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Preliminary List of Studies Related to Environmentally-induced Variation  
in Availability of Marine Species

by

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Introduction

At its meeting in September 1984, the Standing Committee on Fishery Science (STACFIS) agreed that the Scientific Council should encourage contributions which evaluate the nature and importance of environmentally-induced variation in availability relevant to stock assessment and fishery management matters. It was suggested that the production of a bibliography of historical studies would be one useful way of determining what information is currently available, and the Assistant Executive Secretary of NAFO was requested to do this for the June 1985 Meeting of the Scientific Council.

Materials and Methods

The compilation of this bibliography resulted from two approaches to the problem of determining the relevance of published information: (a) selections were made from the lists of titles of various ICNAF and NAFO publications during the 1951-84 period, and (b) a computer search was conducted through the facilities of the library of the Northwest Atlantic Fisheries Centre, St. John's, Newfoundland, for appropriate selections from other publications.

The ICNAF and NAFO list of references were selected from scanning the titles of papers in the ICNAF Annual Proceedings (Vol. 1-29), ICNAF Redbook (1958-79), ICNAF Research Bulletin (Vol. 1-14), ICNAF Special Publication (Vol. 1-10), ICNAF Selected Papers (No. 1-6), NAFO Scientific Council Studies (No. 1-8), and Journal of Northwest Atlantic Fishery Science (Vol. 1-5). ICNAF and NAFO lists of meeting documents were not examined because of the large volume of papers involved and because it was considered that any significant information likely would have been published in one of the above-mentioned series. Few of the papers were actually read to establish their relevance to the objectives of this study.

For the list of references from the computer research, key words included the following: availability, diurnal, light-intensity, seasonal, climatological, oceanographic, gear, trawl, longline, seine, catchability, behavior, temperature, environment, current, wind, fishing, stock assessment, fish distribution and fish survey. When it became apparent that relatively few studies had been reported for the Northwest Atlantic, the final search was not limited geographically. The computer search was possible only for publications back to 1977, but a few from the ICES Journal du Conseil back to 1962 have been included. Some editing was done to eliminate titles that were obviously not relevant (e.g. reactions of fish to trawl gear). ICES documents were not included in the computer file, but titles and abstracts of ICES papers available at the Northwest Atlantic Fisheries Centre library (1980-84) were scanned for relevant titles. None of the papers listed in the second section of this bibliography were read to establish their relevance to the objectives of the study.

Bibliography

A. ICNAF and NAFO Publications

- AHLSTROM, E. H. 1965. A review of the effects of the environment on the Pacific sardine. ICNAF Spec. Publ., 6: 53-74.
- ALBIKOVSKAYA, L. K. 1982. Distribution and abundance of Atlantic wolffish, spotted wolffish and northern wolffish in the Newfoundland area. NAFO Sci. Coun. Studies, 3: 29-32.
- ANDERSON, E. D., and B. B. ACKERMAN. 1978. Comparison of USA spring bottom trawl survey abundance indices for Atlantic mackerel, based on day, night and total catches. ICNAF Sel. Papers, 3: 45-48.
- ATKINSON, D. B. 1984. Distribution and abundance of beaked redfish in the Gulf of St. Lawrence, 1976-81. J. Northw. Atl. Fish. Sci., 5: 189-197.
- BEREBEIM, D. Y., and I. K. SIGAEV. 1978. On the correlation between water temperature and spawning times for Georges Bank herring. ICNAF Sel. Papers, 3: 57-60.
- BEVERTON, R. J. H., and A. J. LEE. 1965. The influence of hydrographic and other factors on the distribution of cod on the Spitsbergen Shelf. ICNAF Spec. Publ., 6: 225-246.
- BLAXTER, J. H. S. 1965. Effect of changes in light intensity on fish. ICNAF Spec. Publ., 6: 647-662.
- BOWERING, W. R. 1979. Diurnal variation in availability of witch flounder, Glyptocephalus cynoglossus, and its effect upon estimates of biomass. ICNAF Res. Bull., 14: 73-76.
- BROOK, V. E. 1965. A review of the effects of the environment on tuna. ICNAF Spec. Publ., 6: 75-92.
- BRYANTSEV, V. A. 1965. The influence of water masses of the New England and Nova Scotia shelves on the formation of commercial concentrations of herring. ICNAF Spec. Publ., 6: 597-602.
- CENDRERO, O. 1965. About possible fishing temperature of water relationship. ICNAF Spec. Publ., 6: 167-170.
- COLEBROOK, J. M. 1965. On the analysis of variation in plankton, the environment and the fisheries. ICNAF Spec. Publ., 6: 291-302.
- CORLETT, J. 1965. Winds, currents, plankton and year-class strength of cod in the western Barents Sea. ICNAF Spec. Publ., 6: 373-380.
- DIETRICH, G., H. AURICH, and A. KOTTHAUS. 1962. On the relationship between distribution of redfish and redfish larvae and hydrographical conditions in the Irminger Sea. ICNAF Spec. Publ., 3: 124-139.
- DOUBLEDAY, W. G. 1976. Environmental fluctuations and fisheries management. ICNAF Sel. Papers, 1: 141-150.
- DUDNIK, Yu. I., V. K. ZILANOV, V. D. KUDRIN, V. A. NESVETOV, and A. S. NESTEROV. 1981. Distribution and biology of Atlantic saury, Scomberesox saurus (Walbaum), in the Northwest Atlantic. NAFO Sci. Coun. Studies, 1: 23-29.
- EDWARDS, R. L. 1965. Relation of temperatures to fish abundance and distribution in the southern New England area. ICNAF Spec. Publ., 6: 95-110.
- EGGVIN, J. 1965. The possibility of forecasting oceanographic conditions in North-east European waters and their significance for fisheries. ICNAF Spec. Publ., 6: 903-908.
- ELIZAROV, A. A. 1965. Long-term variations of oceanographic conditions and stocks of cod observed in the areas of West Greenland, Labrador and Newfoundland. ICNAF Spec. Publ., 6: 827-832.

