant, Shelter Island Oyster Co., Greenport, Long Island, New York, February 23-24, 1972 (To advise on methods to control mortalities in cultures of bivalve mollusks)
2. Consultant, NOAA, Office of Sea Grant, Orono, Maine, October 7-10, 1974, (Sea Grant Review - University of Maine)
3. Consultant, EPA, Gulf Breeze, Florida, January 6-8, 1975 (To prepare a RFP on biologic research with dimethylnitrosamine)

#### Special Professional Assignments:

1. Organizational meeting for Cooperative Contaminants Study, Ann Arbor, Michigan, February 17-19, 1971
2. Task force on physiologic effects of marine contaminants, Baltimore, Maryland, April 13-14, 1971
3. Steering Committee Meeting, Pacific Coast Oyster Mortality Investigations, Menlo Park, California, November 30-December 3, 1971
4. Task Development Plan Review, Office of Resource Research, NMFS, Washington, D.C., January 3-11, 1973
5. Ph.D. dissertation defense of Mr. John Manzi (as committee member), Virginia Institute of Marine Science, Gloucester Point, Virginia, August 13, 1973
6. Inshore Ecology Workshop, Northwest Fisheries Center, Seattle, Washington, June 10-12, 1974

#### Research Cruises (Major):

1. R/V Albatross IV, July 30-August 2, 1973
2. R/V Albatross IV, February 1-7, 1974
3. R/V Delaware II, September 9-13, 1974 (Chief Scientist)

Special Administrative Assignments:

1. Acting Director, Pathobiology Investigations, September 6-October 13, 1973.
2. Acting Director, Pathobiology Investigations, January 20-April 19, 1974.
3. Intermittently as Acting Director, Pathobiology Investigations and Officer in Charge, Oxford Laboratory

Special Research Assignments:

1. Cooperative Contaminants Study, MACFC, February 17, 1971 - Present
2. Fin Rot Task Force, MACFC, June 15, 1973-July 1, 1974

Supervisory Duties and Responsibilities:

Oxford Laboratory:

1. Dr. Thomas Sawyer (PCN 003) Fishery Biologist (Res.)
2. Mr. Haskell Tubiash (PCN 006) Microbiologist (Res.)
3. Mr. Austin Farley (PCN 004) Fishery Biologist (Res.)
4. Dr. Phyllis Johnson (PCN 005) Biologist (Res.)
5. Mr. Martin Newman (PCN 008) Fishery Biologist (Res.)
6. Dr. Joel Bodammer (PCN 009) Physiologist (Res.)
7. Mr. Frederick Kern (PCN 010) Fishery Biologist (Res.)
8. Ms. Jane Wade (PCN 011) Biological Laboratory Technician
9. Ms. Ceil Smith (PCN 012) Biological Laboratory Technician
10. Ms. Dorothy Wright (PCN 016) Biological Laboratory Technician
11. Ms. Sharon MacLean (PCN 027) Biological Laboratory Technician

Milford Laboratory:

1. Dr. Richard Roboŋm (PCN 052) Microbiologist (Res.)
2. Dr. Walter Blogoslowski (PCN 006) Microbiologist (Res.)
3. Ms. Carolyn Brown (PCN 011) Biologist (Res.)
4. Work/Study Students (2)

Sandy Hook Laboratory:

1. Mr. John Ziskowski (PCN 023) Fishery Biologist (Gen.)
2. Work/Study Students (1)

Incumbent exercises supervision (direct, first line) over the largest investigative unit in MACFC. Supervision of staff at Milford and Sandy Hook is not reflected in the current position description and necessitates frequent travel to accomplish satisfactorily.

## PUBLICATIONS

- Cleverdon, R. C., Leifson, E. and R. Murchelano. 1961. Morphological and physiological types of Gram negative stenohaline marine bacteria. In Proceedings of the First National Coastal and Shallow Water Research Conference, ed. by D. S. Gorsline, pp. 127-130.
- Leifson, E., Cosenza, B. J., Murchelano, R. and R. C. Cleverdon. 1964. Motile marine bacteria. I. Techniques, ecology, and general characteristics. J. Bacteriol. 87: 652-666.
1. Murchelano, R. A. and C. Brown. 1968. Bacteriological study of the natural flora of the Eastern oyster, Crassostrea virginica. J. Invertebr. Pathol. 11: 520-521.
  2. Murchelano, R. A. and J. L. Bishop. 1969. Bacteriological study of laboratory reared juvenile American oysters, Crassostrea virginica. J. Invertebr. Pathol. 14: 321-327.
  3. Murchelano, R. A. and C. Brown. 1969. Bacteriological flora of some algal foods used for rearing bivalve larvae. J. Fish. Res. Board Can. 26: 2760-2764.
  4. Murchelano, R. A. and C. Brown. 1970. Heterotrophic bacteria in Long Island Sound. Marine Biology 7: 1-6.
  5. Combs, T. J., Murchelano, R. A. and F. Jurgen. 1971. Yeasts isolated from Long Island Sound. Mycologia 63: 178-181.
  6. Murchelano, R. A. 1971. Diseases of Marine Animals. Maritimes 15: 7-9.
  7. Ziskowski, J. and R. Murchelano. 1975. Fin erosion in winter flounder, Pseudopleuronectes americanus, from the New York Bight. Marine Pollution Bulletin (In press, February, 1975).
  8. Murchelano, R. 1975. The histopathology of fin rot disease in the winter flounder, Pseudopleuronectes americanus, from the New York Bight. J. Wildl. Dis. (In press, April, 1975).
  9. Murchelano, R. A., Brown, C. and J. Bishop. 1975. Quantitative and qualitative studies of bacteria isolated from seawater utilized in the laboratory-culture of the American oyster, Crassostrea virginica. J. Fish. Res. Board Can. (In press, July, 1975).
  10. Murchelano, R. A. Histopathology of an acute fin lesion in the summer flounder, Paralichthys dentatus and some etiologic implications. In preparation (1st draft written, revised, and photomicrographs complete).

