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Annotated Bibliography on the Biology of the Menhadens, Genus *Brevoortia*, 1963-1973

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ABSTRACT

A bibliography that consists of 444 references on the classification, distribution, abundance, life history, and ecology of American menhadens, genus *Brevoortia*. Included are references to menhaden published from 1963 through 1973 with those references published prior to 1963 that were omitted from menhaden bibliographies by Reintjes et al. (1960) and Reintjes (1964a). Brief annotations and a subject index are included.

INTRODUCTION

This bibliography is a continuation of those compiled by Reintjes et al. (1960) on the biology of the American menhadens and by Reintjes (1964a) on the menhadenlike fishes of the world. The literature included in this work includes the references published from 1963 through 1973 with those references published before 1963 that were omitted from the two bibliographies mentioned.

In reviewing the literature certain subject areas were used to decide which references should be listed. Included, in general, were references to taxonomy, distribution, occurrence, abundance, life history, morphology, ecology, and behavior. Excluded, generally, were references on the technological aspects of the fishery and the processing industry; daily, monthly, and annual landing reports and statistics; popular accounts in trade journals, newspapers, and magazines; and administrative and project reports. Mimeographed or similarly processed reports of an established series and special reports principally concerned with the biology of menhaden have been included as well as doctoral dissertations and master's theses that contained information on menhaden biology.

Arrangement of the references is alphabetical by author's surname. With multiple authors, the entry is made only under the senior author's name. Each author's works are listed chronologically by year of publication and those published in the same year are given alphabetical sequence by title. Anonymous articles are listed by the name of the journal or the originating agency.

Brief annotations of the contents of the publications that apply to menhaden and the scientific names of the species of *Brevoortia* concerned are given. This annotation is not done to make value judgments of the papers but to give clearer descriptions of the contents than can be obtained from their titles.

We acknowledge the help we received from Ann B. Hall, librarian, and the menhaden research staff of the Atlantic Estuarine Fisheries Center.

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Alperin, Irwin M.

1966. A new parasite of striped bass. New York Fish and Game Journal, vol. 13, no. 1, p. 121-123.

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Cites Arnold (1951) reference to lizard fish feeding on small menhaden.

Altman, Philip L., and Dorothy S. Dittmer.

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Physical and chemical characteristics of fats and oils of B. tyrannus.

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Salinity tolerance of B. smithi from Gunter and Hall (1963).

Alverson, F. G., and G. C. Broadhead.

1971. International trade - fish meal. United Nations, Food and Agriculture Organization, UNDP Indian Ocean Program, IOFC/DEV/71/17, 42 p.

Menhaden fishery production discussed.

Anderson, William W.

1968. Fishes taken during shrimp trawling along the South Atlantic coast of the United States, 1931-35. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 570, 60 p.

Number of Brevoortia by month.

Anderson, William W., and Jack W. Gehringer.

1965. Biological-statistical census of the species entering fisheries in the Cape Canaveral area. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 514, 79 p.

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1951. Northward dispersal of warm-water marine fishes in southern New England during the summer of 1949. Copeia, 1951, no. 1, p. 87-88.

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1965. Occurrence of spiny dogfish, Squalus acanthias, and other elasmobranchs in South Carolina coastal waters. Copeia, 1965, no. 3, p. 378.

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Bearden, Charles M.

1967. Salt-water impoundments for game fish in South Carolina. Progressive Fish-Culturist, vol. 29, no. 3, p. 123-128.

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DiCapua, Richard A.

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DiCapua, Richard A.

1969. On the application of immunological techniques in geographic group studies of Atlantic sea herring, Clupea harengus. II. Herring serum analysis by gel diffusion. Journal of Experimental Zoology, vol. 172, no. 1, p. 11-24.

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Domanevskii, L. M., and V. A. Rikhter.

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Dovel, William.

1967. Fish eggs and larvae of the Magothy River, Maryland. Chesapeake Science, vol. 8, no. 2, p. 125-129.

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Dovel, William L.

1968. Predation by striped bass as a possible influence on population size of the Atlantic croaker. Transactions of the American Fisheries Society, vol. 97, no. 4, p. 313-319.

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Dovel, William L.

1971. Fish eggs and larvae of the upper Chesapeake Bay. Natural Resources Institute, University of Maryland, Special Report no. 4, 71 p.

Menhaden eggs collected in spring and fall at Solomons, Md., temperature range 13-20°C, salinity 10-22 ppt. Young menhaden appeared in upper estuarine areas from late March to late June.

Dragovich, Alexander.

1969. Review of studies of tuna food in the Atlantic Ocean. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 593, 21 p.

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Dryfoos, Robert L., Randall P. Cheek, and Richard L. Kroger.

1973. Preliminary analyses of Atlantic menhaden, Brevoortia tyrannus, migrations, population structure, survival and exploitation rates and availability as indicated from tag returns. National Marine Fisheries Service, Fishery Bulletin, vol. 71, no. 3, p. 719-734.

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Duke, Thomas W., John P. Baptist, and Donald E. Hoss.

1966. Bioaccumulation of radioactive gold used as a sediment tracer in the estuarine environment. U.S. Fish and Wildlife Service, Fishery Bulletin, vol. 65, no. 2, p. 427-436.

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Dunbar, Gary S.

1958. Historical geography of the North Carolina Outer Banks. Louisiana State University Studies, Coastal Studies Series no. 3, 234 p.

Early account of menhaden fishing in North Carolina.

Dunham, Fred.

1972. A study of commercially important estuarine-dependent industrial fishes. Louisiana Wild Life and Fisheries Commission, Technical Bulletin No. 4, 63 p.

Distribution and abundance of Gulf menhaden, B. patronus, samples from a trawl survey July 1969 to June 1972. Occurrence of fishes other than menhaden in purse-seine landings by sampling during 1971-72.

Ehrlich, Paul R., and Anne H. Ehrlich.

1970. Population, resources, environment: Issues in human ecology. W. H. Freeman Co., San Francisco. 383 p.

Menhaden over exploited.

Eisler, Ronald.

1965. Erythrocyte counts and hemoglobin content in nine species of marine teleosts. Chesapeake Science, vol. 6, no. 2, p. 119-120.

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Evermann, B. W., and W. C. Kendall.

1900. Check-list of the fishes of Florida. U.S. Commissioner of Fish and Fisheries, Report for 1899, p. 37-103.

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Fahy, William E.

1966. Species composition of the North Carolina industrial fish fishery. Commercial Fisheries Review, vol. 28, no. 7, p. 1-8.

Menhaden composed 42.9 percent by weight of trash fish caught in long-haul and pound-net fishery.

Fairbanks, Randall B., W. Stephen Collings, and Wendell T. Sides.

1971. An assessment of the effects of electrical power generation on marine resources in the Cape Cod Canal. Massachusetts Department of Natural Resources, Division of Marine Fisheries, 48 p.

Juvenile Atlantic menhaden among fish killed by chlorine biocide and heated water near the effluent plume of the Canal Electric Company plant.

Finucane, John H.

1969a. Antimycin as a toxicant in a marine habitat. Transactions of the American Fisheries Society, vol. 98, no. 2, p. 288-292.

B. smithi included in a list of fishes experimentally killed by Antimycin A.

Finucane, John H.

1969b. Faunal production report, p. 11-15. In Report of the Bureau of Commercial Fisheries Biological Laboratory, St. Petersburg Beach, Florida, fiscal year 1968. U.S. Fish and Wildlife Service, Circular 313.

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Foehrenbach, Jack.

1972. Chlorinated pesticides in estuarine organisms. Journal of the Water Pollution Control Federation, vol. 44, no. 4, p. 619-624.

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Fontenot, Bennie J., Jr., and Howard E. Rogillio.

1970. A study of estuarine sportfishes in the Biloxi marsh complex, Louisiana. Louisiana Wild Life and Fisheries Commission, Dingell-Johnson Project, Completion report F-8, 172 p.

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Fore, Paul L.

1971. The distribution of eggs and larvae of the round herring, Etrumeus teres, in the northern Gulf of Mexico. (Abstract). ASB (Association of Southeastern Biologists) Bulletin, vol. 18, no. 2, p. 34.

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Fore, Paul L., and Kenneth N. Baxter.

1972a. Collections of larval Gulf menhaden, B. patronus, from Galveston Entrance (1959-1969) and Sabine Pass (1963-1967), Texas. National Marine Fisheries Service, Data Report 74, 17 p.

Results of regular sampling of two Texas inlets for larval Gulf menhaden.

Fore, Paul L., and Kenneth N. Baxter.

1972b. Diel fluctuations in the catch of larval Gulf menhaden, B. patronus, at Galveston Entrance, Texas. Transactions of the American Fisheries Society, vol. 101, no. 4, p. 729-732.

Catches of larval Gulf menhaden made in a series of collections during a 96-hour period at the inlet to Galveston Bay and the relation of these catches to tidal currents.

Forste, Robert H.

1964. Industry trends and indicators of economic performance in the menhaden fishery. Proceedings of the Gulf and Caribbean Fisheries Institute, 16th Annual Session, 1963, p. 30-46.

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Franklin, Lynn.

1972. Menhaden fishing. Oceans Magazine, vol. 3, no. 2, p. 65-73.

Popular description with numerous photographs.

Fuss, Charles M., Jr.

1968. A new thread herring fishery in eastern Gulf of Mexico. Commercial Fisheries Review, vol. 30, no. 6, p. 36-41.

Menhaden fishery mentioned.

Fuss, Charles M., Jr., John A. Kelly, Jr., and Kenneth W. Prest, Jr.

1969. Gulf thread herring: Aspects of the developing fishery and biological research. Proceedings of the Gulf and Caribbean Fisheries Institute, 21st Annual Session, 1968, p. 111-125.

Menhaden fishery compared to developing thread herring fishery.

General Dynamics -Electric Boat Division.

1971. Potential environmental effects of an offshore submerged nuclear power plant. Environmental Protection Agency, Water Pollution Control Research, GFI 06/71, vol. 1, 325 p.; vol. 2, 285 p.

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Godwin, Walter F., and Thomas L. Vaughn.

1968. An adult pugheaded American shad Alosa sapidissima. Transactions of the American Fisheries Society, vol. 97, no. 1, p. 50.

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Goldmintz, Daniel, and Joseph C. Hull.

1970. Bacterological aspects of fish protein concentrate production, p. 335-340. In Cyril J. Corum [ed.], Developments in industrial microbiology, vol. 11. American Institute of Biological Sciences, Washington, D.C.

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Goodyear, C. Phillip.

1967. Feeding habits of three species of gars, Lepisosteus, along the Mississippi Gulf Coast. Transactions of the American Fisheries Society, vol. 96, no. 3, p. 297-300.

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Gordon, Bernard L.

1958. The bountiful menhaden. Nature Magazine, vol. 51, no. 6, p. 322-323, 332.

Popular, general account of Atlantic menhaden, B. tyrannus.

Gowanloch, James Nelson.

1950. New developments in the menhaden industry. Proceedings of the Gulf and Caribbean Fisheries Institute, 2nd Annual Session, 1949, p. 39-40.