- HARDEN-JONES, F. R. 1965. Fish migrations and water currents. ICNAF Spec. Publ., 6: 257-266.
- HANSEN, P. M., and F. HERMANN. 1965. Effect of long-term temperature trends on occurrence of cod at West Greenland. ICNAF Spec. Publ., 6: 817-820.
- HOLLIDAY, F. G. T. 1965. The significance of environment-endocrine studies to investigation and exploitation of fish stocks. ICNAF Spec. Publ., 6: 663-672.
- HORSTED, Sv. Aa. 1967. Some observations on year-class fluctuations in the West Greenland cod stocks. ICNAF Redbook, 1967(III): 26-34.
- HORSTED, Sv. Aa., and E. SMIDT. 1965. Influence of cold water on fish and prawn stocks in West Greenland. ICNAF Spec. Publ., 6: 199-208.
- JEAN, Y. 1965. Seasonal distribution of cod (*Gadus morhua* L.) along the Canadian Atlantic coast in relation to water temperature. ICNAF Spec. Publ., 6: 111(abstract). [See J. Fish. Res. Board Can., 21: 429-460.]
- KONSTANTINOV, K. G. 1965. Water temperature as a factor guiding fishes during their migrations. ICNAF Spec. Publ., 6: 221-224.
- KUDLO, B. P., and V. D. BOYTSOV. 1979. The effect of water dynamics on year-class strength of cod on Flemish Cap. ICNAF Sel. Papers, 5: 7-10.
- LAEVASTU, T. 1965. Interpretation of fish distributions in respect to currents in the light of available laboratory and field observations. ICNAF Spec. Publ., 6: 249-256.
- LAEVASTU, T. 1965. Is oceanographic forecasting feasible for fisheries? ICNAF Spec. Publ., 6: 881-884.
- LAUZIER, L. M., and S. N. TIBBO. 1965. Water temperature and the herring fishery of Magdalen Islands, Quebec. ICNAF Spec. Publ., 6: 591-596.
- MARTIN, W. R., and A. C. KOHLER 1965. Variation in recruitment of cod (*Gadus morhua* L.) in southern ICNAF waters, as related to environmental changes. ICNAF Spec. Publ., 6: 833-846.
- MAY, A. W. 1967. Effect of offshore fishing on the inshore Labrador cod fishery. ICNAF Res. Bull., 4: 67-75.
- McCRACKEN, F. D. 1965. Distribution of haddock off the eastern Canadian Mainland in relation to season, depth and bottom temperature. ICNAF Spec. Publ., 6: 113-130.
- MIDTTUN, L. S. 1965. The relationship between temperature conditions and fish distribution in the southeastern Barents Sea. ICNAF Spec. Publ., 6: 213-220.
- MOHR, H. 1965. Changes in the behavior of fish due to environment and motivation and their influence on fishing. ICNAF Spec. Publ., 6: 775-780.
- MOROSOVA, G. N. 1982. Distribution, relative abundance and size composition of three species of eelpouts in the Labrador and Newfoundland Areas. J. Northw. Atl. Fish. Sci., 3: 159-164.
- PARRISH, B. B. 1965. A review of the effects of the environment on herring. ICNAF Spec. Publ., 6: 93(abstract). [See Oceanogr. Mar. Biol., 3: 323-373.]
- PARSONS, L. S., and D. G. PARSONS. 1976. Effects of diurnal variation in availability upon estimation of redfish numbers and biomass from stratified-random bottom trawl surveys. ICNAF Sel. Papers, 1: 19-30.
- PECHNIK, L. N., and I. I. SVETLOV. 1965. Influence of the temperature regime on the behaviour of redfish off West Greenland in the spring, 1959-1961. ICNAF Spec. Publ., 6: 209-212.
- PINHORN, A. T., and R. G. HALLIDAY. 1985. A framework for identifying fisheries management problems associated with the influence of environmental factors on distribution and migration of marine species. NAFO Sci. Coun. Studies, 8: 83-92.