11. Wolke, R. E. and R. A. Murchelano. A hyperplastic epidermal lesion in smooth dogfish, Mustelus canis. In preparation (1st draft written, photomicrographs complete).
12. Bridges, D. W. and R. A. Murchelano. Lymphocystis disease in winter flounder, Pseudopleuronectes americanus, from Casco Bay, Maine. In preparation (text and photomicrographs).

COMPARATIVE PATHOBIOLOGY INVESTIGATIONS  
R. A. MURCHELANO, CHIEF

ORGANIZATION: Oxford and Milford Laboratories, Middle Atlantic Coastal Fisheries Center, National Marine Fisheries Service, Oxford, Maryland, and Milford, Connecticut.

ACTIVITY AREA: Investigation of the role of infectious and noninfectious disease in massive natural mortalities of wild populations of marine animals and marine animals maintained under conditions of cultivation, including aquaculture operations. Studies of mortalities and abnormalities in marine poikilotherms as indicators of environmental degradation.

OBJECTIVES: To understand the biology and mechanics of disease dissemination and transmission; to further understand those disease processes and defense mechanisms operative in marine poikilotherms (vertebrate and invertebrate) for fishery management purposes and to prevent or control disease spread and disease caused abnormalities and mortalities; to assess the effects of marine animal health resulting from environmental modification or from exposure to man's effluvia.

SUMMARY: Studies are aimed toward understanding disease induced abnormalities and mortalities of marine mollusks, crustaceans, and fish. Approaches used are primarily observational using light and electron transmission microscopy. Experimental approaches include acute and chronic exposures of marine species to certain micropathogens, heavy metals, inorganic and organic compounds. Activities involve: descriptions of pathologic responses in host tissues and cells; disease diagnoses; disease epizootiology and etiology; and the isolation and characterization of infectious disease agents.

There are four major areas of research whose current functions may be summarized as follows:

Molluscan Pathology: 1) Histologic studies of representative mollusks for prevalence of micropathogens and pathologic manifestations, including neoplasia and baseline histology; 2) comparative ultrastructure of molluscan neoplasms; 3) identification and characterization of oyster viruses; 4) chemical induction of neoplasia; 5) diagnostic services for other agencies.

Crustacean Pathology: 1) The production of a practical atlas of normal crab histology geared for use by pathologists is a major activity; 2) histologic investigations of abnormal conditions such as those found in crabs or other crustaceans stressed by exposure to heavy metals and other pollutants and by parasitic infections.

Fish Pathology: 1) Baseline histology and histopathology of fish exposed to heavy metals; 2) study abnormalities and mortalities in fish and determine cause of fish disease whether infectious, noninfectious, or environmentally induced; 3) histopathology of the "puffy snout" condition in captive skipjack tuna.

Disease of Larval Mollusks: 1) Utilizing conventional and newly developed microbiologic techniques, isolate and identify micropathogens in bivalve mollusk cultures; 2) develop chemical and physical methods (including ozonation) for the elimination of microbial pathogens, toxins, and metabolites; 3) provide consultative disease control services to industry and sea grant institutions engaged in molluscan aquaculture.

RESOURCES:

FY 161.7 K  
FY 144.1 K

SENIOR STAFF:

JOHNSON, DR. PHYLLIS T(RUTH), b. Salem, Ore, Aug. 8, 26. INVERTEBRATE PATHOBIOLOGY. Ph.D. (parasitol), California, Berkeley, 54. Parasitologist, med. entom, bur. vector control, State Dept. Health, Calif, 48-50; entomologist, dept. entom, Walter Reed Army Inst. Res, Walter Reed Army Med. Center, 50-55; entom. res. br, U.S. Dept. Agr, 55-58; med entomologist, Gorgas Mem. Lab, 59-63; Asst-Assoc. Res. Pathobiologist, California, Irvine, 64-70; Res. Associate, Calif. Inst. Technol, 70-71; Consult, Smithsonian Inst, 71-72; BIOLOGIST, NATL. MARINE FISH. SERV, OXFORD, MD, 72-. Res. assoc, U.S. Dept. Agr, 58-63; Consult, U.S. Naval Med. Res. Unit 3, Cairo, Egypt, 57- Editorial Bd, J. Invertebr. Pathol, 70-74; Comm. Animal Models & Genetic Stocks, ILAR, Natl. Res. Council 73- AAAS; Soc. Invertebr. Pathol; Soc. Parasitol; Soc. Trop. Med. & Hyg.; Entom. Soc. Wash. Crustacean pathobiology; immune processes in invertebrates; relationships of diseases and their arthropod vectors, especially protozoan and rickettsial diseases; Leishmaniasis; taxonomy of Siphonaptera and Anoplura. Address: Oxford, Laboratory, Middle Atlantic Coastal Fisheries Center, Oxford, Maryland 21654.

Publications

Johnson, P. T., and E. B. Thurman. 1950. The occurrence of Aedes (Ochlerotatus) pullatus (Coquillett), in California. Pan-Pacific Entomol. 26: 107-110.

Thurman, E. B. and P. T. Johnson. 1950. The taxonomic characters of the larvae of the genus Culiseta Felt, 1904 in California. Pan-Pacific Entomol. 26: 181-187.

Traub, R., and P. T. Johnson. 1952. Fleas collected during a plague survey in Venezuela. Bol. Ofic. Sanit. Panamer. 32: 111-135.