General review of Gulf menhaden purse-seine fishery.

Graham, Herbert W.

1968. Trends in the marine fisheries of the Continental Shelf of the eastern United States. Transactions of the American Fisheries Society, vol. 97, no. 1, p. 77-82.

Brief report on menhaden landings with graph showing landings by region, 1930-66.

Green, J.

1968. The biology of estuarine animals. University of Washington Press, Seattle, 401 p.

The importance of Brevoortia to estuarine food web is mentioned.

Gregg, S. Alexander, Jr.

1968. The fisheries of North Carolina. M.S. thesis, University of North Carolina, Chapel Hill, 90 p.

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Gunter, Gordon.

1964. The Gulf of Mexico fishery in relation to the sport fisheries. Proceedings of the Gulf and Caribbean Fisheries Institute, 16th Annual Session, 1963, p. 99-108.

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1967. Some relationships of estuaries to the fisheries of the Gulf of Mexico, p. 621-638. In George H. Lauff [ed.], Estuaries. American Association for the Advancement of Science, Publication no. 82, Washington, D.C.

Discussion of the commercial menhaden fishery in the Gulf, and the relationships of young menhaden to estuaries.

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1969. Fisheries in coastal lagoons, p. 663-670. In Agustin Ayala Castanares and Fred B. Phleger [eds.], Coastal lagoons, a symposium. Universidad Nacional Autonoma de Mexico, Cuidad Universitaria.

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Gunter, Gordon, and Gordon E. Hall.

1963. Biological investigations of the St. Lucie estuary (Florida) in connection with Lake Okeechobee discharges through the St. Lucie Canal. Gulf Research Reports, vol. 1, no. 5, p. 189-307.

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Gusev, E. E.

1964. Some peculiarities in menhaden morphology, Brevoortia tyrannus (Latrobe). Contributions to Commercial Fisheries Research of the Artic Basin, N. M. Knipovicha Institute (PINRO), no. 2, p. 13-16. Trans. J.M. Moulton, Bowdoin College, Brunswick, Me.

Discussion of filter feeding of menhaden with description of intestinal tract structure.

Hall, F. G.

1928. Blood concentration in marine fishes. Journal of Biological Chemistry, vol. 76, p. 623-631.

Increased concentration of blood elements of B. tyrannus during asphyxiation followed by a weight loss of the spleen.

Harder, Wilhelm.

1964. Anatomie der Fische, vol. 2A. E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart, 308 p.

Alimentary tract of Brevoortia mentioned.

Hatton, S. R., and G. R. Smalley.

1938. Reduction process for sardines in California. California Fish and Game, vol. 24, no. 4, p. 391-414.

Menhaden fishery mentioned.

Hays, H., and R. W. Risebrough.

1972. Pollutant concentrations in abnormal young terns from Long Island Sound. Auk, vol. 89, no. 1, p. 19-35.

Concentrations of DDT and PCB compounds and mercury in Atlantic menhaden.

Heald, Eric J.

1968. Atlas of the principal fishery resources on the Continental Shelf from New York to Florida. Prepared for the E. I. du Pont de Nemours Company, University of Miami, Institute of Marine Sciences, 225 p.

Brief account of fishery by regions along the Atlantic Coast with three charts for menhaden. B. tyrannus discussed and B. smithi listed.

Heald, Eric J., and Raymond C. Griffiths.

1967. The age determination, from scale readings, of the sardine, Sardinella anchovia, of the Gulf of Cariaco, Eastern Venezuela. Venezuela Ministerio de Agricultura y Cria, Investigaciones Pesqueras, Serie Recursos y Explotacion Pesqueras, vol. 1, no. 10, p. 375-446.

Mentions aging of B. tyrannus.

Hela, Ilmo.

1967. Meritieteen tehtavista. Merentutkimuslaitoksen Julkaisu Havsforskningsinstitutets Skrift, no. 222, 55 p.

B. tyrannus and menhaden fishery mentioned.

Henry, Kenneth A.

1965. Biological investigations of purse seine fishery for Atlantic menhaden. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 519, 12 p.

Compilation of fishery statistics.

Henry, Kenneth A.

1968. Exploitation and biological research of Atlantic menhaden, p. 265-273. In Transactions of the National Symposium on Ocean Sciences and Engineering of the Atlantic Shelf. Marine Technology Society, Washington, D. C.

General account of menhaden studies.

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1969. Menhaden fisheries, p. 393-398. In Frank E. Firth [ed.], The encyclopedia of marine resources. Van Nostrand Reinhold Co., New York.

General account of the menhaden fishery with landings, 1942-66.

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1971. Atlantic menhaden (Brevoortia tyrannus) resource and fishery - analysis of decline. National Marine Fisheries Service, Special Scientific Report - Fisheries 642, 32 p.

Analysis of age and size, fishing effort, catch and population dynamics of the Atlantic menhaden resource, 1955-68.

Henry, Kenneth A., Edwin B. Joseph, Charles M. Bearden, and John W. Reintjes.

1965. Atlantic menhaden...a most abundant fish. Atlantic States Marine Fisheries Commission, Leaflet no. 2, 4 p.

Popular general account.

Henry, Kenneth A., Joseph H. Kutkuhn, and Staff.

1968. Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, N.C., for the fiscal year ending June 30, 1967. U.S. Fish and Wildlife Service, Circular 287, 22 p.

An annual review of menhaden research including development and oceanic distribution of larval menhaden, response of young menhaden to environmental changes, abundance of young-of-the-year menhaden, and population dynamics of Atlantic and Gulf resources by sampling catch and mark-recapture methods.

Henry, Kenneth A., Joseph H. Kutkuhn, and Staff.

1970a. Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, N.C., for the fiscal year ending June 30, 1968. U.S. Fish and Wildlife Service, Circular 341, 24 p.

An annual review of menhaden research including menhaden life history and biology, menhaden population dynamics, and menhaden tagging.

Henry, Kenneth A., Joseph H. Kutkuhn, and Staff.

1970b. Research in fiscal year 1969 at the Bureau of Commercial Fisheries Laboratory, Beaufort, N.C. U.S. Fish and Wildlife Service, Circular 350, 49 p.

An annual review of menhaden research including life history of Atlantic and Gulf menhaden, estimation of larval and juvenile abundance, rearing menhaden, schooling and migratory behavior, tagging and population dynamics of Atlantic and Gulf menhaden.

Henry, Kenneth A., and Staff.

1965. Annual report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, N.C., for the fiscal year ending June 30, 1964. U.S. Fish and Wildlife Service, Circular 215, 27 p.

An annual review of menhaden research including sampling of the Atlantic and Gulf fishery, morphology and population studies, estimation of juvenile abundance and estuarine biology of young menhaden.

Henry, Kenneth A., and Staff.

1966. Annual report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, N.C., for the fiscal year ending June 30, 1965. U.S. Fish and Wildlife Service, Circular 240, 39 p.

An annual review of menhaden research including classification and distribution of North American menhadens, estuarine survival of young menhaden, abundance of juvenile menhaden, structure and biology of Gulf menhaden stocks and population dynamics of Atlantic and Gulf menhaden.

Henry, Kenneth A., and Staff.

1967. Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, N.C., for the fiscal year ending June 30, 1966. U.S. Fish and Wildlife Service, Circular 264, 30 p.

An annual review of menhaden research including classification and distribution of North American menhaden, response of juvenile menhaden to temperature and salinity, abundance of young menhaden, biology of Gulf of Mexico menhaden and sampling the Atlantic and Gulf purse-seine fisheries.

Herke, William H.

1968. Weirs, potholes and fishery management, p. 193-211. In John D. Newsom [ed.], Proceedings of the Marsh and Estuary Management Symposium. Thomas J. Moran's Sons, Inc., Baton Rouge.

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Herke, William H.

1969. A boat-mounted surface push-trawl for sampling juveniles in tidal marshes. Progressive Fish-Culturist, vol. 31, no. 3, p. 177-179.

Menhaden, *Brevoortia* sp., caught with push-trawl.

Herke, William H.

1971. Use of natural, and semi-impounded Louisiana tidal marshes as nurseries for fishes and crustaceans. Ph.D. thesis, Louisiana State University, 242 p. (Dissertation Abstracts International, vol. 32, p. 2654-B).

B. patronus is one of the principal species. Monthly length frequencies of menhaden from two tidal marshes with observations on size and seasonal distribution with salinity changes.

Hess, Paul W.

1961. Food habits of two dasyatid rays in Delaware Bay. Copeia, 1961, no. 2, p. 239-241.

B. tyrannus included in the food of rays.

Hettler, William F., Jr.

1968. Artificial fertilization among yellowfin and Gulf menhaden (Brevoortia) and their hybrid. Transactions of the American Fisheries Society, vol. 97, no. 2, p. 119-123.

Eggs of B. smithi were fertilized with sperm from B. smithi, B. patronus, and hybrids of the two species. Resulting larvae reared through the yolk-sac stage.

Hettler, William F., Jr.

1970. Rearing larvae of yellowfin menhaden, Brevoortia smithi. Copeia, 1970, no. 4, p. 775-776.

Ova and sperm were obtained from sexually mature B. smithi and were hatched and reared. The last larva, 14.9 mm T.L. survived 32 days.

Hettler, William F., Jr.

1971. A yellowfin menhaden without pelvic fins. Quarterly Journal of the Florida Academy of Sciences, vol. 34, no. 1, p. 63-66.

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Hettler, William F., Jr.

1973. Rearing menhaden larvae (Part 2), p. 149-157. In A. L. Pacheco (ed.), Proceedings of a Workshop on Egg, Larval and Juvenile Stages of Fish in Atlantic Coast Estuaries. National Marine Fisheries Service, Middle Atlantic Coastal Fisheries Center, Technical Publication no. 1.

Methods used to rear larval B. smithi in the laboratory from fertilized eggs.

Hettler, William F., Jr., Richard W. Lichtenheld, and Herbert R. Gordy.

1971. Open seawater system with controlled temperature and salinity. Progressive Fish-Culturist, vol. 33, no. 1, p. 3-11.

Seawater system designed to rear Atlantic menhaden.

Higham, Joseph R., and William R. Nicholson.

1964. Sexual maturation and spawning of Atlantic menhaden. U.S. Fish and Wildlife Service, Fishery Bulletin, vol. 63, no. 2, p. 255-271.

Sexual development and incidence of spawning is based on examination of ovaries collected along Atlantic Coast from 1956-59.

Hildebrand, Samuel F.

1963. Family Clupeidae, p. 257-454. In Fishes of the Western North Atlantic. Sears Foundation for Marine Research, Memoir 1, part 3.

A taxonomic treatment of the genus Brevoortia with detailed description of B. tyrannus, B. patronus, and B. smithi. Although included, B. brevicaudata is no longer considered a valid species.

Hoese, H. Dickson.

1962. Sharks and rays of Virginia's seaside bays. Chesapeake Science, vol. 3, no. 3, p. 166-172.

Menhaden, Brevoortia, used for shark bait.

Hoese, Hinton Dickson.