- PITT, T. K. 1967. Diurnal variation in the catches of American plaice, Hippoglossoides platessoides Fabr., from the Grand Bank. ICNAF Res. Bull., 4: 53-58.
- SANDEMAN, E. J. 1969. Diurnal variation in availability of different sizes of redfish, Sebastes mentella. ICNAF Res. Bull., 6: 35-46.
- SARNITS, A. A., and V. I. SAUSKAN. 1967. Hydrological conditions and distribution of silver hake, Merluccius bilinearis Mitchell, on Georges Bank and off Nova Scotia. ICNAF Res. Bull., 4: 76-86.
- SCOTT, J. S. 1982. Depth, temperature and salinity preferences of common fishes of the Scotian Shelf. J. Northw. Atl. Fish. Sci., 3: 29-39.
- SHMARINA, L. R. 1965. Distribution of wintering herring in the southern part of the Norwegian Sea according to temperature conditions. ICNAF Spec. Publ., 6: 635-643.
- SISSSENWINE, M. P., and E. W. BOWMAN. 1978. An analysis of some factors affecting the catchability of fish by bottom trawls. ICNAF Res. Bull., 13: 81-87.
- SMIDT, E. 1978. Diurnal variation in shrimp catches on the offshore grounds in ICNAF Divisions 1B and 1C. ICNAF Sel. Papers, 4: 45-46.
- STEELE, J. H. 1965. Some problems in the study of marine resources. ICNAF Spec. Publ., 6: 463-476.
- SVETLOV, I. I. 1970. Forecasting cod distribution at West Greenland by means of water temperature. ICNAF Res. Bull., 7: 15-18.
- SVETLOV, I. I. 1971. Water temperature as an index of cod distribution in Subarea 1 (West Greenland). ICNAF Redbook, 1971(III): 73-82.
- TÄNING, Å. V. 1953. Long-term changes in hydrography and fluctuations in the fish stocks. ICNAF Ann. Proc., 3: 68-78.
- TAYLOR, C. C., and H. W. GRAHAM. 1953. Changes in the distribution of marine animals in New England and Middle Atlantic waters in relation to changes in the temperature. ICNAF Ann. Proc., 3: 68(abstract).
- TEMPLEMAN, W. 1965. Some instances of cod and haddock behaviour and concentration in the Newfoundland and Labrador areas in relation to food. ICNAF Spec. Publ., 6: 449-462.
- TEMPLEMAN, W. 1965. Some of the unknowns in research information necessary for calculation of maximum sustained yields of commercial fishes in the ICNAF Area. ICNAF Redbook, 1965(III): 153-163.
- TEMPLEMAN, W. 1972. Year-class success in some North Atlantic stocks of cod and haddock. ICNAF Spec. Publ., 8: 223-238.
- TEMPLEMAN, W. 1973. Distribution and abundance of the Greenland halibut, Reinhardtius hippoglossoides (Walbaum), in the Northwest Atlantic. ICNAF Res. Bull., 10: 83-98.
- TEMPLEMAN, W. 1976. Biological and oceanographic background of Flemish Cap as an area for research on the reasons for year-class success and failure in cod and haddock. ICNAF Res. Bull., 12: 91-118.
- TEMPLEMAN, W., and A. M. FLEMMING. 1953. Changes in hydrographic conditions and corresponding changes in the abundance of marine animals. ICNAF Ann. Proc., 3: 78-86.
- TEMPLEMAN, W., and V. M. HODDER. 1965. Distribution of haddock on the Grand Bank in relation to season, depth and temperature. ICNAF Spec. Publ., 6: 171-188.
- TEMPLEMAN, W., and V. M. HODDER. 1965. Distribution of haddock on St. Pierre Bank by season, depth and temperature. ICNAF Spec. Publ., 6: 189-198.
- TEMPLEMAN, W., and A. W. MAY. 1965. Research vessel catches of cod in the Hamilton Inlet Bank area in relation to depth and temperature. ICNAF Spec. Publ., 6: 149-166.

