

Northwest Fisheries Center Processed Report \*

AN ANNOTATED BIBLIOGRAPHY  
ON NON-SALMONID PELAGIC FISHES  
OF THE GULF OF ALASKA AND EASTERN BERING SEA

by

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and

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September 1976

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Submitted as part of the Final Report  
for Contracts #R7120811 and #R7120812  
Task A-7, Research Unit 64/354  
OUTER CONTINENTAL SHELF ENERGY ASSESSMENT PROGRAM  
Sponsored by  
U. S. Department of the Interior  
Bureau of Land Management

September 1976

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INTRODUCTION

The Northwest Fisheries Center in September 1975 received contracts from the Outer Continental Shelf Energy Assessment Program (OCSEAP), Bureau of Land Management, Department of the Interior, for a project to review literature and data for resources of non-salmonid pelagic fishes of the eastern Bering Sea and Gulf of Alaska. This bibliography was prepared as part of the final report required for those contracts.

The objective of the project is to review published and unpublished literature on the distribution, abundance, life histories, fisheries, and population dynamics of non-salmonid pelagic fishes of the two areas. The geographic areas of coverage were defined as follows: Eastern Bering Sea--the area from lat 52° to 60°N. and from long 180° to the Alaskan coast; Gulf of Alaska--the area from the central Gulf of Alaska coastline south to lat 52°N, to the Aleutian Islands on the west and to long 135°W, on the east, respectively.

For the purposes of this study, non-salmonid fishes were conceived to be those which spend the majority of their lives, and especially their adult stages, in the near-surface and midwater layers and are primarily sampled with, and exploited by, off-bottom gear. This latter qualification has had the effect of placing semipelagic gadoid (e.g., pollock) and scorpaenid species in the demersal realm, and thus outside the scope of this study.

Individual species were selected for inclusion in the bibliography on the basis of their prominence in the catches of both United States and foreign commercial fishing fleets, their relative abundance in research vessel catches indicating potentially latent resources, and/or their prominence in the provision and maintenance of ecological balance as major predators, competitors, or forage fish. The final list of species considered includes 15 families and more than 22 individual species.

Literature on non-salmonid pelagic fishes is scanty because most of the species are not objects of commercial fisheries. United States literature and statistics cover the commercial species fairly well, but non-commercial fishes usually have been collected on an incidental basis by sampling gear designed to capture other species. Japanese and Russian literature on fish that are targets of fishing fleets or literature detailing biological studies on unexploited species likewise is incomplete or lacking.

All of the citations included in the bibliography have been verified against the original literature, but they have not been evaluated for quality or merit for inclusion. Some references are checklists or distribution lists only; others are detailed scientific studies. A few citations for unpublished references are included because they contain important information not available elsewhere; these are noted by asterisks (\*).

The style of the citations follows that used by the National Marine Fisheries Service in its publications. References are arranged alphabetically by author and by year. Those with multiple authors are listed alphabetically by senior author's surname and then by the junior author's surname. When more than one paper is listed for an author or authors, the arrangement is chronological by year. The name of the journal is used as author instead of "Anonymous" when

no author is shown on an article. Journals and periodicals are abbreviated using the rules of the Word-Abbreviation List, American National Standards Institute, Standards Committee Z39, published by the National Clearinghouse for Periodical Title Word Abbreviations.

Japanese and Russian journal and periodical sources have been listed in romanized or transliterated form unless the original was printed with an English title. Russian transliteration follows the transliteration table issued by the National Federation of Science Abstracting and Indexing Services. Translations of foreign literature were obtained when available, and translation information is included with the citations.

The index is in two parts--by subject and by geographic area. Fish species are listed by their common names, and scientific names are cross-referenced to appropriate common names. The common names used follow, for the most part, the List of common and scientific names of fishes from the United States and Canada (3rd edition), by Reeve M. Bailey et al., published by the American Fisheries Society, 1970.

In addition to the annotated bibliography, we have included a separate list of bibliographic sources we reviewed in the course of our work. References in these bibliographies pertinent to our research subjects and areas have been annotated and listed in our bibliography.

Finally, although we made every effort to locate and include all pertinent literature, we realize that no bibliographer can rightfully claim to have located every reference on a subject. We can only hope we have not overlooked any important literature and that the bibliography will be of value to scientists and others seeking information on the non-salmonid pelagic fishes of the eastern Bering Sea and Gulf of Alaska.

## ANNOTATED BIBLIOGRAPHY

## ADMINISTRATION OF ALASKA COMMERCIAL FISHERIES.

1956. Progress report and recommendations for 1957. U.S. Fish Wildl. Serv., Admin. of Alaska Commer. Fish., Juneau, Alaska. 34 p.

Three pages of graphs illustrate total catch of herring in Alaska in 1880-1956 and percentage age composition in southeast Alaskan catches in 1951-1956. Spawning areas in southeast Alaska (Baranof Island area) are shown on a map.

## ALASKA DEPARTMENT OF FISH AND GAME.

1965-1974. Alaska catch and production: Commercial fisheries statistics 1965-1974. Alaska Dep. Fish Game, Juneau, Stat. Leaflet. 11, 13, 15, 17, 19, 21, 23, 25-27. Various pagination.

Presents catches, weights, and values to the fishermen. Includes herring catches and value of landings by region and by gear. Production statistics include number of operating plants and wholesale values of production.

## ALDERDICE, D. F., and F. P. J. VELSEN.

1971. Some effects of salinity and temperature on early development of Pacific herring (Clupea pallasii). J. Fish. Res. Board Can. 28(10): 1545-1562.

Results obtained from laboratory incubation of herring eggs at 13 different salinity-temperature combinations were compared with field observations in the North Pacific Ocean. These suggested that the physical limitations of a successful herring spawning ground are a salinity range of 8 to 28 ‰, that population abundance is associated with spawning temperatures of 5-9°C., that abundance is limited by temperatures of 9-10°C., and that maximum temperature for spawning is about 10°C. The study showed the lower limit of thermal tolerance of herring eggs was between 4 and 5°C.

## ALVERSON, DAYTON L.

1968. Fishery resources in the northeastern Pacific Ocean. In: De Witt Gilbert (editor), The future of the fishing industry of the United States, p. 86-101. Univ. Washington, Seattle, Univ. Wash. Publ. Fish., New Ser. 4.

Summarizes data from a variety of published sources on the demersal and pelagic fish and shellfish resources. The spiny dogfish is considered a demersal species and its vertical distribution, size, and estimations of its standing stocks and sustainable yield are presented. Very little data are available on pelagic resources, but their potential value is considered.

ALVERSON, D. L., A. T. PRUTER, and L. L. RONHOLT.

1964. Sharks, skates, and ratfishes. Chapt. 7, p. 145-149, in their  
A study of demersal fishes and fisheries of the northeastern Pacific  
Ocean. H. R. MacMillan Lectures in Fisheries, Univ. B.C., Inst. Fish.,  
Vancouver, B. C.

Includes brief notes on the dogfish fishery on the Pacific coast from  
Oregon to the Gulf of Alaska. Although relatively abundant on the  
continental slope south of Cape Spencer, Alaska, dogfish catches declined  
north of Cape Spencer and at depths greater than 99 fathoms.

ANDERSON, A. W., and C. E. PETERSON.

1952-1954. Fishery statistics of the United States [1949-1951]. U. S. Dep.  
Int., Fish Wildl. Serv., Stat. Dig. No's. 25, 27, 30. Various pagination.

Catch data of Alaskan fisheries by districts are included as well as the  
market value and poundage of the fishery products. Has data for herring  
and sometimes smelt, dogfish, or sharks.

ANDERSON, A. W., and E. A. POWER.

1946-1951, 1955-1967. Fishery statistics of the United States [1942-1948,  
1952-1955]. U.S. Dep. Int., Fish Wildl. Serv., Stat. Dig. No's. 11, 14,  
16, 18, 19, 21, 22, 34, 36, 39, 41. Various pagination.

For annotation, see Anderson and Peterson (1952-1954).

ANDRIYASHEV, ANATOLY P.

1937. K poznaniyu ikhtiofauny Beringova i Chukotskogo morei (A contribution  
to the knowledge of the fishes from the Bering and Chukchi Seas). Akad.  
Nauk SSSR, Zool. Inst., Issled. Morei No. 25 (Issled. Dal'nevost. Morei  
No. 5): 292-355. In Russian. (Transl. by Lisa Lanz with Norman J.  
Wilimovsky, 1955, U.S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 145, 81 p.)

Describes fishes primarily from the collections made by the trawlers  
Dal'nevostochnik ("Far East") in 1932 and the Krasnoarmeets ("Red Army")  
in 1933. In addition to the morphological data, some information on  
distribution and ecological preferences are noted.

ARON, WILLIAM.

1958. Preliminary report of midwater trawling studies in the North Pacific  
Ocean. Univ. Wash., Seattle, Dep. Oceanogr., Tech. Rep. 58: 1-55.  
(Processed.)

Preliminary results of midwater trawl sampling conducted by the University  
of Washington Department of Oceanography on the vessel Brown Bear from  
July 22 to September 22, 1957 are given. See Aron (1960a) for revision  
and analysis of cruise data.

ARON, WILLIAM.

1959. Midwater trawling studies in the North Pacific. *Limnol. Oceanogr.* 4(4): 409-418.

Summarizes the results of 149 exploratory hauls in the northeastern Pacific with a modified Isaacs-Kidd midwater trawl towed at depths ranging from 20 to 250 meters. Contains notes on the depth distribution of some myctophid species.