- Traub, R., and P. T. Johnson. 1952. Kohlsia whartoni and Stenoponia ponera, new species of fleas from North America. *J. Parasitol.* 38: 6-18.
- Traub, R., and P. T. Johnson. 1952. Atyphloceras tancitari and Jellisonia bonia, new species of fleas from Mexico (Siphonaptera). *Amer. Mus. Novit.*, No. 1558: 1-19.
- Traub, R., and P. T. Johnson. 1952. Four new species of fleas from Mexico (Siphonaptera). *Amer. Mus. Novit.*, No. 1598: 1-28.
- Traub, R., P. T. Johnson, M. L. Miesse, and R. E. Elbel. 1954. Isolation of Richettsia tsutsugamushi from rodents from Thailand. *Amer. J. Trop. Med. Hyg.* 3: 356-359.
- Johnson, P. T., and R. Traub. 1954. Revision of the flea genus Peromyscopsylla. *Smithsonian Miscell. Coll.* 123: 1-68.
- Johnson, P. T. 1954. Notes on Pleochaetis Jordan, 1933, from Colombia, with the description of a new species (Siphonaptera: Ceratopsyllidae). *J. Wash. Acad. Sci.* 44: 289-296.
- Johnson, P. T. 1955. The genus Chaetopsylla Kohaut, 1903 in North America, with the description of a new species. (Siphonaptera: Vermipsyllidae). *Pan-Pacific Entomol.* 32: 93-104.
- Johnson, P. T. 1956. *Cat. of the Rothschild Coll. of Fleas, Vol. 2. A Review.* *Science* 124: 412.
- Johnson, P. T. 1956. Myodopsylla setosa and Tiarapsylla bella, new species of fleas from Peru. *J. N. Y. Ent. Soc.* 62: 193-205. (Dated 1954, publ. 1956).
- Johnson, P. T. 1957. A redescription of the flea genus Libyastus Jordan, 1936, with the description of a new species (Ceratopsyllidae: Ceratopsyllinae). *Bull. Brooklyn Ent. Soc.* LII, 72-81.
- Johnson, P. T. 1957. The identity of Pediculus spiculifer Gervais (Anoplura). *Bull. Brooklyn Ent. Soc.* LII: 25-27.
- Johnson, P. T. 1957. Description of two new species of Eulinognathus Cummings, and redescription of Eulinognathus aculeatus (Newmann) (Anoplura). *J. Egypt. Publ. Hlth. Assoc.* XXXII: 273-283.
- Johnson, P. T. 1957. A classification of the Siphonaptera of South America, with descriptions of new species. *Ent. Soc. Wash., Memoir No. 5*, pp. 1-299.

- Scanlon, J. E., and P. T. Johnson. 1957. On some microtine-infecting Polyplax. Proc. Ent. Soc. Wash. 59: 279-283.
- Johnson, P. T. 1958. Type specimens of lice (order Anoplura) in the United States National Museum. Proc. U.S. Nat. Mus. 108: 39-49.
- Johnson, P. T. 1958. A new species of Anoplura from the Philippines. Bull. Brooklyn Ent. Soc. 53: 76-80.
- Hopkins, G. H. E. and P. T. Johnson. 1959. Notes on the type material of two names proposed by Baker for fleas of the genus Foxella. Proc. Ent. Soc. Wash. 61: 79-83.
- Johnson, P. T. 1959. The rodent-infesting Anoplura (sucking lice) of Thailand, with remarks on some related species. Proc. U.S. Nat. Mus. 110: 569-598.
- Johnson, P. T. 1960. The Anoplura of African rodents and insectivores. U.S. Dept. Agric., Tech. Bull. No. 1211, pp. 1-116.
- Johnson, P. T. 1960. A new species of Hoplopleura from Australia (Anoplura: Hoplopleuridae). Proc. Ent. Soc. Wash. 62: 111-113.
- Johnson, P. T. 1961. Autogeny in Panamanian Phlebotomus sandflies (Diptera: Psychodidae). Ann. Ent. Soc. Amer. 54: 116-118.
- Johnson, P. T. 1961. The sucking lice (Anoplura) of Egypt. I. Species infesting rodents. J. Egypt. Publ. Hlth. Assoc. 35: 203-228. (Dated 1960, publ., 1961).
- Johnson, P. T. 1961. A revision of the species of Monopsyllus Kolenati in North America (Siphonaptera, Ceratophyllidae). U.S. Dept. Agric., Tech. Bull. No. 1227, pp. 1-69.
- Johnson, P. T. and J. N. Layne. 1961. A new species of Polygenis Jordan from Florida, with remarks on its host relationships and zoogeographic significance (Siphonaptera: Rhopalopsyllidae). Proc. Ent. Soc. Wash. 63: 115-123.
- Hertig, M., and P. T. Johnson. 1961. The rearing of Phlebotomus sandflies (Diptera: Psychodidae). I. Technique. Ann. Ent. Soc. Amer. 54: 753-764.
- Johnson, P. T., and M. Hertig. 1961. The rearing of Phlebotomus sandflies (Diptera: Psychodidae). II. Development and behavior of Panamanian sandflies in laboratory culture. Ann. Ent. Soc. Amer. 54: 764-776.