- TIBBO, S. N. 1965. Effect of light on movements of herring in the Bay of Fundy. ICNAF Spec. Publ., 6: 579-582.
- WALSH, S. J. 1982. Distribution and abundance of pre-recruit and commercial-sized American plaice on the Grand Bank. J. Northw. Atl. Fish. Sci., No. 3: 149-157.
- WINTERS, G. H., and V. M. HODDER. 1975. Analysis of the southern Gulf of St. Lawrence herring stock and implications concerning its future managements. ICANF Res. Bull., 11: 43-60.
- WOODHEAD, P. M. J. 1965. Effects of light upon behaviour and distribution of demersal fishes of the North Atlantic. ICNAF Spec. Publ., 6: 267-287.

## B. Other Publications

- Adeniji, H. A. 1977. Circadian migration of zooplankton during homothermy and its significance to fish distribution and abundance in Kainji Lake, Nigeria p. 203-207. In Proc. of the International Conference on Kainji Lake and River Basins Development in Africa, Ibadan, 11-17 Dec. 1979. Publ. by KLRI, New Bussa (Nigeria) V. 1
- Alegria-Hernandez, V., S. Jukic. 1981. Seasonal changes in the abundance index of the sardine (*Sardinea pilchardus* Walb.) population in the eastern Adriatic. Acta Biol. Jugosl. (E. Ichthyol.) 13: 1-9.
- Bagge, O., S. Munch-Petersen. 1979. Some possible factors governing the catchability of Norway lobster in the Kattegat. p. 143-146 In H. J. Thomas (ed.) Population assessments of shellfish stocks. Rapp. P-V. Reun. Ciem. V. 175
- Bardach, J. E., J. J. Magnuson, R. C. May, J. M. Reinhart (ed.) 1980. Fish behaviour and its use in the capture and culture of fishes. Proceedings of the Conference on the physiological and behavioural manipulation of food fish as production and management tools. ICLARM Conf. Proc. No. 5, 512 pp.
- Blaxter, J. H. S., and B. B. Parrish. 1965. The importance of light in shoaling, avoidance of nets and vertical migration by herring. ICES J. de Conseil, 30: 40-57.
- Borodin, R. G. 1977. Estimation of initial stock and catchability coefficient of male sperm whales in the southern hemisphere. Rep. Int. Whaling Comm. No. 27, p. 368.
- Bowman, R. E., E. W. Bowman. 1980. Diurnal variation in the feeding intensity and catchability of silver hake (*Merluccius bilinearis*). Can. J. Fish. Aquat. Sci. 37: 1565-1572.
- Caddy, J. F. 1979. Some considerations underlying definitions of catchability and fishing effort in shellfish fisheries and their relevance for stock assessment purposes. Fish. Mar. Serv. Man. Rept. No. 1489: 24 p.
- Chestnoj, V. N. 1977. Bottom trawl catchability dynamics. Pishchevaya promyshlennost., Moskva, 97 p.
- Cooke, J. G. 1983. Estimating catchability coefficients from catch and effort data. Rept. Int. Whaling Comm. 33: 449-451.
- Dalen, J., A. Hylen, T. Jakobsen, O. Nakken, K. Randa. 1984. Preliminary report of the Norwegian investigations on young cod and haddock in the Barents Sea during the winter 1984. ICES C.M.1984/G:44, 26 p.
- Dalen, J., A. Hylen, O. Nakken, K. Randa, O. Smedstad. 1983. Preliminary report of the Norwegian investigations on young cod and haddock in the Barents Sea during the winter 1983. ICES C.M.1983/G:15, 23 p.