1965. Spawning of marine fishes in the Port Aransas, Texas, area as determined by the distribution of young and larvae. Ph.D. thesis, University of Texas, 144 p. (Dissertation Abstracts, vol. 26, p. 7507).

Abundance and occurrence of B. patronus and B. gunteri in samples are discussed.

Hoese, H. D., B. J. Copeland, Frank N. Moseley, and E. D. Lane.

1968. Fauna of the Aransas Pass Inlet, Texas. III. Diel and seasonal variations in trawlable organisms of the adjacent area. Texas Journal of Science, vol. 20, no. 1, p. 33-60.

B. patronus among species measured.

Hoff, James G.

1970. Vertebral anomalies in a humpbacked specimen of Atlantic silverside, Menidia menidia. Chesapeake Science, vol. 11, no. 1, p. 64-65.

B. tyrannus mentioned; reference to Musick and Hoff (1968).

Holland, H. Tom, David L. Coppage, and Philip A. Butler.

1967. Use of fish brain acetylcholinesterase to monitor pollution by organophosphorus pesticides. Bulletin of Environmental Contamination & Toxicology, vol. 2, no. 3, p. 156-162.

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Holliday, F. G. T.

1969. The effects of salinity on the eggs and larvae of teleosts, p. 293-311. In W. S. Hoar and D. J. Randall [eds.], Fish physiology, vol. 1, Excretion, ionic regulation, and metabolism. Academic Press, New York.

Cites Lewis (1966).

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Hopkins, S. H.

1973. Annotated bibliography on effects of salinity and salinity changes on life in coastal waters. Department of Biology, Research Foundation, Texas A & M University. (Contract Report H-73-2, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss), 411 p.

Menhaden mentioned.

Hoss, Donald E., and John P. Baptist.

1973. Accumulation of soluble and particulate radionuclides by estuarine fish, p. 776-782. In D. J. Nelson [ed.], Radionuclides in ecosystems. Proceedings of the Third National Symposium on Radioecology, U.S. Atomic Energy Commission, Oak Ridge, Tenn.

Experimental accumulation of cesium-144 by B. tyrannus was principally by surface adsorption rather than by assimilation into the tissues.

Hoss, Donald E., Linda C. Coston, and William F. Hettler, Jr.

1972. Effects of increased temperature on postlarval and juvenile estuarine fish. Proceedings of the 25th Annual Conference, Southeastern Association of Game and Fish Commissioners, 1971, p. 635-642.

Young Atlantic menhaden, B. tyrannus, were exposed to increased temperatures and the effects were measured by the critical thermal maximum, changes in oxygen consumption and survival after exposure to sudden increases in temperature for various periods of time.

Houde, Edward D.

1973. Estimating abundance of sardine-like fishes from egg and larval surveys, eastern Gulf of Mexico: Preliminary report. Proceedings of the Gulf and Caribbean Fisheries Institute, 27th Annual Session, 1972, p. 68-78.

Menhaden resource mentioned.

Hudson River Fisheries Investigation.

1965-1968. [n.d.] Evaluations of a proposed pumped storage project at Cornwall, New York in relation to fish in the Hudson River. Presented to Consolidated Edison Company of New York, Inc., by the Hudson River Policy Committee, 50 p., appendix 30 p.

Menhaden listed among species caught.

Huntsman, Gene R., and Robert B. Chapoton.

1973. Biostatistical data acquisition in the menhaden fisheries. Transactions of the American Fisheries Society, vol. 102, no. 2, p. 452-456.

Methods used for statistical treatment of menhaden biological information.

Idyll, C. P., D. C. Tabb, and B. Yokel.

1968. The value of estuaries to shrimp, p. 83-90. In John D. Newsom [ed.], Proceedings of the Marsh and Estuary Management Symposium. Thomas J. Moran's Sons, Inc., Baton Rouge.

B. tyrannus and B. patronus mentioned.

Jensen, Albert C.

1967. A brief history of the New England offshore fisheries. U. S. Fish and Wildlife Service, Fishery Leaflet 594, 14 p.

B. tyrannus fishery mentioned.

Jensen, Albert C.

1970. Thermal loading in the marine district. New York Fish and Game Journal, vol. 17, no. 2, p. 65-80.

Long Island Sound supports B. tyrannus fishery.

Jensen, Albert C.

1971. Soviet fisheries and fisheries research off the east coast of the United States. Proceedings of the Gulf and Caribbean Fisheries Institute, 23rd Annual Session, 1970, p. 7-23.

Fisheries agreement protects B. tyrannus, p. 16.

Johnson, Donald W.

1968. Pesticides and fishes-A review of selected literature. Transactions of the American Fisheries Society, vol. 97, no. 4, p. 398-424.

B. tyrannus in a list of fishes included in pesticide literature.

Johnson, Kenneth Walter.

1973. Occurrence and abundance of fishes in the intake and discharge areas of the Cedar Bayou power station before and during the first year of plant operation. Ph.D. dissertation, Texas A&M University, College Station, 348 pp.

Number of young B. patronus collected by seines and trawls from October 1969 through December 1971.

Johnson, Roy B.

1966. The effects of engineering projects on the ecology of Jones Bay, p. 148-157. In Texas Parks and Wildlife Department, Coastal Fisheries Project Report, 1966.

B. patronus was the most abundant fish, being present in all salinities throughout the estuary from the middle of April through the last of August.

Jones, Robert S.

1965. Fish stocks from a helicopter-borne purse net sampling of Corpus Christi Bay, Texas, 1962-1963. Publications of the University of Texas, Institute of Marine Science, vol. 10, p. 68-75.

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Jones, Robert S., William B. Ogletree, John H. Thompson, Jr., and William Flenniken.

1963. Helicopter borne purse net for population sampling of shallow marine bays. Publications of the University of Texas, Institute of Marine Science, vol. 9, p. 1-6.

B. patronus was taken in deep water sampling trials.

Jordan, David Starr.

1887. A preliminary list of the fishes of the West Indies. Proceedings of the U.S. National Museum, vol. 9, p. 554-608.

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Jordan, David Starr.

1914. American food and game fishes. New Nature Library, vol. 6, no. 1, 572 p. Doubleday, Page and Co., New York.

Reprinting of 1903 edition. Brief general account of B. tyrannus, p. 108-111.

Jorgenson, Sherrell C., and Grant L. Miller.

1968. Length relations of some marine fishes from coastal Georgia. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 575, 16 p.

Conversion of standard, fork, and total lengths for 82 species of marine fish including B. tyrannus and B. smithi.

Joseph, Edwin B.

1962. Industrial or scrap-fish catch from pound nets in lower Chesapeake Bay - 1960. Virginia Institute of Marine Science, Gloucester Point, Special Scientific Report no. 35, 47 p.

B. tyrannus principal species in pound net catches by locality and date.

June, Fred C.

1963. The menhaden fishery, p. 146-159. In Maurice E. Stansby [ed.], Industrial fishery technology. Reinhold Publishing Corp., New York.

Review of menhaden resource, fishery and processing industry.

June, Fred C.

1965. Comparison of vertebral counts of Atlantic menhaden. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 513, 12 p.

Vertebral counts from 6,048 B. tyrannus from three locations along the Atlantic coast showed statistical differences between spring and autumn spawning groups.

June, Fred C.

1972. Variations in size and length composition of Atlantic menhaden groupings. National Marine Fisheries Service, Fishery Bulletin, vol. 70. no. 3, p. 699-713.

Length and weight composition of summer and autumn schools of Atlantic menhaden from single purse-seine sets. Menhaden school by size and the average length of summer schools decreased with decreasing abundance of fish in a given area.

June, Fred C., and Frank T. Carlson.

1971. Food of young Atlantic menhaden, Brevoortia tyrannus, in relation to metamorphosis. National Marine Fisheries Service, Fishery Bulletin, vol. 68, no. 3, p. 493-512.

Larvae eat zooplankton but prejuveniles and juveniles eat phytoplankton. Similarities and differences between alimentary tract contents and plankton community. Significant changes in alimentary tract morphology with metamorphosis. Results of experimental feeding.

June, Fred C., and Frank T. Carlson.

1973. Food and feeding habits of Atlantic menhaden in relation to metamorphosis of larvae into juveniles, p. 136-137. (Abstract). In A. L. Pacheco [ed.], Proceedings of a Workshop on Egg, Larval and Juvenile Stages of Fish in Atlantic Coast estuaries. National Marine Fisheries Service, Middle Atlantic Coastal Fisheries Center, Technical Publication no. 1.

Larval B. tyrannus feed by capturing zooplankton, chiefly copepods. After metamorphosis food consists mainly of phytoplankton.

June, Fred, C., and William R. Nicholson.

1964. Age and size composition of the menhaden catch along the Atlantic coast of the United States, 1958 with a brief review of the commercial fishery. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 446, 40 p.

A review of the fishery for B. tyrannus during 1958 with distribution of purse seine sets and length and weight by sex for four geographical areas and the North Carolina fall fishery.

June, F. C., and Staff.

1964. Annual report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, N.C., for the fiscal year ending June 30, 1963. U.S. Fish and Wildlife Service, Circular 198, 26 p.

An annual review of menhaden research including sampling the catch, morphology and population studies, estimation of juvenile abundance, and methods of marking and recovery.

Kantner, Arthur H.

1971. Comments on economic and financial aspects of the Gulf fisheries. Proceedings of the Gulf and Caribbean Fisheries Institute, 23rd Annual Session, 1970, p. 37-42.

Menhaden industry and future trends discussed.

Karpukhov, S. Ya.

1962. Menhaden. Rybnoe Khoziaistvo. vol. 38, no. 8, p. 16-19.

Brief, popular account with no new information and no literature cited.

Kelley, John Richard, Jr.

1965. A taxonomic survey of the fishes of Delta National Wildlife Refuge with emphasis upon distribution and abundance. M.S. thesis, Louisiana State University, 133 p.

Juvenile Gulf menhaden occurred in peak abundance from October to January.

Kelly, John A., Jr., and Alexander Dragovich.

1968. Occurrence of macrozooplankton in Tampa Bay, Florida, and the adjacent Gulf of Mexico. U. S. Fish and Wildlife Service, Fishery Bulletin, vol. 66, no. 2, p. 209-221.

Seventy-seven percent of the clupeoids (3-20 mm long) were identified as Brevoortia.

Keup, Lowell, and Jack Bayless.

1964. Fish distribution at varying salinities in Neuse River basin, North Carolina. Chesapeake Science, vol. 5, no. 3, p. 119-123.

B. tyrannus collected at 50 percent of the stations in a salinity range of 0.39-12.22 ppt.

Kingston, N., W. A. Dillon, and W. J. Hargis, Jr.

1969. Studies on larval Monogenea of fishes from the Chesapeake Bay area. Part I. Journal of Parasitology, vol. 55, no. 3, p. 544-558.

Parasites on B. tyrannus.

Kinnear, Brian S.

1973. Atlantic menhaden, p. 268-269, 280-283, 296-297. In A. L. Pacheco [ed.], Proceedings of a Workshop on Egg, Larval and Juvenile Stages of Fish in Atlantic Coast Estuaries. National Marine Fisheries Service, Middle Atlantic Coastal Fisheries Center, Technical Publication no. 1.