\*1960a. The distribution of animals in the eastern North Pacific and its relationship to oceanographic conditions. PhD Thesis, Univ. Wash., Seattle. 82 p., 155 app. p.

Data from sampling by the University of Washington Department of Oceanography during three cruises of the Brown Bear in the North Pacific Ocean in summer 1957 and summer and fall 1958 are presented. Cruise No. 179 covered stations in the Gulf of Alaska and Bering Sea. Data include chemical and physical conditions as well as information on phytoplankton, zooplankton, fish larvae, and fish captured by the modified Isaacs-Kidd midwater trawl. There is some discussion on the distribution and abundance of myctophid species and their occurrence in relation to oceanic conditions, depth, and time of day.

1960b. The distribution of animals in the eastern North Pacific and its relationship to physical and chemical conditions. Univ. Wash., Seattle, Dep. Oceanogr., Tech. Rep. 63. 65 p., 156 p. appendix. (Processed.)

See Aron (1960a) for annotation.

1962. The distribution of animals in the eastern North Pacific and its relationship to physical and chemical conditions. *J. Fish. Res. Board Can.* 19(2): 271-314.

Several species of myctophid fishes collected by an Isaacs-Kidd midwater trawl in the northeastern Pacific Ocean were found to be useful indicator organisms to identify oceanic water masses. Numbers of animals declined and species composition changed in going from subarctic water to warmer intermediate water.

\*BAXTER, RAE.

1975. Inshore marine resources of Bristol Bay, Alaska. Alaska Dep. Fish Game, Bethel, Alaska. Unpubl. manuscr. 97 p.

Information was obtained with commercial trawl vessels in August 1974 and June 1975, supplemented with personal observations and notes on interviews with local fishermen. Includes maps of herring and capelin spawning grounds and a species list giving the average length and length range of the specimens obtained from Bristol Bay.

## BEAN, TARLETON H.

1887. The fishery resources and fishing-grounds of Alaska. In George Brown Goode et al., The fisheries and fishery industries of the United States, p. 81-115. Gov. Print. Off., Washington, D.C.

The important food and bait fishes of various districts of Alaska are described. Of pelagic species, the Atka mackerel were valuable both as food fish for humans and as food for other fish in the Kodiak-Shumagin Islands area and Aleutian Islands. Capelin were mentioned as food for salmon and cod. Other important food fishes were smelts (2 species), eulachon, and herring.

1889. The food fishes of Alaska. In Investigation of the fur-seal and other fisheries of Alaska, Report from the Committee on Merchant Marine and Fisheries of the House of Representatives, p. XL-XLIII. Gov. Print. Office, Washington, D. C.

Consists of brief notes on the major fish species found in Alaskan waters. Comments on the importance of capelin, Atka mackerel, sand lance, eulachon, surf smelt, and herrings as food for other fishes.

## BEKKER, V. E.

- 1963a. Taksonomiya i rasprostranenie tarletonbinii (Tarletonbeania crenularis, Myctophidae, Pisces). [Taxonomy and distribution of the blue lanternfish (Tarletonbeania crenularis, Myctophidae, Pisces)]. Akad. Nauk SSSR, Tr. Inst. Okeanol. 62: 145-163. In Russian. (Transl., Scripps Inst. Oceanogr., La Jolla, Calif.)

A total of 428 specimens collected by the Soviet vessel Vityaz in 1954-1959 and 23 specimens borrowed from Scripps Institution of Oceanography were studied. No specific differences were found between the western T. crenularis and the eastern T. taylori, which should be considered as subspecies, T. crenularis crenularis and T. crenularis taylori. The range of the subspecies is divided by the zone where the Aleutian Current diverges to form the Alaskan and Californian currents (approx. long 140°W). The intermediate area where well-defined specimens of both subspecies are found together extends from 136°W to 146°W. T. crenularis is closely associated with the current systems of the North Pacific (Kuroshio, Aleutian, Alaskan, and Californian). It is absent in waters of the Kuril-Kamchatka region and south of subarctic waters. (--Excerpted from author's summary.)

BEKKER, V. E.

- 1963b. Severotikhookeanskije vidy roda Protomyctophum (Myctophidae, Pisces). [North Pacific species of the genus Protomyctophum (Myctophidae, Pisces)]. Akad. Nauk. SSSR, Tr. Inst. Okeanol. 62: 164-191. In Russian, Engl. summary. (Transl., 1968, Systematic Lab., Natl. Mar. Fish. Serv., Washington, D.C., Transl. 60.)

Three species of primitive Myctophidae are found in the North Pacific: Electrona rissoi (?), Protomyctophum crockeri, and P. thompsoni. P. crockeri is closely associated with waters of mixed origin and P. thompsoni with subarctic waters. The latter inhabits mainly waters of the Kuril-Kamchatka coastal region and the Western Gyral (within limits of Pacific Ocean proper), in Aleutian waters, in the Alaskan Gyral, and in the American coastal region south to lat 40°N; it is considered rare within the subarctic region. P. crockeri is represented by western and eastern forms with an interruption of its range between long 165°E and 150°W. The western range of P. crockeri is in the zone of penetration of Kuroshio and Oyashio waters and its eastern range is in the eastern part of the subarctic region, in the intermediate region as well as in the Californian and American coastal regions south of 45°. (From author's summary).

BETHUNE, WINONA.

1949. Report on the investigation of albacore (Thunnus alalunga): Albacore log records. Fish. Res. Board Can., Pac. Biol. Stn., Nanaimo, B.C., Circ. 17: 10-13. (Processed.)

Log books of fishermen in summer 1948 showed areas off Queen Charlotte Islands from lat 52°30' and 53°N and long 132° and 133°W were most productive of albacore for the season (but also had greatest fishing intensity). More than 33% of the catch was in temperatures between 58° and 60°F., 22% at 60°F., and 17% at 59°F.

BOWER, WARD T.

- 1919-1941. Alaska fishery and fur-seal industries in [1918-1939]. (Title varies.) U.S. Dep. Commer., Bur. Fish., App. to Rep. U.S. Comm. Fish. [1918-1919, 1921-1940], (Reports in 1918-19, 1921-29 also issued as Doc. No's. 872, 891, 909, 933, 951, 973, 992, 1008, 1023, 1040, 1064, 1086; 1930-1939 also as Admin. Rep. No's. 2, 7, 11, 16, 19, 23, 28, 31, 36, 40). Various pagination.

The major fisheries of Alaska--salmon, cod, halibut, and herring, as well as aquatic furs--are described and reviewed each year. Data include annual statistics of the herring industry--the numbers of people employed, the investment in gear, and the poundages and value of the products. Occasionally, potential fisheries resources such as capelin and eulachon are discussed.

- 1942-1944, 1946-1948. Alaska fishery and fur-seal industries: [1940-1946]. U.S. Dep. Int., Fish Wildl. Serv., Stat. Dig. No's. 2, 5, 10, 13, 15, 17. Various pagination.

For annotation, See Bower (1919-1941).

BOWER, WARD T., and HENRY D. ALLER.

1915, 1917-1918. Alaska fisheries and fur industries in [1914-1917]. U.S. Dep. Commer., Bur. Fish., App. to Rep. U.S. Comm. Fish. [1914-1917], (Doc. No's. 819, 834, 838, 847). Various pagination.

For annotation, see Bower (1919-1941).

BRIGHT, DONALD B.

1959. The occurrence and food of the sleeper shark, Somniosus pacificus, in a central Alaska bay. *Copeia* 1959(1): 76-77.

A female sleeper shark was found June 3, 1958 trapped in a tide pool in Kachemak Bay, Cook Inlet, Alaska. Although this species has been reported in Alaska in the Bering Sea and southeastern Alaska, this is thought to be the first record in this area.

1960. A record of the porbeagle, Lamna nasus, from Cook Inlet, Alaska. *Copeia* 1960(2): 145-146.

Notes on a salmon shark caught in a gill net in Kachemak Bay, Alaska, July 18, 1959, include external description, measurements, stomach contents, and parasites.

BROWNING, ROBERT J.

1974. Fisheries of the North Pacific: history, species, gear & processes. Alaska Northwest Publ. Co., Anchorage. 408 p.

Describes, in popular style, the biology of 70 species of commercially important fish and shellfish of the North Pacific and the various types of vessels, methods and gear used in catching, handling, and preserving them.

BUCK, EUGENE H.

1973. Herring, p. 16-19. In his Alaska and the law of the sea: national patterns and trends of fishery development in the North Pacific. Arctic Environ. Inf. and Data Center, Univ. of Alaska, Anchorage (Alaska Sea Grant Rep. 73-4).

Contains two graphs presenting the herring catch statistics of the North Pacific. One illustrates the catch by country for 1905 to 1970 and the other shows the contribution to the catch of the various districts for 1930 to 1969.

\*CHAPMAN, WILBERT McLEOD.

1937. Oceanic fishes from the northeastern Pacific Ocean collected by the International Fisheries Commission. PhD Thesis, University of Washington, Seattle, Wash. 158 p.