- Johnson, P. T., E. McConnell, and M. Hertig. 1962. Natural and experimental infections of leptomonad flagellates in Panamanian Phlebotomus sandflies. *J. Parasitol.* 48: 158.
- Johnson, P. T. 1962. Notes and descriptions of African lice (Anoplura). *Proc. Ent. Soc. Wash.* 64: 51-56.
- Johnson, P. T. 1962. Redescriptions of two cervid-infesting Anoplura from Southeast Asia. *Proc. Ent. Soc. Wash.* 64: 107-110.
- Johnson, P. T. 1962. The species of Fahrenholzia Kellogg and Ferris from spiny pocket mice (Anoplura: Hoplopleuridae). *Ann. Ent. Soc. Amer.* 55: 415-428.
- Johnson, P. T. 1962. Three new Anoplura from African rodents (Anoplura: Hoplopleuridae). *Proc. Ent. Soc. Wash.* 64: 155-165.
- Johnson, P. T., E. McConnel, and M. Hertig. 1963. Natural infections of leptomonad flagellates in Panamanian Phlebotomus sandflies. *Exper. Parasitol.* 14: 107-122.
- Johnson, P. T. 1963. Two rare Anoplura from Kenya. *Proc. Ent. Soc. Wash.* 65: 226-229.
- Johnson, P. T. 1964. The hoplopleurid lice of the Indo-Malayan Subregion (Anoplura). *Miscell. Publ. Ent. Soc. Amer.* 4: 67-102.
- Johnson, P. T. 1966. On Donax and other sandy-beach inhabitants. *The Veliger* 9: 29-30.
- Johnson, P. T. 1966. Mass mortality in a bivalve mollusc. *Limnol. Oceanogr.* 11: 429-431.
- Johnson, P. T., and R. J. Beeson. 1966. In vitro studies on Patiria miniata (Brandt) coelomocytes, with remarks on revolving cysts. *Life Sci.* 5: 1641-1666.
- Wenzel, R. L., and P. T. Johnson. 1966. Checklist of the sucking lice of Panama (Anoplura). In: "Ectoparasites of Panama," Wenzel, R. L., and Tipton, V. J. (eds). *Field Mus. Nat. Hist., Chicago*, pp. 273-279.
- Beeson, R. J., and P. T. Johnson. 1967. Natural bacterial flora of the bean clam, Donax gouldi. *J. Invertebr. Pathol.* 9: 104-110.
- Johnson, P. T. 1968. A new medium for maintenance of marine bacteria. *J. Invertebr. Pathol.* 11: 144.
- Johnson, P. T. 1968. Book Review: "Marine Molluscs as Hosts for Symbiosis." By T. C. Cheng. Vol. 5 of "Advances in Marine Biology," F. S. Russell (Ed.). *J. Invertebr. Pathol.* 11: 153-154.

- Johnson, P. T. 1968. Book Review: "Porifera, Coelenterata, and Platyhelminthes." Vol. 2 of "Chemical Zoology," Florkin and Scheer (eds.). J. Invertebr. Pathol. 11: 524.
- Johnson, P. T., with the assistance of F. A. Chapman. 1968. "An Annotated Bibliography of Pathology in Invertebrates other than Insects." Burgess Publ. Co., Minneapolis, Minn., i-xii + 1-324.
- Johnson, P. T. 1968. Population crashes in the bean clam, Donax gouldi, and their significance to the study of mass mortality in other marine invertebrates. J. Invertebr. Pathol. 12: 349-358.
- Johnson, P. T. 1969. The coelomic elements of sea urchins (Strongylocentrotus). I. The normal coelomocytes; their morphology and dynamics in hanging drops. J. Invertebr. Pathol. 13: 25-41.
- Johnson, P. T. 1969. The coelomic elements of sea urchins (Strongylocentrotus). II. Cytochemistry of the coelomocytes. Histochemie 17: 213-231.
- Johnson, P. T. 1969. The coelomic elements of sea urchins (Strongylocentrotus). III. In vitro reaction to bacteria. J. Invertebr. Pathol. 13: 42-62.
- Johnson, P. T. 1969. Hamophthirus galeopitheci Mjöberg rediscovered, with the description of a new family of sucking lice (Anoplura: Hamoepthiriidae). Proc. Ent. Soc. Wash. 71: 420-428.
- Hertig, M., P. T. Johnson, and E. McConnell. 1969. Growth pattern of Leishmania in Phlebotomus. Science 165: 1379-1380.
- Johnson, P. T. and F. A. Chapman. 1969. "An Annotated Bibliography of Pathology in Invertebrates other than Insects, Supplement." Center for Pathobiology, Miscell. Publ. No. 1, pp. i-ii, 1-76.
- Johnson, P. T. and M. Hertig. 1970. Behavior of Leishmania in Panamanian phlebotomine sandflies. Exper. Parasitol. 27: 281-300.
- Johnson, P. T., and F. A. Chapman. 1970. Abnormal epithelial growth in sea urchin spines (Strongylocentrotus franciscanus). J. Invertebr. Pathol. 16: 116-122.
- Johnson, P. T. and F. A. Chapman. 1970. Comparative studies on the in vitro response of bacteria to invertebrate body fluids. I. Dendrostomum zosteriolum, a sipunculid worm. J. Invertebr. Pathol. 16: 127-138.
- Johnson, P. T. and F. A. Chapman. 1970. Infection with diatoms and other microorganisms in sea-urchin spines (Strongylocentrotus franciscanus). J. Invertebr. Pathol. 16: 268-276.

Johnson, P. T. and F. A. Chapman. 1970. Comparative studies on the in vitro response of bacteria to invertebrate body fluids. II. Aplysia californica (sea hare) and Ciona intestinalis (tunicate). J. Invertebr. Pathol. 16: 259-267.

Johnson, P. T. 1970. The coelomic elements of sea urchins (Strongylocentrotus and Centrostephanus). VI. Cellulose-acetate electrophoresis. Comp. Biochem. Physiol. 37: 289-300.

Johnson, P. T., P. K. Chien, and F. A. Chapman. 1970. The coelomic elements of sea urchins (Strongylocentrotus). V. Ultrastructure of leukocytes exposed to bacteria. J. Invertebr. Pathol. 16: 466-469.

Johnson, P. T. 1970. Book Review: A revision of the flea genus Thrassis Jordan 1933 (Siphonaptera: Ceratophyllidae), by H. E. Stark. Univ. Calif. Publ. Entomol., vol. 53, 1970. J. Med. Ent. 7: 470.