Distribution and early development of juvenile B. tyrannus in Atlantic Coast estuaries with a list of sites sampled.

Kinnear, Brian S., and Charles M. Fuss, Jr.

1971. Thread herring distribution off Florida's west coast. Commercial Fisheries Review, vol. 33, nos. 7-8, p. 27-39.

Gulf menhaden purse-seine fishery included catches of Atlantic thread herring, Opisthonema oglinum.

Klima, E. F.

1971. The automated fishing platform, p. 498-501. In H. Kristjonsson [ed.], Modern fishing gear of the world: 3. Fishing News (Books) Ltd., London.

B. patronus resource mentioned but the species not included in the catches from the platform.

Klima, Edward F., and Durbin C. Tabb.

1959. A contribution to the biology of the spotted weakfish, Cynoscion nebulosus (Cuvier), from northwest Florida, with a description of the fishery. Florida Board of Conservation, Technical Series no. 30, 25 p.

Menhaden collected by beach seine in Apalachicola Bay.

Kreutzer, Conradin O.

1963. Electrofishing with bottom trawls at sea. Proceedings of the Gulf and Caribbean Fisheries Institute, 15th Annual Session, 1962, p. 26-29.

Electrofishing applied to menhaden industry.

Kreutzer, Conradin O.

1964. Utilization of fish reactions to electricity in sea fishing, p. 545-551. In Modern fishing gear of the world: 2. Fishing News (Books), Ltd., London.

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Kroger, Richard L., and Robert L. Dryfoos.

1972. Tagging and tag-recovery experiments with Atlantic menhaden, Brevoortia tyrannus. National Marine Fisheries Service, Special Scientific Report, Fisheries no. 664, 11 p.

Juvenile and adult B. tyrannus were tagged experimentally in 1965 and 1969 and tag recovery tests were conducted at menhaden reduction plants at Beaufort, N.C.

Kroger, Richard L., and James F. Guthrie.

1971. Incidence of crooked vertebral columns in juvenile Atlantic menhaden, Brevoortia tyrannus. Chesapeake Science, vol. 12, no. 4, p. 276-278.

Twelve juvenile Atlantic menhaden with crooked vertebral columns were found in collections from Massachusetts. About 20,000 juveniles from 19 other estuaries along the coast from Massachusetts to Florida were examined and none others with deformed vetebral columns were found.

Kroger, Richard L., and James F. Guthrie.

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Observations of injuries and scars on young Gulf and Atlantic menhaden indicate that predation is greater in clear water streams than in turbid ones.

Kroger, Richard L., and James F. Guthrie.

1972b. Incidence of the parasitic isopod, Olencira praegustator, in juvenile Atlantic menhaden. Copeia, 1972, no. 2, p. 370-374.

Frequency of occurrence of parasite in mouth and gill chamber of Atlantic menhaden in 19 estuaries from Massachusetts to Florida with notations on the amount of gill damage.

Kroger, Richard L., and James F. Guthrie.

1972c. Occurrence of the branchiuran, Argulus alosae, on dying Atlantic menhaden, Brevoortia tyrannus, in the Connecticut River. Transactions of the American Fisheries Society, vol. 101, no. 3, p. 559-560.

Heavy infestation of fish lice on adult Atlantic menhaden was coincident with mortality in September 1970.

Kroger, Richard L., and James F. Guthrie.

1973a. Additional anomalous menhaden and other fishes. Chesapeake Science, vol. 14, no. 2, p. 112-116.

Reports on deformed B. patronus and B. tyrannus obtained during juvenile menhaden abundance surveys along the Gulf and Atlantic coasts of the U.S.

Kroger, Richard L., and James F. Guthrie.

1973b. Migrations of tagged juvenile Atlantic menhaden. Transactions of the American Fisheries Society, vol. 102, no. 2, p. 417-422.

Recoveries of tags from juvenile B. tyrannus tagged from 1967 to 1971 showed coastal migrations during the following years.

Kroger, Richard L., Robert L. Dryfoos, and Gene R. Huntsman.

1971. Movement of juvenile Atlantic menhaden tagged in New England waters. Chesapeake Science, vol. 12, no. 2, p. 114-115.

Four tags from 1,020 juvenile Atlantic menhaden tagged in Rhode Island in October 1969 were recovered. One in January and two in June at Beaufort, N.C., and one Fernandina Beach, Fla., July 1970.

Kudo, Richard R.

1966. Protozoology. 5th ed. Charles C. Thomas, Springfield, Ill. 1,174 p.

Describes and illustrates Eimeria brevoortiana and Kudoa clupeidae from the host, B. tyrannus.

Kutkuhn, Joseph H.

1966. Bureau of Commercial Fisheries interests in estuarine ecology, p. 45-51. In Proceedings, Symposium on Estuarine Ecology, Coastal Waters of North Carolina. Water Resources Research Institute, Raleigh.

Review of menhaden research program.

Lanham, Url.

1962. The fishes. Columbia University Press, New York, 116 p.

Menhaden mentioned as plankton feeder and as fish used by American Indians as fertilizer.

Lear, W. H., and J. H. C. Pippy.

1971. A record of the Atlantic menhaden (Brevoortia tyrannus) from Northumberland Strait. Journal of the Fisheries Research Board of Canada, vol. 28, no. 3, p. 461-462.

Northern extension of the range of B. tyrannus of 104 miles and an eastern extension of 63 miles or approximately 740 sea miles from the Bay of Fundy, the previous record.

Leim, A. H., and W. B. Scott.

1966. Fishes of the Atlantic coast of Canada. Fisheries Research Board of Canada, Bulletin no. 155, 485 p.

Atlantic menhaden, p. 93-94.

Levi, Eldon J.

1973. Juvenile yellowfin menhaden from the Bahama Islands. Transactions of the American Fisheries Society, vol. 102, no. 4, p. 848-849.

First record of a North American menhaden, B. smithi, from beyond the Continental Shelf.

Lewis, D. H., L. C. Grumbles, S. McConnell, and A. I. Flowers.

1970. Pasteurella-like bacteria from an epizootic in menhaden and mullet in Galveston Bay. Journal of Wildlife Diseases, vol. 6, no. 3, p. 160-162.

Culture analysis and tests from fish kill.

Lewis, Robert M.

1965. The effect of minimum temperature on the survival of larval Atlantic menhaden, Brevoortia tyrannus. Transactions of the American Fisheries Society, vol. 94, no. 4, p. 409-412.

Results of laboratory experiments on the lethal effects of -1 to 8°C on menhaden larvae acclimated at 7, 10, 12.5, 15 and 20°C.

Lewis, Robert M.

1966. Effects of salinity and temperature on survival and development of larval Atlantic menhaden, Brevoortia tyrannus. Transactions of the American Fisheries Society, vol. 95, no. 4, p. 423-426.

Results of laboratory experiments on the lethal effects of 2-6°C in salinities of 0-30 ppt on menhaden larvae acclimated at 10 and 15°C.

Lewis, Robert M., and William F. Hettler, Jr.

1968. Effect of temperature and salinity on the survival of young Atlantic menhaden, Brevoortia tyrannus. Transactions of the American Fisheries Society, vol. 97, no. 4, p. 344-349.

Results of laboratory experiments of the lethal effects of high and low temperatures at different salinities on juvenile menhaden acclimated at different temperatures.

Lewis, Robert M., William F. Hettler, Jr., E. Peter H. Wilkens, and G. Nelson Johnson.

1970. A channel net for catching larval fishes. Chesapeake Science, vol. 11, no. 3, p. 196-197.

Description of a channel net designed to catch larval Atlantic menhaden in tidal currents.

Lewis, Robert M., and Walter C. Mann.

1971. Occurrence and abundance of larval Atlantic menhaden, Brevoortia tyrannus, at two North Carolina inlets with notes on associated species. Transactions of the American Fisheries Society, vol. 100, no. 2, p. 296-301.

Relative abundance indexes of Atlantic menhaden larvae entering estuaries from November to April, 1966-67 and 1967-68. Larvae most abundant during March and in night collections. Catches included the young of 23 other fishes.

Lewis, Robert M., and Walter C. Mann.

1973. Occurrence and abundance of larval Atlantic menhaden, Brevoortia tyrannus, at two North Carolina inlets and a list of associated species, p. 142-147. In A. L. Pacheco [ed.], Proceedings of a Workshop on Egg, Larval and Juvenile Stages of Fish in Atlantic Coast Estuaries. National Marine Fisheries Service, Middle Atlantic Coastal Fisheries Center, Technical Publication no. 1.

Comparison of the relative abundance of B. tyrannus larvae at Beaufort and Bogue Inlets, 1966-68.

Lewis, Robert M., and E. Peter H. Wilkens.

1971. Abundance of Atlantic menhaden larvae and associated species during a diel collection at Beaufort, N.C. Chesapeake Science, vol. 12, no. 3, p. 185-187.

Abundance of Atlantic menhaden, spot and pinfish larvae in continuous collections from a tidal channel during a 24-hour period was examined by analysis of variance to show the effects of species, depth, light and tide.

Lewis, Robert M., E. Peter H. Wilkens, and Herbert R. Gordy.

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Length-weight relations for larval, prejuvenile, and juvenile Atlantic menhaden collected along a salinity gradient in a tidal stream.

Lippson, Alice Jane.

1973. The Chesapeake Bay in Maryland: An atlas of natural resources. Natural Resources Institute, University of Maryland, Johns Hopkins University Press, Baltimore, 55 p.

Map of juvenile and adult Atlantic menhaden distribution in Maryland section of Chesapeake Bay.

Livingstone, Robert, Jr.

1965. A preliminary bibliography with KWIC index on the ecology of estuaries and coastal areas of the Eastern United States. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 507, 352 p.

Fifty-five references to menhaden, genus Brevoortia, included in Reintjes, Christmas, and Collins (1960), Reintjes (1964), and this bibliography.

Longhurst, Alan R.

1971. The clupeoid resources of tropical seas, p. 349-385. In Harold Barnes [ed.], Oceanography and marine biology, an annual review, vol. 9. Hafner Publishing Co., New York.

Menhaden fishery mentioned.

Lorio, Wendell J., and Harry E. Schafer.

1966. A food habit study of the spotted seatrout, Cynoscion nebulosus, in the Biloxi Marsh area, Louisiana. Proceedings of the 19th Annual Conference, Southeastern Association of Game and Fish Commissioners, 1965, p. 289-296.

Menhaden found in stomachs of spotted seatrout.

Love, R. Malcolm.

1970. The chemical biology of fishes. Academic Press, New York, 547 p.

Reference to physiology of B. patronus.

Love, R. M., J. A. Lovern, and N. R. Jones.

1959. The chemical composition of fish tissues. Great Britain Department of Scientific and Industrial Research, Food Investigation, Special Report no. 69, 62 p.

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Lowe, Jack I.

1966. Some effects of endrin on estuarine fishes. Proceedings of the 19th Annual Conference, Southeastern Association of Game and Fish Commissioners, 1965, p. 271-276.

Toxicity of endrin on B. tyrannus.