Biological data were analyzed from macroplankton collections at 1,161 stations by the International Fisheries Commission in the northeast Pacific from Cape Flattery, Wash., to the Sanak Islands, Alaska during 1926-1934. Pelagic and bathypelagic fishes studied include Bathylagus alascanus and B. pacificus, Myctophum oculeum and M. crenulare, Lampanyctus leucopsarus and L. micropunctatus, and Diaphus rafinesquei. Morphological data on fish from various stations are given, as well as latitudes and longitudes of stations where samples were taken.

CHITWOOD, PHILIP E.

1969. Japanese, Soviet, and South Korean fisheries off Alaska: Development and history through 1966. U.S. Fish Wildl. Serv., Circ. 310. 34 p.

Includes a brief summary of the U.S.S.R. herring fishery in the Bering Sea. Some catch statistics and numbers of vessels are given.

CLEMENS, W. A., and G. V. WILBY.

1961. Fishes of the Pacific coast of Canada. Fish. Res. Board Can., Bull. 68 (2nd ed., rev.). 443 p. (Orig. ed., rev., 1949, 368 p.)

Essentially an identification manual with brief notes giving the description, life history, and distribution of each species. Includes literature references.

COBB, JOHN N.

1906. The commercial fisheries of Alaska in 1905. [U.S.] Bur. Fish., Rep. Comm. Fish. 1905 (1907), (Doc. 603, Oct. 16, 1906). 46 p.

Describes the major fisheries of Alaska in 1905: cod, halibut, herring, and salmon. In addition, provides short notes on potential fisheries, such as Atka mackerel.

1907. The fisheries of Alaska in 1906. [U.S.] Bur. Fish., Rep. Comm. Fish., 1906 (1908), (Doc. 618, issued May 16, 1907). 70 p.

Describes the major fisheries of Alaska in 1906: salmon, cod, halibut, and herring, as well as aquatic furs and potential fishery resources such as eulachon and Atka mackerel.

DAHLGREN, EDWIN H.

1936. Further developments in the tagging of the Pacific herring, Clupea pallasii. J. Cons. Int. Explor. Mer 11(2): 229-247.

Tagging studies of the Pacific herring in southeast Alaska in 1932-1935, using magnetic belly tags, clarified the separateness of certain stocks and indicated that commercial fishing took a much greater portion of the stocks than was previously supposed by the industry.

DAHLGREN, E. H., and L. N. KOLLOEN.

1943a. Outlook for the Alaska herring fishery in 1943. U.S. Fish Wildl. Serv., Fish. Leaflet 16. 16 p.

Discusses the fluctuations of herring stocks from 1927 to 1942 in the Kodiak, Prince William Sound, and Southeastern Alaska districts. The degree of success of a given year class was found to be comparable in each of the three areas.

DAHLGREN, EDWIN H., and L. N. KOLLOEN.

- 1943b. Fluctuations in the abundance of the Alaska herring. *Sci. Monthly* 56: 538-543.

Throughout history, herring has been important as a source of food, meal, and oil and as forage for larger fish. Possible reasons for the great fluctuations which occur in the fishery are considered: changes in availability; decreased abundance due to man's intervention; changes in recruitment; and basic changes in migratory patterns. Differing success of year classes is thought to be the main reason for the large fluctuations, but the pressure of man's fishery is thought to be the main factor in the overall decline in abundance of many herring stocks.

1944. Outlook for the Alaska herring fishery in 1944. U.S. Fish Wildl. Serv., Spec. Sci. Rep. 25. 18 p.

Catch data (with year class composition) of Kodiak, Prince William Sound, and southeastern Alaska fisheries are presented. Estimates are given for 1944 catches based on analyses of the data.

DALL, WM.

1871. The food fishes of Alaska. Rep. U.S. Comm. Agric. 1870: 375-392.

Describes, briefly, the predominant food fishes of Alaska in 1870, with notes on the native fisheries and potential for commercial fisheries.

DICKINSON, WILLIAM R.

1973. Japanese fishing vessels off Alaska. *Mar. Fish. Rev.* 35(1-2): 6-18.

Describes the three types of trawlers, salmon and herring gillnetters, longliners, crab boats and whale catchers comprising the approximately 700 Japanese ships that fish annually off Alaska. The Japanese herring trawling industry, which fishes in the Bering Sea between the Pribilofs and St. Matthews Island, increased its catch from 3,000 metric tons in 1966-67 to 35,000 metric tons in 1971. In addition, a small herring gillnet fishery operates off the western coast of Alaska.

DUDNIK, YU. I., and E. A. USOL'TSEV.

1964. O sel'di vostochnoi chasti Beringova morya (The herrings of the eastern part of the Bering Sea). *Tr. Vses. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr.* 49 (*Izv. Tikhookean. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr.* 51): 225-229. In Russian. (Transl. by Israel Prog. Sci. Transl., 1968, p. 236-240 in P. A. Moiseev (ed.), *Soviet fisheries investigations in the northeast Pacific*, Pt. 2, avail. Natl. Tech. Inf. Serv., Springfield, Va. as TT 67-51204.)

The distribution, behavior, age and size composition of herring in winter fishing grounds in the eastern Bering Sea during 1959-62 are discussed. Some notes on feeding and migration are included. Contains a figure showing the distribution of herring at different times of the year.

## EVERMANN, BARTON WARREN.

1912-1914. Alaska fisheries and fur industries in [1911-1913]. U.S. Dep. Commer., Bur. Fish., App. to Rep. U.S. Comm. Fish. [1911-1913], (Doc. No.'s 766, 780, 797). Various pagination.

For annotation, see Bower (1919-1941).

## FACULTY OF FISHERIES, HOKKAIDO UNIVERSITY.

1957a. 1955 cruise of the "Oshoro Maru" to the Bering Sea and northern North Pacific (NORPAC Project). 15. Data on fish larvae collected with fish larva net. Data Rec. Oceanogr. Obs. Explor. Fish. 1: 112-115.

Table 26 lists fish larvae collected by station position, date, time, species, and number of specimens.

1957b. 1956 cruise of the "Oshoro Maru" to the Bering Sea. 14. Data on fish larvae collected with fish larva net. Data Rec. Oceanogr. Obs. Explor. Fish. 1: 204-207.

Table 10 lists fish larvae collected by station position, date and time, species, and number of specimens at a number of stations.

1958. 1957 cruise of the "Oshoro Maru" to Aleutian waters. 15. Data on fish larvae collected with fish larva net. Data Rec. Oceanogr. Obs. Explor. Fish. 2: 70-74.

Table 10 lists fish larvae collected by station position, date and time, species, and number of specimens for a number of stations in the central and western Bering Sea.

1959. The "Oshoro Maru" Cruise 42 to the Bering Sea in May-July 1958 (IGY Programme). 12. Data on fish larvae collected with fish larva net. Data Rec. Oceanogr. Obs. Explor. Fish. 3: 122-127.

Table lists fish larvae collected by station position, date and time, species, number of individuals, and range of total length for a number of stations in the central and western Bering Sea.

1960. The "Oshoro Maru" Cruise 44 to the Bering Sea in June-July, 1959. 12. Data on fish larvae collected with a fish larva net. Data Rec. Oceanogr. Obs. Explor. Fish. 4: 80-86.

Table lists fish larvae collected by station position, date and time, species, number of specimens, and range of total length at a number of stations.

1961a. The "Oshoro Maru" Cruise 46 to the Bering Sea and North Pacific in June-August 1960. 17. Data on fish larvae collected with a larva net. Data Rec. Oceanogr. Obs. Explor. Fish. 5: 202-207.

Table shows specimens of fish larvae from mixed plankton samples collected by larva net hauls. Data include date, geographic position, time, number of larvae, and range of total length.

## FACULTY OF FISHERIES, HOKKAIDO UNIVERSITY.

- 1961b. The "Oshoro Maru" Cruise 46 to the Bering Sea and North Pacific in June-August 1960. 18. Data on fish larvae collected with an underway plankton catcher V. Data Rec. Oceanogr. Obs. Explor. Fish. 5: 208-213.

Table gives scientific names of fish larvae found in mixed plankton samples collected during high speed tows with an underway plankton catcher V. For those tows yielding larvae, data include genus or species, date, geographic position; tows with no fish larvae also are noted.

1964. The "Oshoro Maru" Cruise 4 to the Bering Sea and northwestern North Pacific in May-July 1963. 6. Data on fish larvae collected with a larva net and a small planned Isaacs-Kidd midwater trawl net in the Bering Sea. Data Rec. Oceanogr. Obs. Explor. Fish. 8: 257-260.

Tables 21-22 list fish larvae collected at a number of stations in the Bering Sea by station position, date, species or family, number of specimens and range of total length.

- 1967a. The "Oshoro Maru" Cruise 19 to the northern North Pacific and Bering Sea in June-August 1966. 8. Data on fish larvae collected with a larva net. Data Rec. Oceanogr. Obs. Explor. Fish. 11: 219-226.

Table 7 lists fish larvae collected by station position, date, species, number of specimens per net, and ranges of total length.

- 1967b. The "Oshoro Maru" Cruise 19 to the northern North Pacific and Bering Sea in June-August 1966. 9. Data on salmon gillnet set. Data Rec. Oceanogr. Obs. Explor. Fish. 11: 226-233.

Tables list mesh sizes used and incidental catches, including salmon shark in the eastern Bering Sea.

1968. The "Oshoro Maru" Cruise 24 to the northern North Pacific and Bering Sea in June-August 1967. 10. Data on fish larvae collected by surface tow and midwater tow with the larva net. Data Rec. Oceanogr. Obs. Explor. Fish. 12: 375-382.