- Dow, R. L. 1964. A comparison among selected marine species of an association between sea water temperature and relative abundance. ICES J. du Conseil, 28: 425-431.
- Dow, R. L. 1976. Relationships of sea surface temperature to American and European lobster landings. ICES J. du Conseil, 37: 186-191.
- Dow, R. L. 1976. Effects of climatic cycles on the relative abundance and availability of commercial marine and estuarine species. ICES J. du Conseil, 37: 274-280.
- Dow, R. L. 1981. Influence of sea temperature cycles on the abundance and availability of marine and estuarine species of commerce. p. 775-779. In The Ocean - an International Workplace, Oceans 81 Conference Record. Boston, Mass. Sept. 16-18, 1981, Vol. 2
- Edwards, J. I., F. Armstrong, A. E. Magurran, T. J. Pitcher. 1984. Herring, mackerel, and sprat target strength experiments with behavioural observations. ICES C.M.1984/B:34, 9 p.
- Eliassen, J-E. 1983. Depth distribution of roughhead grenadier (Macrourus berglax Lacepede) in relation to hydrographical conditions along the Continental Slope of northern Norway. ICES C.M.1983/G:42, 17 p.
- Fedoseev, Yu P., V. N. Chur. 1980. Relationship between feeding intensity of Bigeye Tuna (Thunnus obesus) of the Gulf of Guinea and their catches in the day time. Coll. Vol. Sci. Pap. ICCAT 9(2): 287-290.
- Frechette, J., S. Pilote, B. Portelance. 1984. Data on the vertical distribution of the shrimp, Pandalus borealis, and its importance for stock assessment. Cah. Int. Dir. Rech. Sci. Tech. Dir. Gen. Peches Marit. (Que. Prov.) No. 107.
- Garcia, S. 1977. Evaluation of mortalities in the pink shrimp Penaeus duorarum notialis of the Ivory Coast. Cah. Orstom (Oceanogr.) 15(3): 251-260.
- Godø, O. R. 1984. Immigration and emigration of cod in the spawning areas of Lofoten and Mo/re. ICES C.M.1984/G:48, 15 p.
- Grainger, R. J. R. 1981. Herring abundance off the west of Ireland in relation to oceanographic variation. ICES J. du Conseil, 40: 180-188.
- Harden-Jones, F. R., and P. Scholes. 1980. Wind and the catch of a Lowestoft trawler. ICES J. du Conseil, 39: 53-69.
- Hewitt, R. P., P. Smith. 1979. Seasonal distributions of epipelagic fish schools and fish biomass over portions of the California Current region. Cal COFFI Rept. 20: 102-110.
- Hoag, S. H., R. B. Deriso, G. St-Pierre. 1984. Recent changes in halibut CPUE: studies on area differences in setline catchability. International Pac. Hal. Comm. 71: 44 p.
- Houghton, R. G., S. Flatman. 1981. The exploitation pattern, density-dependent catchability, and growth of cod (Gadus morhua) in the west-central North Sea. J. Cons. Ciem. 39(3): 271-287.
- Inman, C. R., R. C. Dewey, P. P. Durocher. 1976. Growth comparisons and catchability of three largemouth bass strains. Proc. Ann. Conf. Southeast Assoc. Game Fish Comm. (1976) 30: 40-47.
- Jones, R., J.H.A. Martin. 1981. The relationship between demersal fish landings and bottom temperature. ICES C.M.1981/G:44, 8 p.
- Kadilnikov, Y. V. 1983. Behaviour of fishing targets and catchability of fishing trawls. ICES Council Meeting 1983 (Collected papers) 29 pp.