Lukton, A., and H. S. Olcott.

1958. Content of free imidazole compounds in the muscle tissue of aquatic animals. Food Research, vol. 23, no. 6, p. 611-618.

Anserine and carnosine in muscles of B. tyrannus.

Lux, F. E., and F. E. Nichy.

1971. Number and lengths, by season, of fishes caught with an otter trawl near Woods Hole, Massachusetts, September 1961 to December 1962. National Marine Fisheries Service, Special Scientific Report - Fisheries no. 622, 15 p.

One B. tyrannus 33 mm fork length in August 1962.

McColl, J. D., and R. J. Rossiter.

1952a. A comparative study of the lipids of the vertebrate central nervous system. I. Brain. Journal of Experimental Biology, vol. 29, p. 196-202.

Lipids in B. tyrannus brain.

McColl, J. D., and R. J. Rossiter.

1952b. A comparative study of the lipids of the vertebrate central nervous system. II. Spinal cord. Journal of Experimental Biology vol. 29, p. 203-210.

Lipids in B. tyrannus spinal cord.

McFarland, William N.

1963. Seasonal change in the number and the biomass of fishes from the surf at Mustang Island, Texas. Publications of the University of Texas, Institute of Marine Science, vol. 9, p. 91-105.

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McHugh, J. L.

1966. Management of estuarine fisheries, p. 133-154. In A symposium on estuarine fisheries. American Fisheries Society, Special Publication no. 3.

Problems of menhaden fishery and economic importance.

McHugh, J. L.

1967. Estuarine nekton, p. 581-620. In George H. Lauff [ed.], Estuaries. American Association for the Advancement of Science, Publication no. 83, Washington, D.C.

Menhaden mentioned with estimate of growth of B. tyrannus in Chesapeake Bay.

McHugh, J. L.

1969a. Comparison of Pacific sardine and Atlantic menhaden fisheries. Fiskeridirektoratets Skrifter, Serie Havundersøkelser, vol. 15 no. 3, p. 356-367.

Comparison of life histories, fisheries and dynamics of sardine and menhaden resources with a brief review of the present condition and future prospects for the Atlantic menhaden.

McHugh, J. L.

1969b. Fisheries of Chesapeake Bay. Proceedings of the Governor's Conference on Chesapeake Bay, September 12-13, 1968, p. II-135-II-160.

Historical review of fisheries including Atlantic menhaden, B. tyrannus. Graph of total Atlantic coast landings of menhaden, 1875-1966.

McHugh, J. L.

1972a. Jeffersonian democracy and the fisheries, p. 134-155. In B. J. Rothschild [ed.], World fisheries policy-Multidisciplinary views. University of Washington Press, Seattle.

Menhaden fishery discussed.

McHugh, J. L.

1972b. Marine fisheries of New York State. National Marine Fisheries Service, Fishery Bulletin, vol. 70, no. 3, p. 585-610.

Atlantic menhaden resource discussed with New York landings, 1880-1970.

McKenney, Thomas W.

1972. Fish eggs and larvae from Port Royal Sound and adjacent waters, p. 233-240. In Port Royal Sound environmental study. South Carolina Water Resources Commission.

B. tyrannus mentioned. No menhaden eggs or larvae.

McKernan, Donald L.

1964. Fisheries and oceanography, p. 202-218. In E. John Long [ed], Ocean sciences. U.S. Naval Institute, Annapolis, Md.

Use of electricity in menhaden fishery and brief mention of menhaden and estuaries.

McKernan, Donald L.

1972. World fisheries-world concern, p. 35-51. In B. J. Rothschild [ed.], World fisheries policy-Multidisciplinary views. University of Washington Press, Seattle.

Menhaden resource mentioned.

McLane, William McNair.

1955. The fishes of the St. Johns River system. Ph.D. thesis, University of Florida, 361 p.

Account of B. smithi; range, habitat, abundance, feeding habits, and parasites.

McLusky, Donald S.

1971. Ecology of estuaries. Heinemann Educational Books, London, 144 p.

Menhaden mentioned on p. 102.

McMahon, John W.

1963. Monogenetic trematodes from some Chesapeake Bay fishes. Part I: The superfamilies Capsaloidea Price, 1936 and Diclidophoroidea Price, 1936. Chesapeake Science, vol. 4, no. 4, p. 151-160.

Descriptions of the trematode parasites, Clupeocotyle brevoortia and Mazocraeoides georgei which parasitize B. tyrannus, B. patronus, and B. gunteri.

Manooch, Charles S., III.

1973. Food habits of yearling and adult striped bass, Morone saxatilis (Walbaum), from Albemarle Sound, North Carolina. Chesapeake Science, vol. 14, no. 2, p. 73-86.

Brevoortia tyrannus composed the principal food of 1,094 striped bass, 125 to 714 mm total length in Albemarle Sound from July 1970 to August 1971. The accounted for 54% by number and 50% by volume.

Manski, W., S. P. Halbert, and T. P. Auerbach.

1964. Immunochemical analysis of the phylogeny of lens proteins, p. 545-562. In Charles A. Leone [ed.], Taxonomic biochemistry and serology. The Ronald Press Company, New York.

Menhaden lens proteins were utilized in a seriological study of vertebrate phylogeny.

Mansueti, Alice J., and Jerry D. Hardy, Jr.

1967. Development of fishes of the Chesapeake Bay Region: An atlas of egg, larval, and juvenile stages. Part I. Natural Resources Institute, University of Maryland, 202 p.

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Mansueti, Romeo J.

1960a. Comments on the roughtail stingray, Dasyatis centroura, in Maryland waters. Chesapeake Science, vol. 1, no. 1, p. 76-77.

Remains of a B. tyrannus found in stomach of stingray collected at the mouth of the Chesapeake Bay.

Mansueti, Romeo J.

1960b. The occurrence of the rough scad, Trachurus lathami, in Chesapeake Bay, Maryland. Chesapeake Science, vol. 1, no. 2, p. 117-118.

Mentioned occurrence of menhaden in balloon trawl catches in Bay.

Mansueti, Romeo J.

1962a. Effects of civilization on striped bass and other estuarine biota in Chesapeake Bay and tributaries. Proceedings of the Gulf and Caribbean Fisheries Institute, 14th Annual Session, 1961, p. 110-136.

Atlantic menhaden, B. tyrannus, mentioned.

Mansueti, Romeo J.

1962b. Eggs, larvae, and young of the hickory shad, Alosa mediocris, with comments on its ecology in the estuary. Chesapeake Science, vol. 3, no. 3, p. 173-205.

Figure comparing head outlines with larval Atlantic menhaden, B. tyrannus.

Mansueti, Romeo J.

1964. Eggs, larvae, and young of the white perch, Roccus americanus, with comments on its ecology in the estuary. Chesapeake Science, vol. 5, no. 1-2, p. 3-45.

Larvae of B. tyrannus mentioned.

Marcellus, Kenneth Lee.

1972. Fishes of Barnegat Bay, New Jersey, with particular reference to seasonal influences and the possible effects of thermal discharges. Ph.D. thesis, Rutgers University, 190 p. (Dissertation Abstracts, vol. 33, no. 5, p. 2185-B - 2186-B.)

B. tyrannus included in haul-seine catches. Only 75 caught during a 4-year study.

Margalef, R.

1969. Pelagic ecosystem in the area, p. 127. In Symposium on investigations and resources of the Caribbean Sea and adjacent regions. Abstract FAO Fisheries Report no. 71.1.

Brevoortia important among clupeoid fishes in the region.

Marine Pollution Bulletin.

1970. Fish kills in Florida. Marine Pollution Bulletin, vol. 1, no. 10, p. 148.

Ten to fifteen million menhaden (Brevoortia sp.) were killed in Escambia Bay on September 3, 1970. This is one of 42 kills reported in the Bay since June 21. Presumed cause of kills was over-nutrification, a condition that has caused summer kills of menhaden for the past 10 years.

Marine Pollution Bulletin.

1973. Menhaden killed near Pilgrim Power Station. Marine Pollution Bulletin, vol. 4, no. 6, p. 86.

Estimated kill of 10,000 adult Atlantic menhaden from gas embolism from supersaturation of water with nitrogen from plant effluent canal.

Marine Research Incorporated.

1973. Rome Point investigations. Quarterly Progress Report, June - August 1973, Marine Research Inc., East Wareham, Mass. 150 p. (unpaged).

Occurrence and numbers of eggs and larvae of Brevoortia tyrannus and other fishes in Narragansett Bay.

Marsh, M. C., and F. P. Gorham.

1905. The gas disease in fishes. Report of the U.S. Bureau of Fisheries for 1904, p. 343-395.

Menhaden mortalities in Narragansett Bay during the summer of 1904 with exophthalmia or "pop-eye".

Marshall, N. B.

1971. Explorations in the life of fishes. Harvard University Press, Cambridge, 204 p.

Brief comment on the coloration of juvenile Brevoortia.

Massmann, William H.

1962. Water temperature, salinities, and fishes collected during trawl surveys of Chesapeake Bay and York and Pamunkey Rivers, 1956-1959. Virginia Institute of Marine Science, Gloucester Point, Special Scientific Report no. 27, 57 p.

B. tyrannus included.

Massmann, William H.

1963. Annulus formation on the scales of weakfish, Cynoscion regalis, of Chesapeake Bay. Chesapeake Science, vol. 4, no. 1, p. 54-56.

Brief mention of scale growth of B. tyrannus.

Massmann, William H.

1967. A positive approach to coastal sport fishery problems. Proceedings of the 18th Annual Conference, Southeastern Association of Game and Fish Commissioners, 1964, p. 255-258.

Importance of estuaries to the young of menhaden.

Massmann, William H.

1971. The significance of an estuary on the biology of aquatic organisms of the middle Atlantic region, p. 96-109. In Philip A. Douglas and Richard H. Stroud [eds.], A symposium on biological significance of estuaries. Sport Fishing Institute, Washington, D. C.

Atlantic menhaden mentioned.

Massmann, William H., and Romeo J. Mansueti.

1963. Data from Virginia-Maryland cooperative fish trawl surveys in Chesapeake Bay - 1957 and 1958. Virginia Institute of Marine Science, Gloucester Point, Special Scientific Report no. 42, 21 p.

Catch of B. tyrannus with temperature and salinities.

Massmann, William H., John J. Norcross, and Edwin B. Joseph.

1963. Distribution of larvae of the naked goby, Gobiosoma bosci, in the York River. Chesapeake Science, vol. 4, no. 3, p. 120-125.

Menhaden occurrence briefly mentioned.

Matthiessen, George C.

1972-1973. Rome Point investigations. Quarterly Progress Reports, June-August, September-November and December 1973-February 1973, Marine Research Inc., East Wareham, Mass. (unpaged).

Mazyck, W. St. J.

1887. Dead fish along the coast of South Carolina. Bulletin of the U.S. Fish Commission for 1886, vol. 6, p. 413-414.

Mass mortality of young menhaden in late December of unknown causes.

Mead, A. D.

1898. Peridinium and the "red water" in Narragansett Bay. Science, vol. 8, no. 203, p. 707-709.

Atlantic menhaden, B. tyrannus, among the principal fish killed.