Tables 6-8 and 6-9 list fish larvae collected by station position, date, species, number of individuals, and range of length at a number of stations in the Bering Sea.

1969. The "Oshoro Maru" Cruise 28 to the northern North Pacific, Bering Sea and the Gulf of Alaska in June-August 1968. 15. Data of fish larvae collected with a larva net. Data Rec. Oceanogr. Obs. Explor. Fish. 13: 70-75.

Table 13 lists fish larvae collected by station position, date, species, number of specimens, range of total length, and mean length at a number of stations in the Bering Sea in June-August and five stations in the Gulf of Alaska in August.

- 1970a. The "Oshoro Maru" Cruise 28 to the northern North Pacific, Bering Sea and the Gulf of Alaska in June-August 1968. 16. Data on salmon gillnet set. Data Rec. Oceanogr. Obs. Explor. Fish. 13: 76-85.

Tables list net meshes used and include data on catches of herring and salmon shark in various meshes in the eastern Bering Sea.

## FACULTY OF FISHERIES, HOKKAIDO UNIVERSITY.

1970b. The "Oshoro Maru" Cruise 28 to the northern North Pacific, Bering Sea and the Gulf of Alaska in June-August 1968. 18. Data on trawl fishing. Data Rec. Oceanogr. Obs. Explor. Fish. 13: 119-121.

Tables include catches of Pleurogrammus monopterygius and Mallotus catervarius in the Gulf of Alaska in July 1968.

1970c. The "Oshoro Maru" Cruise 32 to the North Pacific, Bering Sea and Bristol Bay in June-August 1969. 12. Data on fish larvae collected with a larva net. Data Rec. Oceanogr. Obs. Explor. Fish. 14: 68-73.

Table lists fish larvae collected by station position, date, species, number of specimens, range of total length, and average length for 48 stations.

1970d. The "Oshoro Maru" Cruise 32 to the North Pacific, Bering Sea and Bristol Bay in June-August 1969. 13. Data on salmon gillnet set. Data Rec. Oceanogr. Obs. Explor. Fish. 14: 74-81.

Table lists mesh sizes used and incidental catches, including Atka mackerel, sandfish, shark, and herring in the eastern Bering Sea.

1970e. The "Oshoro Maru" Cruise 32 to the northern North Pacific, Bering Sea and Bristol Bay in June-August 1969. 15. Data on trawl fishing. Data Rec. Oceanogr. Obs. Explor. Fish. 14: 116-119.

Includes, in Table 13, catch of herring in kg per trawl haul for 9 hauls in August 1969 at locations shown in Fig. 5.

1972. The "Oshoro Maru" Cruise 37 to the northern North Pacific, Bering Sea and the Gulf of Alaska in June-August 1970. 15. Data on trawl fishing. Data Rec. Oceanogr. Obs. Explor. Fish. 15: 85-89.

Table 13 includes catches of dogfish (Squalus acanthias) and capelin (Mallotus catervarius) in kg. per haul and Atka mackerel (Pleurogrammus monopterygius) in numbers of individuals captured in 15 trawl hauls in the Gulf of Alaska in June-August 1970.

## \*FAVORITE, FELIX, W. JAMES INGRAHAM, JR., and DONALD M. FISK.

1975. Environmental conditions near Portlock and Albatross Banks (Gulf of Alaska) May 1972. U.S. Dep. Commer., Natl. Oceanic Atmos. Admin., Natl. Mar. Fish. Serv., Northwest Fish. Center, Proc. Rep. 45 p.

Data presented are from a multidisciplinary cruise on the RV George B. Kelez in spring 1972 to the northern Gulf of Alaska. The locations of the catches of sand lance larvae, the second most dominant larval form in the catches (11.4%), are shown on a map.

## FEDOROV, V. V.

1973a. Ikhtiofauna materikovogo sklona Beringova morya i nekotorye aspekty ee proiskhozhdeniya i formirovaniya (Ichthyofauna of the continental slope of the Bering Sea and some aspects of its origin and formation). Izv. Tikhookean. Nauchno-issled. Inst. Rybn. Khoz. Okeanogr. 87: 3-41. In Russian. (Transl., 1975, 70 p., Dep. Environ, Fish. and Mar. Serv., Pac. Biol. Stn., Nanaimo, B.C., Transl. Ser. 3345.)

Catalogues 234 species of Bering Sea fishes into groups (ichthyocoenoses and biotopes) according to their predominant habitat (horizontal or vertical distribution). Discusses the zoogeographic origin of secondary deep water fishes, considering the morphology of the Bering Sea basin in the past.

1973b. Spisok ryb Beringova morya (A list of the Bering Sea fishes). Izv. Tikhookean. Nauchno-issled. Inst. Rybn. Khoz. Okeanogr. 87: 42-71. In Russian.

Consists of a list, in taxonomic order, of 393 species of fishes of the Bering Sea and includes the Russian, English, and Japanese common names. No biological data are given.

## FIEDLER, R. H.

1931-1932, 1934-1936, 1938-1941. Fishery industries of the United States [1929-1932, 1934-1939]. U.S. Dep. Commer., Bur. Fish., App. to Rep. U.S. Comm. Fish. [1930-1933, 1935-1940]. Various appendix numbers (Reports for 1934-1939 also issued as Admin. Rep. No's. 20, 24, 27, 32, 37, 41). Various pagination.

Each year various fisheries are reviewed, including catch data of Alaskan fisheries by districts as well as market values and poundage of fishery products. Data for herring, and occasionally smelt and dogfish, are included.

1942-1943, 1945. Fishery statistics of the United States [1939-1941]. U.S. Dep. Int., Fish Wildl. Serv., Stat. Dig. No's. 1, 4, 7. Various pagination.

See annotation above.

## FIEDLER, R. H., JOHN RUEL MANNING, and F. F. JOHNSON.

1934. Fishery industries of the United States, 1933. App. 1, Rep. U.S. Comm. Fish. 1934 (1936): 1-237.

For annotation, see Anderson and Peterson (1952-1954).

FISCUS, CLIFFORD H., GARY A. BAINES, and FORD WILKE.

1964. Pelagic fur seal investigations, Alaska waters, 1962. U.S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 475. 59 p.

Capelin was found to be the single most important food item in the stomach contents of the Alaskan fur seal in Unimak Pass and vicinity, comprising over 56% of the total food by volume in the three sub-areas studied. Squid and pollock ranked second and third in the diet. Herring, eulachon, Atka mackerel, and sand lance contributed to a lesser degree.

FISHERIES AGENCY OF JAPAN.

1974. Resources of yellowfin sole, rock sole, flathead sole, Pacific halibut, shrimps, Pacific herring, Pacific cod and turbot in the Bering Sea. Fisheries Agency of Japan. 21 p. In Japanese. (Transl. by Yoshiya Takahashi, 10 p., Int. North Pac. Fish. Comm. Doc. 1679.)

Includes the history of the Bering Sea herring fishery as well as graphs of herring catches by Japan, catches by Japan and the U.S.S.R. combined, and the catch per unit effort for 1960 to 1972.

FISHERY AGENCY OF JAPAN [sic.]

1975. Resources of rock sole, flathead sole, Pacific cod, turbot and Pacific herring in the Bering Sea. Fishery Agency of Japan. 8 p. In Japanese. (Transl. by Yoshiya Takahashi, 3 p., Int. North Pac. Fish. Comm. Doc. 1775.)

Includes the history of the Bering Sea herring fishery as well as a graph and table giving the catch, average stock density indices, and effective fishing effort for gill net and stern trawls in the years 1964 to 1974.

FRASER, C. McLEAN.

1922. The Pacific herring. Biol. Board Can., Contrib. Can. Biol. 1921(6): 103-111.

Contains observations on the uniformity of size among Pacific herring in schools, their movements in relation to food supply, gonad maturation, their behavior during spawning, and factors causing the mortality of eggs, larvae, and young.

GERSHANOVICH, DAVID E., NIKOLAI C. FADEEV, TATIYANA G. LIUBIMOVA, PETER A. MOISEEV, and VALERY V. NATAROV.

1974. Principal results of Soviet oceanographic investigations in the Bering Sea, Chapt. 11, p. 363-370. In: D. W. Hood and E. J. Kelley (eds.), Oceanography of the Bering Sea. Univ. Alaska, Inst. Mar. Sci., Occas. Publ. 2.

The geologic and hydrologic structure, circulation dynamics, and biomass distribution of marine fauna of the Bering Sea are summarized. A description of the currently exploited herring stocks--their seasonal distribution and concentrations--is included.

GILBERT, CHARLES H.

1895. The ichthyological collections of the steamer Albatross during the years 1890 and 1891. U.S. Comm. Fish and Fish., Part 19, Rep. Comm. 1893: 393-476.

Fish collected in the Bering Sea and the North Pacific during the summers of 1890 and 1891 are listed. Among species noted are herring, capelin, eulachon, rainbow smelt, sand lance, Atka mackerel, and sandfish.

GORBUNOVA, N. N.

1962. Razmnozhenie i razvitie ryb semeïstva terpugovykh (Hexagrammidae). [Spawning and development of greenlings (Family Hexagrammidae)]. Akad. Nauk SSSR, Tr. Inst. Okeanol. 59: 118-182. In Russian. (Transl. p. 121-185 in 208 p. transl. of T.S. Rass (editor), "Greenlings: taxonomy, biology, interoceanic transplantation", translated by Israel Program Sci. Transl., for U.S. Dep. Int. and Natl. Sci. Found., 1970, avail. Natl. Tech. Inf. Serv., Springfield, Va. as TT 69-55097.)

