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Russell E. Train, *Under Secretary*
Leslie L. Glasgow, *Assistant Secretary*
for Fish and Wildlife, Parks, and Marine Resources
Charles H. Meacham, *Commissioner, U.S. FISH AND WILDLIFE SERVICE*
Philip M. Roedel, *Director, BUREAU OF COMMERCIAL FISHERIES*

Fishery Leaflet 628

Washington, D. C. 20240

in m. ch. 79-46 no 3
it says date 99 - v. 60 no 3
February 1970

AVAILABLE FISHERY BULLETINS OF THE U.S. FISH AND WILDLIFE SERVICE

Fishery Bulletins are technical reports on scientific investigations of fishery biology. The Bulletin of the United States Fish Commission was begun in 1881; it became the Bulletin of the Bureau of Fisheries in 1904 and the Fishery Bulletin of the Fish and Wildlife Service in 1941. Separates were issued as documents through volume 46; the last document was No. 1103. Beginning with volume 47 in 1931 and continuing through volume 62 in 1963, each separate appeared as a numbered Bulletin. A new system began in 1963 with volume 63, in which papers are bound together in a single number of the Bulletin. Available Bulletins are distributed free to libraries and to a limited number of universities and other scientific cooperators. A listing of all Bulletins in volumes 47 through 65 is distributed free by the Division of Publications, Bureau of Commercial Fisheries, 1801 N. Moore St., Arlington, Va. 22209, if you need this complete listing, please ask for Fishery Leaflet 597.

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| 44. | Contributions to the biology of the Pacific tunas. By Milner B. Schaefer and John C. Marr. 1948, vol. 51, ii + pp. 187-206, 10 figs., 2 tables. |
| 45. | Age and growth of immature rosefish (<u>Sebastes marinus</u>) in the Gulf of Maine and off western Nova Scotia. By Alfred Perlmutter and George M. Clarke. 1949, vol. 51, ii + pp. 207-228, 21 figs., 14 tables. |
| 46. | Notes on the Philippine frigate mackerels, family Thunnidae, genus <u>Auxis</u> . By Charles B. Wade. 1949, vol. 51, ii + pp. 229-240, 10 figs., 7 tables. |
| 47. | Definitions of body dimensions used in describing tunas. By John C. Marr and Milner B. Schaefer. 1949, vol. 51, ii + pp. 241-244, 1 fig. |
| 48. | Observations on juvenile oceanic skipjack (<u>Katsuwonus pelamis</u>) from Hawaiian waters and sierra mackerel (<u>Scomberomorus sierra</u>) from the eastern Pacific. By Howard H. Eckles. 1949, vol. 51, ii + pp. 245-250, 3 figs. |
| 50. | On the effectiveness of spermatozoa of the pink salmon (<u>Oncorhynchus gorbuscha</u>) at varying distances from point of dispersal. By Richard F. Shuman, 1950, vol. 51, i + pp. 359-363, 1 fig., 1 table. |
| 52. | Apparent abundance of the pilchard (<u>Sardinops caerulea</u>) off Oregon and Washington, 1935-43, as measured by the catch per boat. By John C. Marr. 1950, vol. 51, i + pp. 385-394, 7 figs., 2 tables. |