Meldrim, John W.

1971. An experimental study of the behavior of estuarine fishes to a proposed thermal effluent. Proceeding of the Fourth Mid-Atlantic Industrial Waste Conference, November, 1970, University of Delaware, p. 65-74.

B. tyrannus among estuarine fishes tested in the laboratory for avoidance responses to increased temperature gradients.

Meldrim, John W., and James J. Gift.

1971. Temperature preference, avoidance and shock experiments with estuarine fishes. Ichthyological Associates, Ithaca, New York, Bulletin 7, 72 p.

B. tyrannus prefer temperature at 70°F and avoid temperatures from 78-80°F.

Merchant, George, Jr.

1884. The incipiency of night-seining for mackerel. Bulletin of the U.S. Fish Commission, vol. 4, p. 142.

Seining menhaden at night.

Merriner, J. V., and W. L. Wilson.

1972. Jaw deformity (cross bite) of Atlantic menhaden, B. tyrannus, from Virginia. Chesapeake Science, vol. 13, no. 1, p. 62-63.

One B. tyrannus with deformed jaw was caught in James River with river herring, American shad and Bay anchovy.

Miller, Grant L., and Sherrell C. Jorgenson.

1969. Seasonal abundance and length frequency distribution of some marine fishes in coastal Georgia. U.S. Fish and Wildlife Service, Data Report 35, 102 p.

Length frequency of B. tyrannus and B. smithi by month with weather, tide, water temperature and salinity. Only other clupeoids were Anchoa hepsetus and A. mitchilli.

Miller, Grant L., and Sherrell C. Jorgenson.

1973. Meristic characters of some marine fishes of the Western Atlantic Ocean. National Marine Fisheries Service, Fishery Bulletin, vol. 71, no. 1, p. 301-312.

Brevoortia gunteri, patronus, tyrannus and smithi listed with counts of precaudal and caudal vertebrae, dorsal, anal and caudal fin rays.

Miller, John M.

1965. A trawl survey of the shallow Gulf fishes near Port Aransas, Texas. Publications of the University of Texas, Institute of Marine Science, vol. 10, p. 80-107.

Three small B. patronus (55, 68, and 190 mm) were captured at 3 and 6 fathoms on February 19, April 1, and June 2, 1964.

Miller, Robert Victor.

1969. Constancy of epibranchial organs and fourth epibranchial bones within species groups of clupeid fishes. Copeia, 1969, no. 2, p. 308-312.

Comparison of epibranchial organs and fourth epibranchial bones of 5 species of Brevoortia with species of Opisthonema, Dorosoma and Clupea.

Monod, Theodore.

1968. Le complexe urophore des poissons teleosteens. Memoires de l'Institut Fondamental d'Afrique Noire, no. 81, 705 p.

Ethmalosa fimbriata and *B. tyrannus* listed with figures of *E. fimbriata*.

Moseley, Frank N., and B. J. Copeland.

1969. A portable drop-net for representative sampling of nekton. Contributions in Marine Science of the University of Texas, Institute of Marine Science, vol. 14, p. 37-45.

B. patronus, the principal species caught.

Moss, S. A., and W. N. McFarland.

1970. The influence of dissolved oxygen and carbon dioxide on fish schooling behavior. Marine Biology, vol. 5, no. 2, p. 100-107.

Dense schooling of *B. tyrannus* mentioned.

Moulton, James M.

1956. The movements of menhaden and butterfish in a sound field. Anatomical Record, vol. 125, no. 3, p. 592.

Abstract of 15 minute motion picture.

Moulton, James M.

1963. Acoustic orientation of marine fishes and invertebrates. Ergebnisse der Biologie, Band 26, p. 27-39.

Reaction of menhaden to underwater sound.

Moulton, James M., and Richard H. Dixon.

1967. Directional hearing in fishes, p. 187-232. In W. N. Tavolga [ed.], Marine bio-acoustics, vol. 2, Pergamon Press, New York.

Brevoortia ear structure and function.

Moulton, James M., and Jules M. Lerner.

1963. The ear-air bladder connections of the menhaden, B. tyrannus. (Abstract). American Zoologist, vol. 3, no. 4, p. 498.

Roles of hearing, gas pressure regulation and depth perception.

Mulkana, Mohammed Saeed.

1966. The growth and feeding habits of juvenile fishes in two Rhode Island estuaries. Gulf Research Reports, vol. 2, no. 2, p. 97-167.

Occurrence of B. tyrannus and estimated growth from successive collections from July to October. Stomach contents of 300 young menhaden (10-80 mm) contained amorphous organic ooze and dinoflagellates with few diatoms or crustaceans.

Muncy, Robert J.

1960. A study of the comparative efficiency between nylon and linen gillnets. Chesapeake Science, vol. 1, no. 2, p. 96-102.

B. tyrannus among the clupeids listed in gillnet catches from Chesapeake Bay.

Musick, John A., and James G. Hoff.

1968. Vertebral anomalies in humpbacked specimens of menhaden, Brevoortia tyrannus. Transactions of the American Fisheries Society, vol. 97, no. 3, p. 277-278.

Three humpbacked menhaden were collected along with 335 normal menhaden near Buzzards Bay, Mass.

Myers, George S.

1964. A brief sketch of the history of ichthyology in America to the year 1850. Copeia, 1964, no. 1, p. 33-41.

A brief mention of the origin of the generic name Brevoortia.

Nahhas, F. M., and R. B. Short.

1965. Digenetic trematodes of marine fishes from Apalachee Bay, Gulf of Mexico. Tulane Studies in Zoology, vol. 12, no. 2, p. 39-50.

Digenetic trematodes in Brevoortia.

Nelson, Gareth J.

1967a. Epibranchial organs in lower teleostean fishes. Journal of Zoology, vol. 153, no. 1, p. 71-89.

Description of gill arches in Brevoortia and other clupeoid genera.

Nelson, Gareth J.

1967b. Gill arches of teleostean fishes of the family Clupeidae. Copeia, 1967, no. 2, p. 389-399.

The genera Brevoortia, Ethmalosa, and Ethmidium are discussed with reference to the morphology of gill arches.

Nicholson, William R.

1971a. Changes in catch and effort in the Atlantic menhaden purse-seine fishery, 1940-68. National Marine Fisheries Service, Fishery Bulletin, vol. 69, no. 4, p. 765-781.

Analysis of catch, number of vessel weeks, and catch per vessel week in the Atlantic menhaden fishery.

Nicholson, William R.

1971b. Coastal movements of Atlantic menhaden as inferred from changes in age and length distributions. Transactions of the American Fisheries Society, vol. 100, no. 4, p. 708-716.

Length frequency distributions plotted by age, month, and latitude support the hypothesis of an annual north-south movement.

Nicholson, William R.

1972a. Fishing pressure and its influence on Monday catches of Atlantic menhaden in the Chesapeake Bay purse-seine fishery. Chesapeake Science, vol. 13, no. 3, p. 215-218.

Until about 1955 Atlantic menhaden purse-seine catches in Chesapeake Bay were distributed equally among week days from Monday to Friday. From 1956-61 the catch landed on Mondays averaged about 22 percent of the weekly totals. As fishing pressure increased and the population decreased after 1961, the percentage of the catch landed on Mondays rose, averaging about 34 percent of the weekly total. The increase in Monday catches is attributed to greater availability of fish after reduced fishing over the weekend.

Nicholson, William R.

1972b. Population structure and movements of Atlantic menhaden, Brevoortia tyrannus, as inferred from back-calculated length frequencies. Chesapeake Science, vol. 13, no. 3, p. 161-174.

Conclusions from analysis of back-calculated fork lengths sampled from 1955-64: (1) mixing of menhaden of all ages from all areas occurs south of Cape Hatteras during the winter, (2) at the time of first annulus formation in early spring, age-1 menhaden segregate along the coast by size, which increases from south to north, (3) all menhaden do not return to the same area they occupied the previous year, (4) for normal year classes, recruitment into the fishable population may not be complete until late in the second summer of life.

Nicholson, William R., and Joseph R. Higham, Jr.

1964a. Age and size composition of the menhaden catch along the Atlantic coast of the United States, 1959 with a brief review of the commercial fishery. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 478, 34 p.

A review of the fishery for 1959 with distribution of purse-seine sets, length and weight by sex for four geographical areas and the North Carolina fall fishery.

Nicholson, William R., and Joseph R. Higham, Jr.

1964b. Age and size composition of the 1960 menhaden catch along the U.S. Atlantic coast with a brief review of the commercial fishery. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 479, 41 p.

A review of the fishery for B. tyrannus during 1960 with distribution of purse-seine sets and length and weight by sex for four geographical areas and the North Carolina fall fishery.

Nicholson, William R., and Joseph R. Higham, Jr.

1965. Age and size composition of the menhaden catch along the Atlantic coast of the United States, 1961, with a brief review of the commercial fishery. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 495, 28 p.

A review of the fishery for B. tyrannus during 1961 with distribution of purse-seine sets and length and weight by sex for four geographical areas and the North Carolina fall fishery.

Nicholson, William R., and Joseph R. Higham, Jr.

1966. Age and size composition of the menhaden catch along the Atlantic coast of the United States, 1962, with a brief review of the commercial fishery. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 527, 24 p.

A review of the fishery for B. tyrannus during 1962 with distribution of purse-seine sets and length and weight by sex for four geographical areas and the North Carolina fall fishery.

Norcross, J. J., and W. Harrison.

1967. Part I, Introduction, p. 3-9. In W. Harrison, J. J. Norcross, N. A. Pore, and E. M. Stanley, Circulation of shelf waters off the Chesapeake Bight, surface and bottom drift of Continental Shelf waters between Cape Henlopen, Delaware, and Cape Hatteras, North Carolina, June 1963-December 1964. U.S. Department of Commerce, ESSA Professional Paper no. 3.

Atlantic menhaden, B. tyrannus, are spawned at sea and larvae are transported into nursery areas by ocean currents.

Norden, Carroll R.

1966. The seasonal distribution of fishes in Vermilion Bay, Louisiana. Transactions of the Wisconsin Academy of Sciences, Arts and Letters, vol. 55, p. 119-137.

B. patronus was one of the three most abundant species in fish collections from Vermilion Bay. Larval menhaden first appeared in catches in November and continued into April. Mentioned occurrence of B. gunteri in nearby Gulf waters.

Odum, William E.

1968. Mullet grazing on a dinoflagellate bloom. Chesapeake Science, vol. 9, no. 3, p. 202-204.

The presence of B. tyrannus noted in Duplin River, near Sapelo Island, Ga.

Oishi, Keiichi, and Ayako Okumura.

1963. Likes and dislikes of fish meat. Part I. By some Americans. Bulletin of the Faculty of Fisheries, Hokkaido University, vol. 14, no. 3, p. 182-192.

Americans dislike menhaden as a food source compared to beef and other marine products.

Ovchinnikov, V. V.

1964. The fish fauna composition of the Gulf of Mexico and some questions concerning its origin (in Russian). Trudy Atlanticheskii nauchno-issledovatel'skii Institut Rybnogo Khoziaistva i Okeanografii, vol. 11, p. 12-20.