- Lasker, R. 1978. The relation between oceanographic conditions and larval anchovy food in the California current: identification of factors contributing to recruitment failure. p. 212-230. In Marine ecosystems and fisheries oceanography. Parsons, T. R., B-O. Jansson, A. R. Longhurst, G. Saetersdal (ed.) Rapp. P-V Reun. Ciém V. 173
- Loesch, J. G., W. H. Kriete Jr., E. J. Foell. 1982. Effects of light intensity on the catchability of juvenile anadromous Alosa species. Trans. Am. Fish. Soc. 111: 41-44.
- Luka, G. I., V. P. Ponomarenko. 1983. Seasonal and daily vertical migrations and structure of capelin concentrations in the Barents Sea. ICES C.M.1983/H:27, 16 p.
- Mohr, H., W. Fischer. 1977. Observations on the behaviour of krill populations. Protok, Fischereitech 14(64): 40-53.
- Musick, J. A., J. A. Colvocoresses, E. J. Foell. 1982. Seasonality and the distribution, availability and composition of fish assemblages in the Chesapeake Bight. Atlantica 5: 83.
- Nielsen, L. A. 1983. Variation in the catchability of yellow perch in an otter trawl. Trans. Am. Fish. Soc. 112: 53-59.
- Oakley, S. G. 1979. Diurnal and seasonal changes in the timing of peak catches of Nephrops norvegicus reflecting changes in behaviour. p. 367-374 In Cyclic phenomena in marine plants and animals. E. Naylor and R. G. Härtvoll (ed.) Pergamon Press, Oxford (U.K.)
- Ogaiva, Y. 1982. Evaluation of the influence of changes in prey abundance on catch fluctuations "Shiroka", Loligo edulis, in coastal waters of the Southwestern Japan Sea. Bull. Jap. Soc. Fish. Oceanogr. 41: 11-16.
- Olsen, K. 1981. The significance of fish behaviour in the evaluation of hydroacoustic survey data. ICES C.M.1981/B:22, 25 p.
- Olsen, S., T. Laevastu. 1983. Effects of near-bottom currents on the distribution of olfactory stimuli (smell) from baits. ICES C.M.1983/B:3, 11 p.
- Orlowski, A. 1984. Multichannel echo integration and its application for determining of relationships between fish distribution and environment conditions. ICES C.M.1984/B:36, 11 p.
- Pati, S. 1981. The influence of temperature and salinity on the pelagic fishery in the northern part of the Bay of Bengal. ICES J. du Conseil, 40: 220-225.
- Pati, S. 1984. Observations on the relation between rainfall and the inshore fishery along the Orissa coast. ICES J. du Conseil, 41: 145-148.
- Peterman, R. M., G. J. Steer. 1981. Relation between sport-fishing catchability coefficients and salmon abundance. Trans. Am. Fish. Soc. 110: 585-593.
- Pollock, D. E., C. J. de B. Beyers. 1979. Trap selectivity and seasonal catchability of rock lobster Jasus lalandii at Robben Island Sanctuary, near Cape Town. Fish. Bull. Div. Sea Fish. S. Afr. (No. 12): 75-79.
- Sbikin, Yu. N. 1977. Changes in the behaviour of some fish from the Cuban shelf during morning and evening twilight. J. Ichthyol. 17(5): 785-790.
- Schoene, R. 1980. Distribution and possible catchability of blue whiting in the sea area between Faroe Is. and south-west Ireland from January to March 1980. Inf. Fischwirtsch 27(3): 94-98.
- Shepherd, J. G., and J. W. Horwood. 1978. The sensitivity of exploited populations to environmental "noise", and the implications for management. ICES J. Conseil, 38: 318-323.

- Shevchenko, A. V., N. A. Isaev. 1983. Year-to-year variations of blue whiting distribution in the Norwegian Sea in spring-summer 1978-1982 due to hydrographic conditions. ICES C.M.1983/H:26, 18 p.
- Sinclair, M., V. C. Anthony, T. D. Iles, R. N. O'Boyle. 1984. Stock assessment problems in Atlantic herring (Clupea harengus) in the Northwest Atlantic. ICES C.M.1984/H:35, 31 p.
- Staples, D. J., D. J. Vance. 1979. Effects of changes in catchability on sampling of juvenile and adolescent banana prawns, Pandalus merguensis de Man. Aust. J. Mar. Freshwater Res. 30: 511-519.
- Vanengel, W. A. 1979. Climatological effects on distribution, catch and abundance of the blue crab. Proc. Natl. Shellfish Assoc., Md., 69: 200.