Chien, P. K., P. T. Johnson, N. D. Holland, and F. A. Chapman. 1970. The coelomic elements of sea urchins (Strongylocentrotus). IV. Ultrastructure of the coelomocytes. Protoplasma 71: 419-442.

Johnson, P. T. and F. A. Chapman. 1971. Comparative studies on the in vitro response of bacteria to invertebrate body fluids. III. Stichopus tremulus (sea cucumber) and Dendroaster excentricus (sand dollar). J. Invertebr. Pathol. 17: 94-106.

Johnson, P. T. 1971. Invertebrate Pathology. In: "The McGraw-Hill Encyclopedia of Science and Technology." McGraw-Hill Publ. Co., New York, p. 263-269.

Johnson, P. T. 1971. Book Review: "Aspects of the Biology of Symbiosis." T. C. Cheng, Editor. Univ. Park Press, Baltimore, 1970. J. Invertebr. Pathol. 18: 430.

Johnson, P. T. 1972. Hoplopleura intermedia Kellogg and Ferris and allies, with the description of a new species (Anoplura: Hoplopleuridae). Proc. Ent. Soc. Wash. 74(3): 330-337.

Johnson, P. T. 1972. The sucking lice of Venezuelan rodents, with remarks on related species (Anoplura). Brigham Young Univ., Biol. Ser. 17(5): 1-62.

Johnson, P. T. 1972. Some Anoplura of the Oriental Region. A study of Hoplopleura pacifica Ewing and allies. J. Med. Ent. 9(3): 219-227.

Johnson, P. T. 1972. Neohaematopinus appressus, a new species of sucking louse from an Asian tree squirrel (Anoplura). Pacific Insects 14(2): 389-392.

Johnson, P. T. 1972. Hoplopleura diaphora Johnson and Hoplopleura kitti Kim: Sibling species of sucking lice (Anoplura)? J. Med. Ent. 9(3): 227-232/

Johnson, P. T. 1972. Polyplax rhizomydis, a new species of sucking louse (Anoplura) from Asian Bamboo Rats. Pacific Insects 14(2): 393-397.

Johnson, P. T. 1972. Two new species of Hoplopleura Enderlein from Laotian murids (Anoplura). Pacific Insects 14(3): 607-611.

Johnson, P. T. and J. E. Bodammer. A disease of the blue crab, Callinectes sapidus, of possible viral etiology. J. Invertebr. Pathol.

FARLEY, C. AUSTIN, b. Louisville, Kentucky, Mar. 3, 36; m. 58; c. 2. INVERTEBRATE PATHOLOGY. B.S, Kentucky, 58; Fish. Biol. (Res.), U.S. Dept. Int. 49-69; FISH. BIOL. (RES.) U.S. DEPT. COM, NATL. MAR. FISH. SERV., OXFORD, MD, 70- Soc. Invertebr. Pathol; Wash. Electron Microsc. Soc. Life cycle, pathology, and epizootiology of Minchinia nelsoni disease in oysters. Neoplastic diseases in mollusks, ultrastructural pathology of mollusks and morphological virology of oyster viruses. Address: Oxford Laboratory, Middle Atlantic Coastal Fisheries Center, Oxford, Maryland 21654.

#### Publications:

Farley, C. A. 1965. A modification of Noland's stain for permanent smears of protozoan flagella, cilia and spore filaments. J. Parasitol. 51: 834.

Farley, C. A. 1965. Acid-fast staining of haplosporidan spores in relation to oyster pathology. J. Invertebr. Pathol. 7: 144-147.

Farley, C. A. 1965. Pathologic responses of the oyster, Crassostrea virginica (Gmelin) to infection by the protistan parasite MSX. Amer. Malacol. Union Bull. 32: 23-24.

Couch, J. A., C. A. Farley, and A. Rosenfield. 1966. Sporulation of Minchinia nelsoni (Haplosporida, Haplosporidiidae) in Crassostrea virginica (Gmelin). Science 153: 1521-1531.

Farley, C. A. 1967. A proposed life cycle of Minchinia nelsoni (Haplosporida, Haplosporidiidae) in the American oyster, Crassostrea virginica. J. Protozool. 14: 616-625.

Farley, C. A. 1968. Minchinia nelsoni (Haplosporida) disease syndrome in the American oyster, Crassostrea virginica. J. Protozool. 15: 585-599.

Farley, C. A. 1969. Probable neoplastic disease of the hematopoietic system of oysters (Crassostrea virginica and Crassostrea gigas). Natl. Cancer Inst. Monogr. 31: 541-555.

Farley, C. A. 1969. Sarcomatoid proliferative disease in a wild population of blue mussels (Mytilus edulis). J. Nat. Cancer Inst. 43: 509-516.

Farley, C. A. and A. K. Sparks. Proliferative disease of hemocytes, endothelial cells, and connective tissue cells in mollusks. In R. M. Dutcher (ed.), Comparative Leukemia Research 1969. Bibl. Haematol. no. 36, pp. 610-617. A. Karger, Basel, Switzerland.

Farley, C. A., W. G. Banfield, G. Kasnic, Jr., and W. S. Foster. Oyster herpesvirus. Science 178: 759-760.

Christensen, D. J., C. A. Farley, and F. G. Kern. Epizootic neoplasms in the clam Macoma balthica (L.) from Chesapeake Bay. J. Natl. Cancer Inst. 52: 1739-1749.

Farley, C. A. Epizootic and enzootic aspects of Minchinia nelsoni (Haplosporida) disease in Maryland waters. J. Protozool. (In Press).

Farley, C. A. Ultrastructural observations on epizootic neoplasia and lytic virus infection in bivalve mollusks. Submitted to Proceedings of the Symposium on Neoplasms in Aquatic Animals as Indicators of Environmental Carcinogens.