B. tyrannus listed.

Oviatt, Candace, and George W. Gray, Jr.

1968. Juvenile lookdowns, Selene vomer, in Wickford Cove, Narragansett Bay, Rhode Island. Transactions of the American Fisheries Society, vol. 97, no. 1, p. 64.

B. tyrannus was taken in beach seines in the Bay.

Oviatt, C. A., A. L. Gall, and S. W. Nixon.

1972. Environmental effects of Atlantic menhaden on surrounding waters. Chesapeake Science, vol. 13, no. 4, p. 321-323.

Schools of Atlantic menhaden, B. tyrannus, have measurable effects upon the estuarine waters of Narragansett Bay, R.I., by their feeding, respiration and excretion. The concentrations of phytoplankton and oxygen decreased and ammonia increased within the immediate vicinity of schools.

Pacheco, Anthony L.

1962. Age and growth of spot in lower Chesapeake Bay, with notes on distribution and abundance of juveniles in the York River system. Chesapeake Science, vol. 3, no. 1, p. 18-28.

B. tyrannus mentioned.

Pacheco, Anthony L., and George C. Grant.

1965. Studies of the early life history of Atlantic menhaden in estuarine nurseries. Part I--Seasonal occurrences of juvenile menhaden and other small fishes in a tributary creek of Indian River, Delaware, 1957-58. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 504, 32 p.

Monthly occurrences and size range of juvenile B. tyrannus and other small fishes from 32 families are summarized from 800 seine collections. Salinity and temperature observations for each collection are included.

Pacheco, Anthony L., and George C. Grant.

1973. Immature fishes associated with larval Atlantic menhaden at Indian River Inlet, Delaware, 1958-61, p. 78-117. In A. L. Pacheco [ed.], Proceedings of a Workshop on Egg, Larval and Juvenile Stages of Fish in Atlantic Coast Estuaries. National Marine Fisheries Service, Middle Atlantic Coastal Fisheries Center, Technical Publication no. 1.

Atlantic menhaden, bay anchovy, American eel, Atlantic silverside, summer and winter flounder made up 70% by numbers of the 59 species of fish collected during October to May, 1958-61.

Parker, Jack C.

1965. An annotated checklist of the fishes of the Galveston Bay system, Texas. Publications of the University of Texas, Institute of Marine Science, vol. 10, p. 201-220.

B. gunteri was seldom found in the bay, while B. patronus was abundant throughout the year.

Parker, R. O., Jr.

1972. An electric detector system for recovering internally tagged menhaden, genus Brevoortia. National Marine Fisheries Service, Special Scientific Report - Fisheries 654, 7 p.

Menhaden with internal ferromagnetic tags are recovered by an electronic device that does not interfere with reduction plant operations. Date and locality of capture are obtained for tagged fish as they are unloaded from the fishing vessel.

Parker, R. O., Jr.

1973. Menhaden tagging and recovery: Part II. Recovery of internal ferromagnetic tags used to mark menhaden, genus Brevoortia. Marine Fisheries Review, vol. 35, nos. 5-6, p. 36-39. Atlantic Estuarine Fisheries Center Beaufort, N.C. 28516.

Plate and rotating grate magnets were installed in reduction plants to recover tags from menhaden. Recovery efficiency was determined at each plant with test lots of large and small tags.

Pearse, A. S.

1947. On the occurrence of ectoconsortes on marine animals at Beaufort, N.C. Journal of Parasitology, vol. 33, no. 6, p. 453-458.

External copepod parasites on B. tyrannus are mentioned.

Pearson, John C.

1929. Natural history and conservation of redfish and other commercial sciaenids on the Texas coast. Bulletin of the U.S. Bureau of Fisheries for 1928, vol. 44, p. 129-214.

Menhaden is included in food of red drum.

Perkins, Richard J., and Michael D. Dahlberg.

1971. Fat cycles and condition factors of Altamaha River shads. Ecology, vol. 52, no. 2, p. 359-362.

Menhaden is mentioned in comparison with maximum fat content for Atlantic and Gulf menhadens.

Perret, William Stanley.

1966. Occurrence, abundance, and size distribution of fishes and crustaceans collected with otter trawl in Vermilion Bay, Louisiana. M.S. thesis, University of Southwestern Louisiana, Lafayette, La., 64 p.

B. patronus occurred at all stations.

Perret, William S.

1968. Menhaden or pogies: Louisiana's most valuable commercial fish. Louisiana Conservationist, vol. 20, nos. 1 & 2, p. 14-15.

Popular account of the purse-seine fishery for Gulf menhaden.

Peters, David S.

1972. Feeding selectivity in juvenile Atlantic menhaden, Brevoortia tyrannus, (Pisces: Clupeidae). (Abstract). ASB (Association of Southeastern Biologists) Bulletin, vol. 19, no. 2, p. 91.

Laboratory experiments to determine if menhaden feed selectively show that suspended and bottom particles of larger sizes were preferred to fine inorganic silt. Menhaden caught in the natural habitat ate mixed plankton while avoiding suspended silt.

Peterson, Ross.

1967. Design and economics of a new 86-foot aluminum multi-purpose fishing vessel. Proceedings of the Gulf and Caribbean Fisheries Institute, 19th Annual Session, 1966, p. 39-48.

A menhaden vessel is described.

Poole, John C.

1964. Feeding habits of the summer flounder in Great South Bay. New York Fish and Game Journal, vol. 11, no. 1, p. 28-34.

B. tyrannus is listed as a food item of the summer flounder.

Pratt, Joseph Hyde.

1917. The fisheries of North Carolina. Journal of the Elisha Mitchell Scientific Society, vol. 32, no. 4, p. 149-175.

B. tyrannus included among the important fisheries of the state.

President's Science Advisory Committee. Panel on Oceanography.

1966. Effective use of the sea. U.S. Government Printing Office, Washington, D. C.

Menhaden fishery is mentioned.

Pristas, Paul J.

1970. BCF scientists tag and recover menhaden. Commercial Fisheries Review, vol. 32, nos. 8-9, p. 47-49.

A brief review of menhaden tagging during 1966-69. Reported that 1,066,357 Atlantic menhaden, B. tyrannus, were tagged, with 203,037 recovered; and 35,198 Gulf menhaden, B. patronus were tagged with 6,860 recovered.

Pristas, Paul J., and Thurman D. Willis.

1973. Menhaden tagging and recovery: Part I. Field methods for tagging menhaden, genus Brevoortia. Marine Fisheries Review, vol. 35, nos. 5-6, p. 31-35.

Methods and equipment used to mark over 1 million B. tyrannus and B. patronus along the Atlantic and Gulf coasts of th U.S. from 1966-1971.

Raney, Edward C.

1952. The life history of the striped bass, Roccus saxatilis (Walbaum). Bulletin of the Bingham Oceanographic Collection, Yale University, vol. 14, art. 1, p. 5-97.

Menhaden is listed as a food item of the striped bass.

Rass, Theodore S.

1936. On types of fish eggs and their bearing on the classification of fishes. Doklady Akademii Nauk S.S.S.R., Seriya Biologiya, vol. 2, no. 7, p. 303-307.

Compared three types of clupeid eggs and allied Brevoortia with Sardina, Sardinella, and Clupeionella rather than with Alosa and Caspialosa.

Rass, Theodore S.

1937. Pigmentation of embryos and larvae in the herring family (Clupeidae) as an adaptation to a pelagic mode of life. Byulleten' Moskovskogo Obshchestva Ispytatelei Prirody, Otdel Biologicheskii, S.S.S.R., vol. 56, p. 155-164.

Groups Brevoortia with other pelagic clupeids that have pigment along dorsal aspect of larvae presumably to protect nervous system from sunlight (In Russian with English summary).

Rass, T. S.

1967. Geographical principles for the development of fisheries in the world's ocean (in Russian). Gidrobiologicheskiy Zhurnal, vol. 3, no. 5, p. 22-31.

Menhaden, Brevoortia sp., occur in Southern Boreal (moderately warm waters).

Rawls, Charles K.

1965. Field tests of herbicide toxicity to certain estuarine animals. Chesapeake Science, vol. 6, no. 3, p. 150-161.

B. tyrannus mentioned.

Ray, Clayton E., Alexander Wetmore, David H. Dunkle, and Paul Drez.

1968. Fossil vertebrates from the marine Pleistocene of Southeastern Virginia. Smithsonian Miscellaneous Collection, vol. 153, no. 3, Publication 4742, 25 p.

Brevoortia sp.: Menhaden. Specimens identified are a preoperculum (USNM 25064) and an operculum (USNM 25065). The genus is known from the Pliocene of North Africa but is previously unrecognized as a fossil in North America. Its recent distribution in the Western Atlantic is from Brazil to Nova Scotia.

Recksiek, Conrad W., and James D. McCleave.

1973. Distribution of pelagic fishes in the Sheepscot River-Back River Estuary, Wiscasset, Maine. Transactions of the American Fishery Society, vol. 102, no. 3, p. 541-551.

Atlantic menhaden among the species reported.

Reintjes, John W.

1963. An initial inquiry into a photoelectric device to detect menhaden marked with fluorescent pigments. International Commission for the Northwest Atlantic Fisheries, North Atlantic Fish Marking Symposium, Special Publication no. 4, p. 362-368.

Unsuccessful preliminary attempts to mark menhaden with fluorescent pigments for electronic detection.

Reintjes, John W.

1964a. Annotated bibliography on biology of menhadens and menhaden-like fishes of the world. U.S. Fish and Wildlife Service, Fishery Bulletin, vol. 63, no. 3, p. 531-549.

Bibliography of Brevoortia, Ethmalosa and Ethmidium with major references to 1957 and all references, 1958-62.

Reintjes, John W.

1964b. The importance of the occurrence of menhaden in the coastal waters and estuaries of peninsular Florida. Proceedings of the Gulf and Caribbean Fisheries Institute, 16th Annual Session, 1963, p. 108-112.

The distribution and potential fishery for three species of Brevoortia in Florida is discussed.

Reintjes, John W.

1969. Synopsis of biological data on the Atlantic menhaden, Brevoortia tyrannus. U.S. Fish and Wildlife Service, Circular 320, 30 p. (FAO Species Synopsis no. 42).

Taxonomy, morphology, distribution, reproduction, life history, growth, behavior and abundance of Atlantic menhaden with data on size, age, and sex composition of the commercial catch. Description of fishing methods and equipment.

Reintjes, John W.

1970. The Gulf menhaden and our changing estuaries. Proceedings of the Gulf and Caribbean Fisheries Institute, 22nd Annual Session, 1969, p. 87-90.

A brief review of the role of estuaries in the life cycle of Gulf menhaden, B. patronus.

Reintjes, John W.

1971. Five-spot herring, Hilsa kelee, a potential marine resource of South India, p. 162-163. (Abstract). In Symposium on Indian Ocean and adjacent seas, their origin, science and resources. Marine Biological Association of India, Cochin.

Relation of American menhaden purse-seine fishery to potential resource of five-spot herring in the Indian Ocean.