Natural spawning of greenlings was studied in the Maritime Territory and Kamchatka, U.S.S.R. during 1949-1959. In addition, eggs of several species were incubated and their development observed in the laboratory. This paper describes the reproductive biology of each greenling species. It includes information on spawning biology, egg incubation, embryonic development, larval growth, and distribution.

GULLAND, J. A. (ed.).

1971. The fish resources of the oceans. Food Agric. Organ. U.N., FAO Fish. Tech. Pap. 97. 425 p.

Contains a very brief review of herring fisheries and state of the stocks in Alaska and British Columbia.

HANAMURA, NOBUHIKO.

1961. On the present status of the herring stocks of Canada and southeastern Alaska. Int. North Pac. Fish. Comm., Bull. 4: 63-85.

Reevaluation of the status of the herring stocks of British Columbia and southeastern Alaska by Hanamura of the Hokkaido Regional Fish Research Laboratory, Japan. On the basis of his calculations, the rate of exploitation of both Canadian and U.S. herring could be increased without adversely affecting recruitment.

HART, J. L.

1949. Report on the investigation of albacore (Thunnus alalunga): The lengths of albacore in the commercial catch. Fish. Res. Board Can., Biol. Stn., Nanaimo, B.C., Circ. 17: 19-20. (Processed.)

Length measurements of 4,210 albacore from commercial catches off British Columbia in 1948 showed two groups of lengths were most common. One group had lengths centering around 63 cm. and the second less abundant group was around 75 cm. Northern fishing grounds north of Cape St. James had the most abundant size group averaging larger than in the south.

HART, J. L.

1973. Pacific fishes of Canada. Fish. Res. Board Can., Bull. 180. 740 p.

This is essentially an identification manual with brief notes giving the description, life history, and distribution of each species. Literature references are included.

HITZ, CHARLES R., and ROBERT R. FRENCH.

1965. Occurrence of pomfret (Brama japonica) in the northeastern Pacific Ocean. U.S. Fish Wildl. Serv., Fish. Ind. Res. 3(1): 1-7.

Data compiled in gill net surveys from 1950 to 1962 and purse seine sets from 1956 to 1962 were analyzed. Results show that pomfret in the Gulf of Alaska were caught mainly during August and September at surface water temperatures from 11° to 14°C. The catches suggest that in certain areas pomfret may be present in commercially harvestable quantities. No pomfret were taken in the Bering Sea. Sampling areas and relative numbers of fish caught per gear set are drawn on maps.

HOLLAND, GILBERT A.

1957. Migration and growth of the dogfish shark, Squalus acanthias (Linnaeus), of the eastern North Pacific. Wash. Dep. Fish., Fish. Res. Papers 2(1): 43-59.

Commercial fishery recoveries of dogfish tagged off the coasts of Washington and Vancouver Island indicated a southward migration in fall and winter and a northward migration in spring and summer. Recoveries were made as far south as Baja California and as far north as Hecate Strait, B.C. One specimen was recovered off Honshu Island, Japan, a distance of about 4,700 nautical miles, more than 7 years after tagging. The author believes the data show evidence of an indigenous population of dogfish in Puget Sound and the Strait of Georgia and a migratory population off the Pacific Coast ranging at least from Baja California north and west to Japan. A table shows annual landings in pounds of dogfish livers in California, Oregon, Washington, British Columbia, and Alaska for 1937-1954.

INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION.

1957-1975. Statistical Yearbook [1952-1972]. Vancouver, B.C. Pagination and authorship varies.

Presents annual tables of commercial fishery catches by Canada, Japan, United States and U.S.S.R. in North American waters by region and species in numbers and pounds. Includes statistics on the Alaskan herring industry and occasionally provides data on the Japanese herring catch in the Bering Sea. Table format and information provided vary somewhat through the years.

## INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION.

- 1961a. The exploitation, scientific investigation and management of herring (*Clupea pallasii*) on the Pacific coast of North America in relation to the abstention provisions of the North Pacific Fisheries Convention. Int. North Pac. Fish. Comm., Bull. 4. 100 p.

Consists of a collection of articles, (many of which had been previously issued as INPFC Documents) regarding the status of British Columbian and Alaskan herring stocks and whether they are eligible for abstention status under the North Pacific Fisheries Convention provisions. Articles are presented as a dialogue between the concerned parties; those applying to the Bering Sea or Gulf of Alaska are listed in this bibliography as International North Pacific Fisheries Commission 1961b-1961j.

- 1961b. Report of the United States of America concerning the management of certain North Pacific herring stocks with reference to Article III(1) (a) of the International Convention for the High Seas Fisheries of the North Pacific Ocean of 1952. Int. North Pac. Fish. Comm., Bull. 4: 14-20.

Information is presented for use in considering whether the North Pacific herring stocks qualify for continuing abstention under the three conditions specified in Article IV of the Convention. The first condition specifies ~~that~~ more intensive exploitation must not be likely to provide a substantial and sustained increase in yield. Population data and comparisons of yields at two levels of fishing intensity are presented to help satisfy this condition. The other two conditions: that the stock in question is already regulated by each exploiting party, and that the stock is undergoing continuing and extensive scientific study were also substantiated.

- 1961c. Variation of fishing effort in recent years, Alaska herring. Int. North Pac. Fish. Comm., Bull. 4: 25-26.

A table shows the annual fishing effort statistics from 1929 to 1956 in response to a request by the INPFC for more information.

- 1961d. The relation between number of spawning herring and resulting recruitment. Int. North Pac. Fish. Comm., Bull. 4: 27-28.

The herring catch per ton-day in southeast Alaska from 1929 to 1953 is given as a crude estimate of abundance of the standing stocks.

- 1961e. Clarification of the difference in estimates of natural mortality rates used in the United States and Canadian reports on herring. Int. North Pac. Fish. Comm., Bull. 4: 31.

The natural mortality rate estimates used in the U.S. and Canadian reports on herring were stated to differ because 1) they pertain to different age groups, and 2) the natural mortality rate appears to be lower in southeastern Alaska, at least among the younger age groups.

## INTERNATIONAL NORTH PACIFIC FISHERIES COMMISSION.

1961f. Additional information regarding the United States reports on herring stocks. Int. North Pac. Fish. Comm., Bull. 4: 32-33. (Note: Tables in this paper replace those given in 1961b.)

The additional information consists of three tables: 1) Alaska herring catches for the years 1929-1957; 2) Alaska herring catch quotas for the years 1940-1958; and 3) the total catch from southeastern Alaska herring year classes. These tables were based on corrected catch figures and were intended to replace the appropriate tables in the original U.S. abstention report (Int. North Pac. Fish. Comm., 1961b).

1961g. Year class fluctuations in United States herring stocks. Int. North Pac. Fish. Comm., Bull. 4: 34-37.

A table of year class fluctuations from 1919 to 1957 shows the yearly contribution of herring in numbers of fish x 1000 in the catch in southeastern Alaska plus the total contribution of each year class.

1961h. Summary of the views of the Japanese national section on the qualifications for abstention of North American herring. Int. North Pac. Fish. Comm., Bull. 4: 45-48.

Views of the Japanese National Section on the Canadian and U.S. reports on qualification of the herring stocks for abstention (Int. North Pac. Fish. Comm., Bull. 4: 1-13; 1961b) are given. The Japanese contend that the herring stocks do not qualify for abstention since 1) an increased fishing effort would result in an increase in yield; and 2) an increase in catches would not result in a decrease in recruitment.

1961i. The status of exploitation of North American herring stocks. Int. North Pac. Fish. Comm., Bull. 4: 86-92.

Based on data previously submitted by the United States and Canada (Int. North Pac. Fish. Comm. Bull. 4: 1-13; and 1961b), the article expresses the views of Japan that the North American herring stocks do not meet the abstention requirements of the Convention.

1961j. Additional information on herring stocks of the United States. Int. North Pac. Fish. Comm., Bull. 4: 93-100.

Contains a reevaluation of the natural mortality rate of Alaskan herring stocks using an analysis of data from a series of tagging experiments conducted in southeastern Alaska in the 1930's.

## INTERNATIONAL PACIFIC HALIBUT COMMISSION.

1964. Catch records of a trawl survey conducted by the International Pacific Halibut Commission between Unimak Pass and Cape Spencer, Alaska from May 1961 to April 1963. Rep. Int. Pac. Halibut Comm. 36. 524 p.

Demersal trawl catch records obtained at 1,560 stations between Unimak Island and Cape Spencer, Alaska, from May 1961 to April 1963 are summarized. Atka mackerel, capelin, sandfish, sand lance, and surf smelt are grouped with a large variety of other fish species as "miscellaneous roundfish". Dogfish are grouped with skates as "elasmobranchs", but the catch data for Pacific saury, herring, and eulachon are given individually.

JORDAN, DAVID STARR, and CHARLES HENRY GILBERT.

1899. The fishes of the Bering Sea. In David Starr Jordan (editor), The fur seals and fur-seal islands of the North Pacific Ocean, Part 3, p. 433-492. Gov. Print. Off., Washington, D.C.