# NOTICE OF RESEARCH PROJECT

<b>SUPPORTING AGENCY:</b> U.S. Department of Commerce National Oceanic and Atmospheric Administration		<b>AGENCY'S NUMBER(S):</b> Contract No: and/or Control No:
<b>TITLE OF PROJECT:</b> Task: Life Studies - Comparative Pathobiology Subtask: Crustacean Pathobiology		
<b>PRINCIPAL INVESTIGATOR, ASSOCIATES:</b> School or Division Dr. Phyllis T. Johnson, Principal Investigator		<b>Department</b>
<b>RECIPIENT INSTITUTION:</b> Name and Address: Including: Zip Code:	National Marine Fisheries Service Middle Atlantic Coastal Fisheries Center Oxford Laboratory Oxford, Maryland 21654	<b>PERIOD FOR THIS NRP:</b> Start Date: July 1, 1974 End Date: June 30, 1975  Annual Funding:

**SUMMARY OF PROJECT:** Be brief-200 word maximum: (Include Objective, Approach  
Current Plans and/or Progress)

Objectives of this project are: to increase understanding of pathological changes occurring in crustacean tissues during the course of diseases caused by microbes, chemical, and physical stresses; to study transmission, occurrence, and histological diagnosis of Paramoeba and virus infections and other diseases of blue crabs; to provide a practical guide to histology of the blue crab.

Progress: A virus disease of the hematopoietic tissue of the blue crab occurs in animals from both Chincoteague and Chesapeake Bays. Symptomatology and gross and microscopic pathology are consistent and recognizable. Paramoeba occurs in Chincoteague crabs all seasons of the year. Since amoebae are present in circulating blood only in moribund crabs, blood sampling does not give an adequate picture of Paramoeba-occurrence within a population. Information now gathered and synthesized on normal histology of the blue crab during its molting cycle, allows comparisons to be made between normal crabs and those undergoing abnormal stresses through physical, chemical, and biological means. A Chlamydia- or Mycoplasma-like organism occurs in Chincoteague crabs. There is suggestive evidence that this organism has been transmitted in the laboratory. Histopathological studies of "gas bubble disease" and bacterial disease in blue crabs are being prepared for publication.

# NOTICE OF RESEARCH PROJECT

**SUPPORTING AGENCY:**

U.S. Department of Commerce  
National Oceanic and Atmospheric Administration

**AGENCY'S NUMBER(S):**

**Contract No:**  
and/or  
**Control No:**

**TITLE OF PROJECT:**

Task: Life Studies - Comparative Pathobiology  
Subtask: Molluscan Pathobiology

**PRINCIPAL INVESTIGATOR, ASSOCIATES School or Division**

**Department**

Mr. C. Austin Farley, Principal Investigator  
Mr. Frederick G. Kern, Principal Investigator

**RECIPIENT INSTITUTION:**

**PERIOD FOR THIS NRP:**

**Name and Address:** National Marine Fisheries Service  
Middle Atlantic Coastal Fisheries Center  
Including Oxford Laboratory  
**Zip Code:** Oxford, Maryland 21654

**Start Date:** July 1, 1974  
**End Date:** June 30, 1975

**Annual Funding:**

**SUMMARY OF PROJECT: Be brief-200 word maximum: (Include Objective, Approach Current Plans and/or Progress)**

**Objectives:** To conduct studies on neoplasms in selected species of mollusks. To describe the morphology and cytopathology of oyster viruses. To determine the presence of microparasites in domestic and exotic mollusks.

**Approach:** Monitoring surveys and experimental studies on neoplasms in the clam Macoma balthica in Chesapeake Bay are being conducted as methods to detect and analyze possible injurious constituents in the environment, be they manmade or natural chemicals or infectious agents. The affects of chlorinated hydrocarbons on M. balthica are being studied; additional chemical analyses are planned. Studies on the ultrastructure of the neoplasm in M. balthica and a papilloma virus of the oyster, Crassostrea virginica, have been prepared for publication.

Diagnostic services are provided on request from states, federal agencies, universities and industry. Papers are in preparation describing a new Minchinia sp. parasite from Pacific oyster, C. gigas, from Korea and a Urosporidium sp. hyperparasite of a larval nematode found in the surf clam Spisula solidissima.

# NOTICE OF RESEARCH PROJECT

SUPPORTING AGENCY:

AGENCY'S NUMBER(S):

U.S. Department of Commerce  
National Oceanic & Atmospheric Administration

Contract No:  
and/or  
Control No:

TITLE OF PROJECT:

Studies of Neoplasia and viruses in shellfish

PRINCIPAL INVESTIGATOR, ASSOCIATES

School or Division

Department

Mr. C. A. Farley<sup>A</sup>  
Mr. F. G. Kern

Food and Drug Admin. Interagency Agreement

RECIPIENT INSTITUTION:

PERIOD FOR THIS NRP:

Name and Address: NMFS  
Middle Atlantic Coastal Fisheries Center  
Including Oxford Laboratory  
Zip Code: Oxford, Maryland 21554

Start Date:

End Date:

Annual Funding:

SUMMARY OF PROJECT:

Be brier-200 word maximum: (include Objective, Approach, Current Plans and/or Progress)

**Objectives:** To conduct studies relating to environmental etiologies of epizootic neoplastic diseases of mollusks. Determine occurrence of chemical carcinogens relative to Macoma balthica epizootic carcinoma and attempt to induce a similar disease using known carcinogens in laboratory experiments. Description of ultrastructural characteristics of molluskan neoplasms and suspected oncogenic viruses.

**Approach:** Periodic histopathologic and chemical survey of clams, sediments and water from epizootic and nonepizootic areas throughout year. Challenge of live clams in recirculated seawater systems with aldrin, dieldrin and nitrite under controlled laboratory conditions. Ultrastructural examination of Ostrea lurida and Mytilus edulis neoplastic tissues for comparison with Macoma balthica neoplasms. Further ultrastructural studies on oyster viruses from oncogenic groups (Herpes, Papillon and Oncornavirus).