Reintjes, John W., and Anthony L. Pacheco.

1966. The relation of menhaden to estuaries, p. 50-58. In A symposium on estuarine fisheries. American Fisheries Society, Special Publication no. 3.

Review of early life history of menhaden including oceanic spawning and the effects of temperature and salinity on the establishment and survival in estuarine nurseries.

Reintjes, John W., James Y. Christmas, Jr., and Richard A. Collins.

1960. Annotated bibliography on biology of American menhaden. U.S. Fish and Wildlife Service, Fishery Bulletin, vol. 60, no. 170, p. 297-322.

A review of the literature on the distribution, occurrence, abundance, life history, morphology, ecology and behavior of menhaden, genus Brevoortia, published prior to and during 1957.

Renfro, William C.

1960. Salinity relations of some fishes in the Aransas River, Texas. Tulane Studies in Zoology, vol. 8, p. 83-91.

Juvenile B. patronus collected in salinities from 0.5 to 54.3 ppt.

Renfro, William C.

1963. Gas-bubble mortality of fishes in Galveston Bay, Texas. Transactions of the American Fisheries Society, vol. 92, no. 3, p. 320-322.

Postlarval B. patronus mentioned.

Richards, C. E., and M. Castagna.

1970. Marine fishes of Virginia's eastern shore (inlet and marsh, seaside waters). Chesapeake Science, vol. 11, no. 4, p. 235-248.

B. tyrannus is included.

Richards, William L.

1968. Ecology and growth of juvenile tarpon, Megalops atlanticus, in a Georgia salt marsh. Bulletin of Marine Science, vol. 18, no. 1, p. 220-239.

Menhaden occurred in seine samples.

Robas, John S.

1961. The multiple-use of shrimp trawlers. Proceedings of the Gulf and Caribbean Fisheries Institute, 13th Annual Session, 1960, p. 59-62.

Menhaden fishery is mentioned.

Roessler, Martin A.

1970. Checklist of fishes in Buttonwood Canal, Everglades National Park, Florida, and observations on the seasonal occurrence and life histories of selected species. Bulletin of Marine Science, vol. 20, no. 4, p. 860-893.

B. smithi and hybrids by season, salinity, temperature, rainfall, and moon phase.

Roithmayr, Charles M.

1963. Distribution of fishing by purse-seine vessels for Atlantic menhaden, 1955-1959. U.S. Fish and Wildlife Service, Special Scientific Report - Fisheries no. 434, 22 p.

Monthly distribution of purse-seine sets along the Atlantic coast of the U.S. for a 5-year period. Information obtained from logbooks kept by vessel personnel.

Roithmayr, Charles M., and Richard A. Waller.

1963. Seasonal occurrence of Brevoortia patronus in the northern Gulf of Mexico. Transactions of the American Fisheries Society, vol. 92, no. 3, p. 301-302.

Monthly offshore distribution.

Romer, Alfred Sherwood.

1966. Vertebrate paleontology. University of Chicago Press, Chicago, 468 p.

Fossil Brevoortia represented from Pliocene of North Africa and questionably reported from recent era.

Rose, Milton M.

1968. Illustrated list of common and scientific names of fishes from the Gulf of Mexico in Latin, Spanish, Russian and English. U.S. Department of Interior, Bureau of Commercial Fisheries, Branch of Foreign Fisheries (Translations), no. A-18, 46 p.

B. patronus included.

Rounsefell, George A.

1963. Realism in the management of estuaries. Alabama Marine Resources Laboratory, Resources Bulletin, no. 1, 13 p.

Estuaries play an important part in maintaining B. patronus and B. gunteri fishery.

Rounsefell, George A.

1964. Preconstruction study of the fisheries of the estuarine areas traversed by the Mississippi River-Gulf outlet project. U.S. Fish and Wildlife Service, Fishery Bulletin, vol. 63, no. 2, p. 373-393.

Occurrence of menhaden (Brevoortia sp.) from otter trawl catches in eight areas. Greatest abundance in salinities from 1.0 - 5.0 ppt.

Rounsefell, George A.

1971. Potential food from the sea. Journal of Marine Science, Marine Science Institute, Bayou La Batre, Ala. vol. 1, no. 3, p. 1-82.

Menhaden mentioned p. 58 and 61.

Royce, William F.

1972. Introduction to the fishery sciences. Academic Press, New York, 351 p.

Brief mention of the menhaden fishery.

Russell-Hunter, W. D.

1970. Aquatic productivity: An introduction to some basic aspects of biological oceanography and limnology. Macmillan, New York, 306 p.

Menhaden trophic relations incorrectly reported as fourth in a food chain: diatoms--copepods--sand lance--menhaden. Also brief mention of fishery and fish meal and oil industry.

Sal'nikov, N. E.

1969. Fishery research in the Gulf of Mexico and the Caribbean Sea, p. 78-171. In A.S. Bogdanov [ed.], Soviet-Cuban fishery research. National Technical Information Service, TT 69-59016.

B. patronus, B. gunteri, and B. smithi considered in the major fishery resources of the Gulf of Mexico.

Sams, Manfredo.

1968. Use of aircraft in fishing detection...capture...research, p. 173-175. In De Witt Gilbert [ed.], The future of the fishing industry of the United States. University of Washington, Publications in Fisheries, New Series, vol. 4.

Menhaden purse-seine fishing mentioned, with three aerial photographs.

Saunders, Dorothy Chapman.

1964. Blood parasites of marine fish of southwest Florida including a new haemogregarine from the menhaden, Brevoortia tyrannus (Latrobe). Transactions of the American Microscopical Society, vol. 83, no. 2, p. 218-225.

Haemogregarina brevoortiae discovered in three of 46 specimens of B. tyrannus.

Sawyer, Roy T., and Norman A. Chamberlain.

1972. A new species of marine leech (Annelida:Hirudinea) from South Carolina, parasitic on the Atlantic menhaden, Brevoortia tyrannus. Biological Bulletin (Woods Hole), vol. 142, no. 3, p. 470-479.

A new species of marine leech, Calliobdella carolinensis, is reported from the estuaries of South Carolina on the clupeid fishes, the Atlantic menhaden and the blueback herring, Alosa aestivalis. The leech, which is provisionally assigned to the genus, Calliobdella, has the following characteristics: 14-midbody segments, 2 pairs of cephalic ocelli, no ocelli on caudal sucker, 11 pairs of pulsatile vesicles and a well-developed medial, muscular organ which functions as a seminal receptacle.

Sawyer, Roy T., and Donald L. Hammond.

1973. Observations on the marine leech Calliobdella carolinensis (Hirudinea: Pisciolidae), epizootic on the Atlantic menhaden. Biological Bulletin, vol. 145, no. 2, p. 373-388.

Epizootic outbreak of marine leech on Brevoortia tyrannus in South Carolina.

Schaaf, William Edward.

1972. Dynamics of the Atlantic menhaden, Brevoortia tyrannus, population from statistics of the purse-seine fishery: 1955-1969. Ph.D. thesis, University of Michigan, Ann Arbor, 42 p. (Dissertation Abstracts International, vol. 33, p. 5153-B).

Analysis of catch and effort data from Atlantic menhaden purse-seine fishery to determine the catch-per-unit-effort, natural and fishing mortality rates and maximum sustainable yield.

Schaaf, William E., and Gene R. Huntsman.

1972a. An analysis of the Atlantic menhaden, Brevoortia tyrannus, (Pisces:Clupeidae) purse-seine fishery, 1955-69. (Abstract). ASB (Association of Southeastern Biologists) Bulletin, vol. 19, no. 2, p. 97.

Analysis of catch and effort data to determine the catch-per-unit-of-effort, natural and fishing mortality rates and maximum sustainable yield.

Schaaf, William E., and Gene R. Huntsman.

1972b. Effects of fishing on the Atlantic menhaden stock: 1955-1969. Transactions of the American Fisheries Society, vol. 101, no. 2, p. 290-297.

Analysis of catch and effort data to determine the catch-per-unit-of-effort, natural and fishing mortality rates and maximum sustainable yield.

Schaefer, Richard H.

1967. Species composition, size and seasonal abundance of fish in the surf waters of Long Island. New York Fish and Game Journal, vol. 14, no. 1, p. 1-46.

B. tyrannus ranked 5th (1961), 14th (1962), and 10th (1963) in abundance and ranged from 70-440 mm in length.

Schaefer, Richard H.

1970. Feeding habits of striped bass from the surf waters of Long Island. New York Fish and Game Journal, vol. 17, no. 1, p. 1-17.

B. tyrannus in stomach contents of striped bass in fall.

Schaefers, Edward A.

1964. Highlights of the Second World Fishing Gear Congress. Proceedings of the Gulf and Caribbean Fisheries Institute, 16th Annual Session, 1963, p. 25-30.

Menhaden purse-seining mentioned.

Schmitt, Michael D.

1972. The abundance and size of Gulf menhaden, Brevoortia patronus, caught by seine haul in Mulatto Bayou, near Pensacola, Florida, from June, 1969 to June, 1971. (Abstract). Quarterly Journal of the Florida Academy of Sciences, vol. 35, suppl. to no. 1, p. 15.

B. patronus present during all months except December 1969 and January 1970, and ranged in size from 20-30 mm to 60-100 mm.

Schwartz, Frank J.

1960. Additional comments on adult bull sharks Carcharhinus leucas (Mueller and Henle), from Chesapeake Bay, Maryland. Chesapeake Science, vol. 1, no. 1, p. 68-71.

Cites B. patronus as food item.

Schwartz, Frank J.

1964. Fishes of Isle of Wight and Assawoman Bays near Ocean City, Maryland. Chesapeake Science, vol. 5, no. 4, p. 172-193.

A brief mention of seasonal distribution of B. tyrannus schools in this area.

Schwartz, Frank J.

1964-65. A pugheaded menhaden from Chesapeake Bay. Underwater Naturalist, vol. 3, no. 1, p. 22-24.

First report of pugheadedness in B. tyrannus.

Schwartz, Frank J.

1972. World literature to fish hybrids, with an analysis by family, species and hybrid. Publications of the Gulf Coast Research Laboratory Museum, no. 3, 328 p.

Cites Dahlberg (1966, 1969a, 1969b and 1970a), Hettler (1968 and 1971), Reintjes (1969) and Turner (1969).

Schwartz, Frank J., and Jim Tyler.

1970. Marine fishes common to North Carolina. North Carolina Department of Conservation and Development, Division of Commercial and Sports Fisheries, 32 p.

Menhaden, B. tyrannus, pictured but not discussed.

Shaklee, James B.

1972. A genetic, biochemical, and evolutionary characterization of LDH isozyme structure in fishes. Ph.D. thesis, Yale University, 244 p. (Dissertation Abstracts, vol. 34, no. 1, p. 88-B.)

Comparison of B. tyrannus to other clupeids and marine fishes.

Sherk, J. Albert, Jr.

1971. The effects of suspended and deposited sediments on estuarine organisms. Chesapeake Biological Laboratory, Solomons, Md., Contribution no. 443, 73 p.

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Sindermann, Carl J.

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