Fish collections were made about Unalaska, Bogoslof Island, and off St. George and St. Paul Islands as part of the 1896 cruise of the Albatross. Notes include remarks about specimens obtained by various investigators from the vicinity of Kamchatka and the Kurile Islands and also from the Shelikof Straits.

KASAHARA, HIROSHI.

1964. Recent developments in the exploitation of bottomfishes in the Bering Sea and Gulf of Alaska. Chapt. 14 in his Fisheries resources of the North Pacific Ocean, Pt. 2, p. 137-149. H.R. MacMillan Lectures in Fisheries, Univ. B.C., Inst. Fish., Vancouver, B.C.

Includes brief notes on the Japanese herring fishery in the Bering Sea in 1961 and 1962.

KASHKINA, A. A.

1970. Letniĭ ikhtioplankton Beringova morya (Summer ichthyoplankton of the Bering Sea). Tr. Vses. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr. 70 (Izv. Tikhookean. Nauchno-issled. Rybn. Khoz. Okeanogr. 72): 225-245. In Russian. (Transl. by Israel Program Sci. Transl., 1972, p. 225-247 in P. A. Moiseev (ed.), Soviet fisheries investigations in the northeastern Pacific, Pt. 5, avail. Natl. Tech. Inf. Serv., Springfield, Va., as TT 71-50127.)

The Soviet vessel Ogon collected material during a cruise in June and July 1962. The ichthyoplankton was found to contain eggs and larvae from 23 families. Larvae and fry of the sand lance, Ammodytes hexapterus, were caught at 13 stations. Data on these collections are included, as well as a map showing the locations sand lance larvae have been found by three different expeditions.

KENYON, KARL W.

1956. Food of fur seals taken on St. Paul Island, Alaska, 1954. J. Wildl. Manage. 20(2): 214-215.

Of the 50,239 immature male fur seals killed on St. Paul Island between June 26 and July 26, 1954, only 32 (or about 0.06%) contained food items in the stomachs. Sandfish, which had not previously been reported as a fur seal food item, comprised 94.2% by volume of the 27 stomach contents that were examined. Sea poacher, cod, and squid formed the remainder of the food items.

\*KESSLER, DOYNE W., and GERALD M. REID.

1962. Studies of the summer herring fishery in southeastern Alaska, 1962. U.S. Fish Wildl. Serv., Biol. Lab., Auke Bay, Alaska, Manusc. Rep. 1962, MR 62-12. 6 p. (Processed.)

No fishing for reduction purposes was done in Prince William Sound or Kodiak waters in 1962, but data were taken from catch samples in southeastern Alaska. Data include geographic distribution of catch, age composition, and total catch by weekly periods.

KETCHEN, K. S.

1972. Size at maturity, fecundity, and embryonic growth of the spiny dogfish (Squalus acanthias) in British Columbia waters. J. Fish. Res. Board Canada. 29(12): 1717-1723.

Information on the maturity and reproduction of the spiny dogfish from the Pacific coast of Canada is compared with findings in other areas. Observations include maximum size, size at maturity, fecundity, and intrauterine growth rate.

KOBAYASHI, KIYU.

1961. Larvae and young of the sand-lance, Ammodytes hexapterus Pallas from the North Pacific. (In Japanese, English abstract.) Bull. Fac. Fish. Hokkaido Univ. 12(2): 111-120.

Larvae and young from 1,671 sand lance specimens collected from the northwestern Pacific Ocean, including the Okhotsk and Bering Seas are described. Data were compiled on fin rays, pigment distribution, myotome and vertebral number, body length composition, and number of larvae and young collected in the various locations in 1955-60.

KOLLOEN, LAWRENCE N.

1947. The decline and rehabilitation of the southeastern Alaska herring fishery. U. S. Fish Wildl. Serv., Fish. Leaflet. 252. 13 p.

Overfishing and poor year class recruitment were felt responsible for the decline of the fishery in the late 1930's. A limitation of fishing and a series of successful year classes restored the stocks, but continued management was recommended to help prevent future declines.

KOLLOEN, L. N., and C. H. ELLING.

1948. Outlook for the Alaska herring fishery in 1948. U. S. Fish Wildl. Serv., Spec. Sci. Rep. 52. 23 p. + 2 figs.

Catch data (with year class composition) for Kodiak, southeastern Alaska, and Prince William Sound fisheries are presented. The 1948 catches were estimated on the basis of analyses of the data.

KOLLOEN, LAWRENCE N., and KEITH A. SMITH.

1953. Southeastern Alaska exploratory herring fishing operations, winter 1952/53. *Commer. Fish. Rev.* 15(11): 1-24.

The exploratory fishing vessel John N. Cobb found that, except at a few locations, herring were not abundant during the operational period of Nov. 4 to Dec. 19, 1952. In winter, the herring appeared to stay at much greater depths than in the summer, as indicated by echolocation surveys. Data include scope of explorations of Cobb and commercial vessels, notes on herring occurrence, length and weight, age, oil content, and winter and summer behavior.

LARKINS, HERBERT A.

1964. Some epipelagic fishes of the North Pacific Ocean, Bering Sea, and Gulf of Alaska. *Trans. Am. Fish. Soc.* 93(3): 286-290.

Incidental species caught by the salmon gill-netting explorations of the U. S. Bureau of Commercial Fisheries in the North Pacific Ocean, Bering Sea, and Gulf of Alaska from 1955 to 1961 are discussed. The numbers of each species taken in the total area and the frequency with which they were caught in each of the six sub-areas are presented in tables.

LeBRASSEUR, R. J.

- 1964a. Stomach contents of blue shark (Prionace glauca L.) taken in the Gulf of Alaska. *J. Fish. Res. Board Can.* 21(4): 861-862.

Observations of stomach contents of 29 blue sharks caught in 2 gillnet sets made in July 1959 in the southeastern part of the Gulf of Alaska suggest that, when salmon are available, the blue shark may temporarily abandon its opportunistic habits and selectively feed on them. Food items are listed.

- 1964b. Data record, collections of fish taken in Isaacs-Kidd midwater trawl from northeastern Pacific Ocean 1958-59. *Fish. Res. Board Can., Manuscr. Rep. Ser. (Oceanogr.-Limnol.)* 175. 25 p.

Contains data from a series of Isaacs-Kidd midwater trawls that were undertaken by Canadian research vessels in 1958-59 to accompany the high seas exploratory salmon fishing investigation in an attempt to sample the larger forage organisms available to salmon. Fish species caught are listed by latitude and longitude, date, gear, depth caught, and length.

1970. Larval fish species collected in zooplankton samples from the northeastern Pacific Ocean, 1956-1959. *Fish. Res. Board Can., Tech. Rep.* 175. 47 p.

Species and geographic locations of ichthyoplankton samples taken off the British Columbia coast and in the Gulf of Alaska are listed. The incidence of fish larvae in samples within 100 miles of the coast was much greater than in the open ocean.

LEGGETT, WILLIAM C., and RICHARD R. WHITNEY.

1972. Water temperature and the migrations of American shad. U.S. Dep. Commer., Natl. Oceanic Atmos. Admin., Natl. Mar. Fish. Serv., Fish. Bull. 70(3): 659-670.

The peak of spawning runs of the American shad is correlated with water temperatures near 18.5°C. Migration patterns in the Atlantic and Pacific Oceans also appear to be temperature related. Although shad are not known to spawn north of the Fraser River, B.C., they do migrate into the Gulf of Alaska during summer months.

LIPANOV, V. G., and P. I. SHESTOPALOV.

1961. Beringovomorskaya sel'd' i perspektivy ee promysla (Bering Sea herring and its fishery prospects). Rybn. Khoz. 37(11): 45-47. In Russian. (Partial transl. by Milan A. Kravanja, 1962, Natl. Mar. Fish. Serv., Transl. Program, Washington, D. C.)

Exploratory herring fishery operations by the U.S.S.R. in the Bering Sea from January 1960 to April 1961 are described. Echosounding and test trawling were used to locate schools of wintering herring in the central and eastern regions. Trawling was found to be more advantageous than drift-net fishing, and large trawlers were proven to be more efficient than small ones.

LYLES, CHARLES H.

1965-1969. Fishery statistics of the United States [1963-1967]. U. S. Dep. Int., Fish Wildl. Serv., Stat. Dig. No's. 57, 58, 59, 60, 61. Various pagination.

For annotation, see Anderson and Peterson (1952-1954).

MACHIDORI, SEIJI, and SATORU NAKAMURA.

1971. Distribution and some biological informations of pomfret (Brama rai) in the northwestern North Pacific Ocean. Bull. Far Seas Fish. Res. Lab. 5: 131-145. In Japanese with English abstract.

Japanese salmon research vessels collected data on horizontal and vertical distributions, length, age, and stomach contents of pomfret in the northwestern North Pacific and Okhotsk and Bering Seas during 1968-1970. No pomfret were caught in the Okhotsk and Bering Seas.

MANZER, J. I.

1972. Length-weight relationship for pomfret. J. Fish. Res. Board Can. 29(7): 1079-1081.

Examines the length-weight relationship of 298 pomfret of 30-49 cm fork length (lower third of length range) caught in the Gulf of Alaska during 1956 and 1957.

## MARINE FISHERIES REVIEW.

1976. USSR reports catch off U.S. Pacific coast. Mar. Fish. Rev. 38(3): 35.

The Soviet preliminary total for catch of Pacific herring in the eastern Bering Sea, January—August 1975, was 18,351 metric tons.