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| 53. | Juvenile forms of <u>Neothunnus macropterus</u> , <u>Katsuwonus pelamis</u> , and <u>Euthynnus yaito</u> from Philippine seas. By Charles B. Wade. 1950, vol. 51, ii + pp. 395-404, 13 figs. |
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| 61. | Characteristics of spawning nests of Columbia River salmon. By Clifford J. Burner. 1951, vol. 52, ii + pp. 97-110, 7 figs., 1 table. |
| 62. | Contributions to the biology of tunas from the western equatorial Pacific. By Bell M. Shimada. 1951, vol. 52, ii + pp. 111-119, 2 figs., 4 tables. |
| 64. | Juvenile oceanic skipjack from the Phoenix Islands. By Bell M. Shimada. 1951, vol. 52, i + pp. 129-131, 1 table. |
| 65. | Estimation of age and growth of yellowfish tuna (<u>Neothunnus macropterus</u>) in Hawaiian waters by size frequencies. By Harvey L. Moore. 1951, vol. 52, ii + pp. 133-149, 14 figs., 11 tables. |
| 66. | Studies of George Bank haddock. Part I: Landings by pounds, numbers, and sizes of fish. By Howard A. Schuck. 1951, vol. 52, ii + pp. 151-176, 16 figs., 37 tables. |
| 67. | Comparison of haddock from Georges and Browns Banks. By Howard A. Schuck and Edgar L. Arnold, Jr. 1951, vol. 52, ii + pp. 177-185, 4 figs., 6 tables. |
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| 72. | Comparison of yellowfin tuna of Hawaiian waters and of the American West Coast. By Milner B. Schaefer. 1952, vol. 52, ii + pp. 353-373, 11 figs., 7 tables. |
| 76. | A contagious disease of salmon possibly of virus origin. By R. R. Rucker, W. J. Whipple, J. R. Parvin, and C. A. Evans. 1953, vol. 54, ii + pp. 35-46, 5 figs., 4 tables. |
| 77. | Spawning of yellowfin tuna in Hawaiian waters. By Fred C. June. 1953, vol. 54, ii + pp. 47-64, 11 figs., 6 tables. |
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| 80. | Phosphorus exchange in marine phytoplankton. By Theodore R. Rice. 1953, vol. 54, ii + pp. 77-89, 3 figs., 7 tables. |
| 81. | Food of yellowfin tuna in the central Pacific. By John W. Reintjes and Joseph E. King. 1953, vol. 54, iii + pp. 91-110, 10 figs., 7 tables. |
| 85. | Determining age of Atlantic shad from their scales. By James P. Cating. 1953, vol. 54, ii + pp. 187-199, 12 figs., 1 table. |
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| 88. | Causes of fluctuations in abundance of Connecticut River shad. By Reynold A. Fredin. 1954, vol. 54, ii + pp. 247-259, 1 fig., 7 tables. |

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| 90. | Studies of Georges Bank haddock. Part II: Prediction of the catch. By William F. Royce and Howard A. Schuck. 1954, vol. 56, ii + pp. 1-6, 1 fig., 4 tables. |
| 96. | Whittings on the coasts of the American continents. By Isaac Ginsburg. 1954, vol. 56, ii + pp. 187-208, 2 figs., 15 tables. |
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| 119. | Early development, spawning, growth, and occurrence of the silver mullet (<u>Mugil curema</u>) along the South Atlantic Coast of the United States. By William W. Anderson. 1957, vol. 57, iii + pp. 397-414, 22 figs., 5 tables. |
| 126. | Natural mortality rate of Georges Bank haddock. By Clyde C. Taylor. 1958, vol. 58, ii + pp. 1-7, 1 fig., 2 tables. |
| 129. | Filtering rates of the hard clam (<u>Venus mercenaria</u>) determined with radioactive phytoplankton. By Theodore R. Rice and Rebecca J. Smith. 1958, vol. 58, ii + pp. 73-82, 6 figs., 3 tables. |
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| 148. | Sexual maturity and spawning of albacore in the Pacific Ocean. By Tamio Otsu and Richard N. Uchida. 1959, vol. 59, iv + pp. 287-305, 13 figs., 9 tables. |
| 150. | Study of age determination by hard parts of albacore from central North Pacific and Hawaiian waters. By Tamio Otsu and Richard N. Uchida. 1959, vol. 59, iv + pp. 353-363, 10 figs., 2 tables. |
| 155. | Early development and metamorphosis of the ten-pounder, <u>Elops saurus</u> Linnaeus. By Jack W. Gehringer. 1959, vol. 59, iv + pp. 619-647, 32 figs., 14 tables. |
| 156. | Age and growth of the redfish (<u>Sebastes marinus</u>) in the Gulf of Maine. By George F. Kelly and Robert S. Wolf. 1959, vol. 60, iv + pp. 1-31, 14 figs., 16 tables. |
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| 158. | Food of the squawfish, <u>Ptychocheilus oregonensis</u> (Richardson) of the Lower Columbia River. By Richard B. Thompson. 1959, vol. 60, iv + pp. 43-58, 14 figs., 3 tables. |
| 161. | Vertical distribution of pelagic fish eggs and larvae off California and Baja California. By Elbert H. Ahlstrom. 1959, vol. 60, iv + pp. 107-146, 13 figs., 32 tables. |
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| 164. | Food of the Pacific sardine (<u>Sardinops caerulea</u>). By Cadet H. Hand and Leo Berner, Jr. 1959, vol. 60, iv + pp. 175-184, 3 figs., 7 tables. |