**Progress:** Ultrastructural characteristics of M. balthica neoplasm and Papillon and viruses in the oyster have been described in a publication which is in press. A review of neoplasms and virus diseases in mollusks is also in press.

# NOTICE OF RESEARCH PROJECT

**SUPPORTING AGENCY:**

**AGENCY'S NUMBER(S):**

U.S. Department of Commerce  
National Oceanic and Atmospheric Administration

**Contract No:**  
**and/or**  
**Control No:**

**TITLE OF PROJECT:**

Task: Life Studies - Comparative Pathobiology  
Subtask: Diseases of Larval Mollusks

**PRINCIPAL INVESTIGATOR, ASSOCIATES:**

**School or Division**

**Department**

Dr. Walter Blogoslawski - Principal Investigator

**RECIPIENT INSTITUTION:**

**PERIOD FOR THIS NRP:**

**Name and Address:** National Marine Fisheries Service  
Middle Atlantic Coastal Fisheries Center  
Including Milford Laboratory  
**Zip Code:** Milford, Connecticut 06460

**Start Date:** July 1, 1974  
**End Date:** June 30, 1975

**Annual Funding:**

**SUMMARY OF PROJECT:** Be brief-200 word maximum: (Include Objective, Approach, Current Plans and/or Progress)

The objective of this research project is to develop and standardize methods for rearing the life stages of bivalve mollusks under disease-free conditions. Using conventional and newly developed bacteriologic techniques, suspect bivalve micro-pathogens are isolated and identified from laboratory or hatchery cultures of mollusks. An ozone seawater disinfection system has been built, tested, and found to eliminate microbial pathogens and "red tide" toxins from contaminated seawater and mollusks. Other physical methods for disinfection and seawater quality improvement are to be tested. In addition, the program provides consultative services to industry and Sea Grant institutions involved in aquaculture.

# NOTICE OF RESEARCH PROJECT

SUPPORTING AGENCY:

AGENCY'S NUMBER(S):

U.S. Department of Commerce  
National Oceanic and Atmospheric Administration

Contract No:  
and/or  
Control No:

TITLE OF PROJECT:

Task: Life Studies - Comparative Pathobiology  
Subtask: Fish Pathobiology

PRINCIPAL INVESTIGATOR, ASSOCIATES School or Division

Department

Mr. Martin W. Newman - Principal Investigator

RECIPIENT INSTITUTION:

PERIOD FOR THIS NRP:

Name and Address: National Marine Fisheries Service  
Middle Atlantic Coastal Fisheries Center  
Including Oxford Laboratory  
Zip Code. Oxford, Maryland

Start Date: July 1, 1974  
End Date: June 30, 1975

Annual Funding:

SUMMARY OF PROJECT: Be brief-200 word maximum: (Include Objective, Approach, Current Plans and/or Progress)

With increasing utilization of the marine environment by recreational and commercial fisheries, fish diseases are achieving greater prominence in both the lay and scientific communities. The question of whether this increased prominence is a matter of environmental degradation or increased public awareness remains to be answered. Marine aquaculture is also attracting a great deal of interest, and any increase in activity in this field will enhance the possibilities for the dissemination of, and infection by disease producing organisms.

Studies are currently in progress of both naturally occurring mortalities and diseases, and experimentally induced changes caused by pollutants, particularly the heavy metals. Histopathologic technics are emphasized in identifying disease processes and organisms.



## BIOGRAPHICAL RESUME

1. Name: JOHNSON, P T Date: March 27, 1973

2. Organization & Address: National Marine Fisheries Service, Middle Atlantic Coastal Fisheries Center, Pathobiology Investigations, Oxford, Maryland SSN: \_\_\_\_\_

3. Date and Place of Birth: August 8, 1926; Salem, Oregon

4. Personal Data:  
Marital Status: Never Married Children: 2 Sex and Birth Year:  
Spouse: \_\_\_\_\_ Female, 1959  
Male, 1961

5. Education: (High School and University by Degree)  
A.B., University of California Berkeley  
Ph.D., University of California Berkeley

6. Military Service: (Branch & Dates)

7. Work Experience: (Dates, Organization, Location, Title & Duties)  
Calif. State Dept. Hlth., Berkeley, Calif. 1948-50, Parasitologist plague epidemic  
U.S. Army Res. School, Walter Reed, Wash., D.C., 1950-1956, Med. entomology  
U.S. Dept. Agriculture, Wash. D.C., 1956-58, louse taxonomy  
Gorgas Memorial Laboratory, Panama, 1958-63, Med. entomology

8. Professional Interests:  
Invertebrate Pathology, Medical entomology, Taxonomy of the Anoplura

9. Professional Societies, Affiliations & Awards:  
Soc. Invertebrate Pathology, Am. Soc. Trop. Med. Hyg., Ent. Soc. Wash., Ent. Soc. Amer., AAAS, Sigma Xi, Am. Soc. Parasitol.

10. Committees and Assignments:  
J. Invertebr. Pathol., editorial board; Soc. Invertebr. Pathol, member, Divisions Committee; Natl. Research Council, member, committee on genetic stocks and animal models.

11. Civic Affiliations:  
None

12. Avocation/Hobbies:  
Heckling Murchelano and Rosenfield

C. Recent Major Research Accomplishments:

Accomplishment:

1. Seasonal over-stressing of marine environment

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1974-75	Ecosystems	Dr. J. Thomas

Seasonal occupation of a 106-station grid in the New York Bight apex for seabed oxygen consumption and bottom dissolved oxygen observations, using a Pamatmat multi-coring device, have already demonstrated, in open oceanic areas above the sewage sludge dump site and the dredge spoiling site, a marked seasonal (warm-water months) depression in seabed oxygen consumption rates and prevailing bottom dissolved oxygen concentrations of 2 ppm or lower. Work sponsored by MESA.