## MARINE MAMMAL BIOLOGICAL LABORATORY.

1970. Fur seal investigations, 1968. U.S. Dep. Commer., Natl. Oceanic Atmos. Admin., Natl. Mar. Fish. Serv., Spec. Sci. Rep. Fish. 617. 125 p.

Approximately 85% of the stomach contents of pelagic fur seals captured off Alaska consisted of walleye pollock, squids, and Atka mackerel. Saury, sandfish, and sand lance were among the organisms making up the remainder of the diet. Maps show the capture locations of fur seals whose stomachs contained Atka mackerel and capelin.

## MARSH, MILLARD C., and JOHN N. COBB.

1908-1911. The fisheries of Alaska in [1907-1910]. U.S. Bur. Fish., Rep. Comm. Fish. [1907-1910], (also issued as Doc. No's. 632, 645, 730, 746). Various pagination.

For annotation, see Bower (1919-1941).

## MEAD, GILES W., and RICHARD L. HAEDRICH.

1965. The distribution of the oceanic fish, Brama brama. Bull. Mus. Comp. Zool. Harvard Univ. 134(2): 29-67.

Although primarily an analysis of the distribution and seasonal migration of the Atlantic species, Brama brama, the paper discusses (p. 38-40) the seasonal distribution of Brama japonica found in the Gulf of Alaska for comparison. These observations are based on the incidental pomfret catches in the high seas salmon gill-net surveys that were summarized by Neave and Hanavan (1960) and Hitz and French (1965).

## MOBERLY, STANLEY A.

1973. Age, sex and size composition of Pacific herring, Clupea pallasii, from southeastern Alaska during winter and spring, 1970-1971. Alaska Dep. Fish Game, Tech. Data Rep. 11. 20 p. (Processed.)

Describes the present fishery and gives a brief note on ongoing biological studies. Contains tables of age, size and sex composition of herring collected from various areas in southeastern Alaska and Yakutat during winter and spring, 1970-1971.

1974a. Age, sex and size composition of Pacific herring, (Clupea pallasii), from southeastern Alaska and Yakutat during winter and spring, 1971-1972. Alaska Dep. Fish Game, Tech. Data Rep. 15. 20 p. (Processed.)

The present fishery is described and brief notes are given on ongoing biological studies. Tables of age, size and sex composition of herring collected from various areas in southeastern Alaska (but not including Yakutat) during winter and spring 1971-1972 are included.

MOBERLY, STANLEY A.

1974b. Age, sex and size composition of Pacific herring, (Clupea pallasii), from southeastern Alaska during fall, winter and spring, 1972-1973. Alaska Dep. Fish Game, Tech. Data Rep. 16. 24 p. (Processed.)

The present fishery is described and brief notes about ongoing biological studies are given. Tables list age, size, and sex composition of herring collected from various areas in southeastern Alaska and Yakutat during fall, winter, and spring, 1972-1973.

1974c. Age, sex and size composition of Pacific herring, (Clupea pallasii), from southeastern Alaska during fall, winter and spring, 1973-1974. Alaska Dep. Fish Game, Tech. Data Rep. 18. 23 p. (Processed.)

The fishery is described and ongoing biological studies are briefly discussed. Tables list age, size, and sex composition of herring collected in various areas in southeastern Alaska during fall, winter, and spring, 1973-1974.

MOBERLY, STANLEY A., and R. E. THORNE.

1974. Assessment of southeastern Alaska herring stocks using hydroacoustical techniques 1970-71. Alaska Dep. Fish Game, Juneau, Inf. Leaflet. 165. 24 p.

Hydroacoustical data on herring stocks were collected, including volumes and densities of herring schools encountered, population sizes were estimated in areas surveyed, and diel distribution was noted.

MOISEEV, P. A.

1965. Chto pokazali issledovaniya Beringova morya (What research in the Bering Sea has demonstrated). Dalryba, Tsentral'noe Byuro Tekhnicheskoi Informatsii, Vladivostok. 27 p. In Russian. (Prelim. transl. by U.S. Joint Publ. Res. Serv., 1966, avail. Natl. Mar. Fish. Serv., Office Int. Fish., Washington, D.C.)

This general review discusses bottom topography, oceanographic features, benthos distribution, fish species (demersal only, but includes grenadiers), and potential fisheries based on recent Soviet exploratory fishing expeditions.

1970. Nekotorye voprosy otsenki biologicheskikh resursov Mirovogo okeana v svete rezul'tatov rabot Beringovomorskoĭ ěkspeditsii (Some problems of estimating biological resources of the oceans in the light of the results of the Bering Sea Expedition). Tr. Vses. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr. 70 (Izv. Tikhookean. Nauchno-issled. Inst. Rybn. Khoz. Okeanogr. 72): 8-14. In Russian. (Transl. by Israel Program Sci. Transl., 1972, p. 1-6 in P. A. Moiseev (ed.), Soviet fisheries investigations in the northeastern Pacific, Part 5, avail. Natl. Tech. Inf. Serv., Springfield, Va., as TT 71-50127.)

The Bering Sea expedition of the Soviets during 1958-1961 examined the fishery resources, their distribution, biology, ecology, and behavior. Knowledge of the resources was considerably expanded, and commercial fisheries of the area were developed. Productivity of narrow shelf areas was found to be 5-6 times higher than that of broad shelves. This article makes general conclusions about productivity but does not discuss specific fisheries.

## \*MORSKI INSTYTUT RYBACKI W GDYNI.

1976. Activities of the Polish fishing fleet in the North East Pacific/INPFC statistical area for January-December 1975. Morski Instytut w Gdyni [Gdynia, Poland]. 156 tables.

Tables and figures show catches of various fish species by Polish stern trawlers from California to Alaska waters in 1975. Species include horse mackerel, herring, and Atka mackerel. Catches are arranged by area, trawler class, species, and month.

## MUSIENKO, L. N.

1963. Ikhtioplankton Beringova morya (po materialam Beringovomorskomoj ekspeditsii TINRO i VNIRO 1958-1959 gg.) [Ichthyoplankton of the Bering Sea (data of the Bering Sea Expedition of 1958-1959)]. Tr. Vses. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr. 48 (Izv. Tikhookean. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr. 50): 239-269. In Russian. (Transl. by Israel Prog. Sci. Transl., 1968, p. 251-286 in P. A. Moiseev (ed.), Soviet fisheries investigations in the northeast Pacific, Pt. 1, avail. Natl. Tech. Inf. Serv., Springfield, Va. as TT 67-51203.)

The Soviet vessels Zhemchug and Alazeya collected samples during 1958 and 1959 with fish plankton nets mainly between lat 53° and 60°N and long 175-161°W. Data include information on egg and larval distribution, time and location of collection, biology, and description of development of species collected.

1970. Razmnozhenie i razvitie ryb Beringova morya (Reproduction and development of Bering Sea fishes). Tr. Vses. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr. 70 (Izv. Tikhookean. Nauchno-issled. Inst. Rybn. Khoz. Okeanogr. 72): 166-224. In Russian. (Transl. by Israel Program Sci. Transl., 1972, p. 161-224 in P. A. Moiseev (ed.), Soviet fisheries investigations in the northeastern Pacific, Pt. 5, avail. Natl. Tech. Inf. Serv., Springfield, Va., as TT 71-50127.)

Information is given on the reproduction and development of fishes collected by the Soviet Bering Sea expedition and exploratory vessels. Notes on spawning and larvae of herring, rainbow smelt, capelin, eulachon, sandfish, sand lance, and Atka mackerel are included. Appendix tables give the spawning times by seasons, the conditions for spawning and development of eggs, and the characteristics of the eggs, larvae, and fry of some of the Bering Sea species.

## NAGASAKI, F.

1961. The status of exploitation of North American herring stocks. Int. North Pac. Fish. Comm., Bull. 4: 38-44.

Data given in the herring abstention proposals submitted by Canada and the United States (Int. N. Pac. Fish. Comm., Bull. 4: 1-13; and 1961b) are reevaluated, expressing the Japanese views. The author feels that neither the British Columbia nor Alaskan herring stocks qualify for abstention.

## NAKAYA, KAZUHIRO.

1971. Descriptive notes on a porbeagle, Lamna nasus, from Argentine waters, compared with the North Pacific salmon shark, Lamna ditropis. Bull. Fac. Fish. Hokkaido Univ. 21(4): 269-279.

Morphological descriptions are given for three North Pacific salmon sharks from the Okhotsk Sea and off Hokkaido, Japan, and four salmon shark jaws from the Bering Sea. A comparison is made with corresponding information on one Argentine porbeagle specimen. No information is shown for the Bering Sea specimens except total length, locality (lat. and long.) of catch, and type of gear.

## NATIONAL MARINE FISHERIES SERVICE.

1971-1975a. Fishery statistics of the United States [1968-1972]. U.S. Dep. Commer., Natl. Mar. Fish. Serv., Stat. Dig. No's. 62, 63, 64, 65, 66. Various pagination.

For annotation, see Anderson and Peterson (1952-1954).

\*1973-1975b. Alaska Region monthly narrative report, [Oct. 1973 to Sept.-Oct. 1975]. U.S. Dep. Commer., Natl. Oceanic Atmos. Admin., Natl. Mar. Fish. Serv., [Juneau, Alaska]. Various pagination.