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| 170. | Annotated bibliography on biology of American menhaden. By John W. Reintjes, James Y. Christmas, Jr., and Richard A. Collins. 1960, vol. 60, iv + pp. 297-322. |
| 171. | Determining age of Atlantic menhaden from their scales. By Fred C. June and Charles M. Roithmayr. 1960, vol. 60, iv + pp. 323-342, 23 figs., 3 tables. |
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| 176. | Sonic tracking of adult salmon at Bonneville Dam, 1957. By James H. Johnson. 1960, vol. 60, iv + pp. 471-485, 14 figs., 2 tables. |
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| 178. | Natural history of the sandbar shark, <u>Eulamia milberti</u> . By Stewart Springer. 1960, vol. 61, iv + pp. 1-38, 5 figs., 6 tables. |
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| 185. | Validity of age determination from scales of marked American shad. By Mayo J. Judy. 1961, vol. 61, iv + pp. 161-170, 8 figs. |
| 187. | Abundance and distribution of eggs and larvae and survival of larvae of jack mackerel (<u>Trachurus symmetricus</u>). By David A. Farris. 1961, vol. 61, iv + pp. 247-279, 15 figs., 33 tables. |
| 189. | Abundance and age of Kvichak River red salmon smolts. By Orra E. Kerns, Jr. 1961, vol. 61, iv + pp. 301-320, 15 figs., 28 tables. |
| 190. | Early development stages of pink shrimp, <u>Penaeus duorarum</u> , from Florida waters. By Sheldon Dobkin. 1961, vol. iv + pp. 321-349, 20 figs., 3 tables. |
| 191. | Serological studies of Atlantic redfish. By Carl J. Sindermann. 1961, vol. 61, iv + pp. 351-354, 4 tables. |
| 193. | Atlas of the oceanographic climate of the Hawaiian Islands region. By Gunter R. Seckel. 1962, vol. 61, iv + pp. 371-427, 28 figs., 6 charts. |
| 194. | Influence of early maturing females on reproductive potential of Columbia River blueback salmon (<u>Oncorhynchus nerka</u>). By Richard L. Major and Donovan R. Craddock. 1962, vol. 61, iv + pp. 429-437, 2 figs., 6 tables. |

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| 195. | Determining age of young haddock from their scales. By Albert C. Jensen and John P. Wise. 1962, vol. 61, iv + pp. 439-450, 5 figs., 5 tables. |
| 196. | Development, distribution, and comparison of rudder fishes <u>Kyphosus sectatrix</u> (Linnaeus) and <u>K. incisor</u> (Cuvier) in the western North Atlantic. By Donald Moore. 1962, vol. 61, iv + pp. 451-480, 22 figs., 13 tables. |
| 197. | Raft culture of oysters in Massachusetts. By William N. Shaw. 1962, vol. 61, iv + pp. 481-495, 12 figs., 6 tables. |
| 201. | Studies on <u>Parorchis acanthus</u> (Trematoda: Digenea) as a biological control for the southern oyster drill, <u>Thais haemastoma</u> . By Nelson R. Cooley. 1962, vol. 62, iv + pp. 77-91, 10 figs., 9 tables. |
| 202. | Development of eggs and yolk-sac larvae of yellowfin menhaden. By John W. Reintjes. 1962, vol. 62, iv + pp. 93-102, 20 figs., 2 tables. |
| 203. | Development and distribution of the short bigeye <u>Pseudopriacanthus altus</u> (Gill) in the western North Atlantic. By David K. Caldwell. 1962, vol. 62, iv + pp. 103-150, 32 figs., 7 tables. |
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Effect of the spawning bed environment on reproduction of pink and chum salmon. By William J. McNeil. Pp. 495-523, 9 figs., 14 tables.

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