2. Seasonal avoidance by demersal finfish of high-carbon areas of the New York Bight

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
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Randomized, stratified demersal finfish assessment surveys of the Middle Atlantic Bight have shown that, during the warm-water months, certain waters of the New York Bight apex enjoy a total demersal finfish biomass which is approximately 25% smaller than is observed in less impacted oceanic areas to the south and east. Sponsored, in part, by MESA.

3. Completion of (8-section) Anglers' Guide

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
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A comprehensive guide to marine fishing along the Atlantic coast (8 sections covering all waters from Passamaquoddy Bay, Maine to Key West, Florida). The first four sections published in 1974; the second four sections will be published in the autumn of 1975.

4. Completion of comprehensive ecological study - Long Island Sound

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1973-75	Ecosystems	Mr. R. Reid

A 86-page report was submitted in 1975 to the New England River Basins Commission covering a synoptic ecological (148-station) study of the length and breadth of the Sound. Comparative studies evidenced marked species shifts in benthic invertebrates. The study documented the currently prevailing sedimentary and water quality conditions. Marked environmental impacts were discerned for the western end and along the northern shoreline of the Sound.

5. "Oncogenic" processes detected in shellfish

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1974	Pathobiology	Dr. P. Johnson

First electron micrographic photographs were obtained of developing "neoplastic" conditions in epithelium-derived cells.

6. Definition of epicenter of fin-rot epizootic

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1974	Pathobiology	Dr. R. Murchelano

Statistically significant results of large-scale observations of trawl-caught demersal fishes demonstrate that the epicenter of fin-rot disease in flatfishes is located in the New York Bight apex and Raritan Bay complex as compared with oceanic control areas to the eastward and to the southward. High incidences are related to the seasonal migrations of winter and summer flounder. Work was done in cooperation with Resource Assessment Investigations and was sponsored by MESA.

7. Demonstrated high levels of chromosomal aberrations in fish eggs

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1974-75	Expt'l Biology	Dr. A. Longwell

Work sponsored in part by MESA, demonstrated that up to 60% of fish eggs sampled from 14 neuston tows in the New York Bight evidenced gross chromosomal damage and other cytological anomalies. Work has important implications for environmental and resource assessment (MARMAP) research.

8. First quantitative pilot sportfish "catch" census completed

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1974-75	Resource Assessment	Mr. A. Pacheco

A pilot study of sportfish activity effort and success in the oceanic waters off Ocean City, Md. was completed in 1974. Highly significant findings have justified similar studies during 1975 at four major New Jersey sportfish areas. This appears to be the first cost-effective approach to obtaining biological statistics on the sportfish catch - which catch in many areas may well exceed the commercial catch.

9. Phytoplankton levels (and red tides) in Raritan Bay complex

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1974-75	Ecosystems	Dr. J. Thomas

Primary productivity studies, sponsored, in part, by MESA, on the Raritan Bay-Lower New York Harbor-Sandy Hook Bay complex have demonstrated that the nutrient-laden waters of the Hudson River circulate counter-clockwise in the bay complex and, within Sandy Hook Bay, support a very rich phytoplankton crop, the concentrations of which far surpass those associated with the richest of known "upwellings." Further, the phytoplankton crop is characterized by seasonal shifts in type of organism, i.e., from netplankton to nanoplankton. These phenomena have been observed also in the New York Bight apex.

10. Completed comprehensive ecological study - Raritan Bay, N.J.

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1974	Ecosystems	Mr. R. Reid

Completed a comprehensive ecological study of Raritan Bay - reoccupying historic sampling stations established twenty years ago. Comparative studies have demonstrated major shifts in benthic invertebrate species, documenting a still further decline in the quality of this marine environment.

11. New method for growing, storing, and shipping algal stock culture

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1975	Expt'l. Biology	Dr. R. Ukeles

A major problem in molluscan aquaculture is maintenance and replacement of algal food, cultures and stocks. A new method has been developed, utilizing strips of paper which are soaked in nutrients and inoculated with algae, and are then placed in a moisture-laden screw-capped test tube. The organisms continue to grow during stock storage and subsequent shipment.

12. Ozone-inactivation of "red tide" organisms and toxins

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1974-75	Pathobiology	Dr. R. Murchelano

Studies in the field and in the laboratory have demonstrated that exposure to ozone destroys several species of "red tide" organisms and inactivates their several neurotoxins. Studies are now in progress to determine efficacy of ozone in depuration of shellfish containing the organisms and/or their toxins. The technique is already being used in seawater intake to prevent loss of biological research and museum specimens.

13. New cytological preparation technique for mutagenic research

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1974	Expt'l Biology	Dr. A. Longwell

Historically, genetic studies of marine organisms have required specialized and meticulous fixation techniques; historical samples, preserved in formalin, could not be studied. A new fixation technique has been developed which permits usage of such formalin-preserved samples and studies are now underway to determine whether presently observed high levels of chromosomal aberrations in fish eggs existed in the past century or are related to recent "high technology" industrialization.

14. First photographs - viral replication in marine organisms

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1974	Pathobiology	Dr. P. Johnson

The first electron micrographs of overwhelming viral replication in the cells of marine organisms were developed, the octagen-shaped particles are thought to be papovavirus.

15. Completed census of surf clam resource; confirming continued failure of recruitment in oceanic waters of northern New Jersey

<u>Year</u>	<u>Investigations</u>	<u>Principal Investigator</u>
1974	Resource Assessment	Dr. A. Merrill

A cooperative Federal/State census of surf clam stocks from Montauk, L. I. to Chincoteague, Va. and from the shoreline out to 30 fathoms demonstrated that recruitment in the New York Bight apex and in the nearby New Jersey waters is still very low while in other areas, stocks are abundant.