Reports include a section on foreign fishing activities off Alaska, in which the numbers and kinds of vessels of each nationality are given, as well as the target species they are thought to be fishing.

## NEAVE, FERRIS, and M. G. HANAVAN.

1960. Seasonal distribution of some epipelagic fishes in the Gulf of Alaska region. J. Fish. Res. Board Can. 17(2): 221-233.

Presents the summer distribution in the Gulf of Alaska of the salmon shark, Pacific salmon, steelhead, pomfret, blue shark, jack mackerel, and albacore as determined by the catch in surface gillnets in early, middle, and late summer of 1956 and 1957. Seasonal changes in range were found to correspond with surface water temperature changes.

NELSON, EDWARD W., with additional notes by  
TARLETON H. BEAN.

1887. Field notes on Alaskan fishes. In: Edward W. Nelson, Report upon natural history collections made in Alaska between the years 1877 and 1881, No. III, Arctic series of publications issued in connection with the Signal Service, U.S. Army, Pt. 3, p. 295-322. Gov. Print. Off., Washington, D.C.

Among species described is Osmerus dentex which was noted as abundant from Kotzebue Sound to the mouth of the Kuskoqwin in tide creeks and inner bays all along shore from about the 10th of September until November.

## NORTH PACIFIC FUR SEAL COMMISSION.

1962. Report on investigations from 1958 to 1961. Presented to the North Pacific Fur Seal Commission by Standing Scientific Committee on 26 November 1962. 183 p.

Tables give the volume and percent frequency of food items in the stomachs of fur seals captured off California, Oregon, and various regions of Alaska. In Alaskan waters herring, capelin, pollock, and sand lance made up 93 and 92% of the stomach contents of pelagic fur seals in 1958 and 1960, respectively. Table 50 lists stomach contents in southeastern Alaska, Gulf of Alaska, and western Alaska during February-July 1958. Table 52 details contents in southeastern Alaska, Gulf of Alaska, western Alaska, and Bering Sea and Unimak Pass, March-August 1960.

1969. Report on investigations from 1964 to 1966. Washington, D.C. 161 p.

In July and August 1964, squids, herring, pollock, capelin, and deepsea smelt composed the majority of the food items in the stomachs of fur seals collected in the Bering Sea. Tables include one listing food items found in stomachs in the Bering Sea in summer and fall, 1964.

1971. Report on investigations in 1962-63. Washington, D.C. 96 p.

In 1962 and 1963 capelin, squid, pollock, Atka mackerel, and deepsea smelt made up the major food items found in the stomachs of fur seals captured off western Alaska and in the Bering Sea. Table 54 lists stomach contents in the Bering Sea, June-October 1962, and Table 55 details contents during July-September 1963.

1975. Report on investigations from 1967 through 1972. Washington, D.C. 212 p.

In Alaska in May to August 1968, the major food items of pelagic fur seals were walleye pollock (32%), squids (26%), Atka mackerel (14%), and Pacific sand lance (11%). Tables list food species taken in various areas including the Gulf of Alaska (spring and summer), western Alaska (summer), and Bering Sea (summer).

## OKADA, SHUN, and KIYU KOBAYASHI.

1968. Hokuyo-gyorui-zusetsu (Colored illustrations of pelagic and bottomfishes in the Bering Sea). Hokuyo Sakemasu Shigen Chosa Kenkyukai and Nihon Suisan Shigen Hogo Kyokai, Tokyo. 179 p.

Basically a check list, it is limited to 81 pelagic and bottom fishes caught in drift nets and trawls on voyages of the Japanese research vessel Oshoro Maru in 1952-55 and 1963-65. Data are supplemented by information from Japanese and foreign literature. Lists scientific and common names (in Japanese, English and Russian), brief descriptions, some morphological and biological data, and distribution. Each species is shown in a color photograph.

OTSU, TAMIO, and RICHARD N. UCHIDA.

1963. Model of the migration of albacore in the North Pacific Ocean. U.S. Fish Wildl. Serv., Fish. Bull. 63(1): 33-44.

This study hypothesizes that there is a single albacore population in the North Pacific. Data are given on their movements; commercial sizes move predominantly from eastern Pacific toward Japan, but movements from spawning grounds up into the Gulf of Alaska are not shown.

PACIFIC FISHERMAN.

1948. Alaska's tuna surprise wanes. Pac. Fisherman 46(11): 34.

Brief news article describes the unusual occurrence of albacore in the vicinity of the Queen Charlotte Islands and their subsequent disappearance. While the tuna were in the area, however, nearly 400,000 lbs. of albacore were landed in Ketchikan where prices paid ranged from \$520 to \$550 per ton.

1958. Gulf of Alaska albacore taken by halibut schooners. Pac. Fisherman 56(10): 11.

The halibut schooners Sunset and Trinity brought several hundred pounds of long-fin tuna picked up on trolling lines in the Gulf of Alaska (location not given). The article notes that tuna taken earlier in Shelikof Strait were tentatively identified as bluefin.

PARIN, N. V.

1960. Areal saury (Cololabis saira Brev.--Scombresocidae, Pisces) i znachenie okeanograficheskikh faktorov dlya ee rasprostraneniya [Range of the saury (Cololabis saira Brev.--Scombresocidae, Pisces) and effects of oceanographic features on its distribution]. Dokl. Akad. Nauk. SSSR 130(3): 649-652. In Russian. (Transl. by Laurence Penny, 1962, avail. Natl. Mar. Fish. Serv., Lang. Serv. Div., Washington, D. C.)

The Pacific saury is a true pelagic species with an amphi-Pacific distribution. The author discusses the major feeding, spawning, and nursery grounds of the saury in the Pacific Ocean and characteristics of each. Spawning times, distribution of eggs and larvae in winter and summer, and water temperatures are included.

1968. Ikhtiofauna okeanskoĭ epipelagiali (Ichthiofauna of the epipelagic zone). Izdatel'stvo "Nauka", Moscow. 186 p. In Russian. (Transl. by Israel Prog. Sci. Transl., 1970, 206 p., avail. Natl. Tech. Inf. Serv., Springfield, Va. as TT 69-59020.)

The author considers this an attempt to condense existing information on the systematics, geographical distribution, ecology, and yield of the fishes that permanently or temporarily inhabit the upper horizons of the pelagic. Chapt. 6, (p. 71-110 of transl.), is a survey, according to families, of the geographical distribution of epipelagic fishes of the world ocean.

POWELL, DONALD E., DAYTON L. ALVERSON, and ROBERT LIVINGSTONE, JR.

1952. North Pacific albacore tuna exploration--1950. U.S. Fish Wildl. Serv., Fish. Leaflet. 402. 56 p.

Exploratory fishing on the research vessel John N. Cobb continued a project begun in midsummer 1949 to study the range and commercial fishery prospects for tuna in the northeast Pacific. Two weeks were spent in Alaskan waters but no commercial quantities of albacore were found. Biological observations include length frequencies of tuna caught in 1950, food, and distribution as related to water temperature.

POWELL, DONALD E., and HENRY A. HILDEBRAND.

1950. Albacore tuna exploration in Alaskan and adjacent waters--1949. U.S. Fish Wildl. Serv., Fish. Leaflet. 376. 33 p.

The R/V Oregon made an exploratory cruise to investigate the commercial range, abundance, and movements of albacore off the western coast of British Columbia and southeastern Alaska. Surface water temperatures were correlated with occurrence of albacore. Stomach analyses showed that the tuna fed almost solely on plankton and small fish.

POWELL, DONALD E., and ALVIN E. PETERSON.

1957. Experimental fishing to determine distribution of salmon in the North Pacific Ocean, 1955. U.S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 205. 30 p.

Includes catch locations of pelagic species other than salmon caught incidentally on the exploratory salmon gillnetting operations of three research vessels in the Gulf of Alaska during the summer and early fall of 1955.

POWER, E. A.

1958-1963. Fishery statistics of the United States [1956-1961]. U.S. Dep. Int., Fish Wildl. Serv., Stat. Dig. No's. 43, 44, 49, 51, 53, 54. Various pagination.

For annotation, see Anderson and Peterson (1952-1954).

POWER, E. A., and C. H. LYLES.

1964. Fishery statistics of the United States 1962. U.S. Dep. Int., Fish Wildl. Serv., Stat. Dig. 56. 466 p.

Catch data of Alaskan fisheries by region and by gear are included as well as the market value and poundage of the fishery products. Data are given for herring.

PROKHOROV, V. G.

1968. O zimnem periode zhizni beringovomorskoĭ sel'di (Winter period of life of herring in the Bering Sea). Izv. Tikhookean. Nauchno-issled. Inst. Rybn. Khoz. Okeanogr. 64: 329-337. In Russian. (Transl., 1970, 21 p., Fish. Res. Board Can., Transl. Ser. 1433.)

Investigations by Soviet scientists in the western Bering Sea in 1958-1965 and in the southeastern part in 1960-1963 resulted in the determination of areas of winter residence of herring. Dispersal and behavior of herring were measured hydroacoustically. Samples of fish from trawl catches were analyzed to determine age, fat content, and hemoglobin content of blood. Karaginskii and Pribilof Island populations were similar in yearly cycle and general biology but differed in their age at maturity, age composition, and temperature of their wintering grounds.

## QUAST, JAY C.

1964. Occurrence of the Pacific bonito in coastal Alaskan waters. *Copeia* 1964(2): 448.

Pacific bonito specimens caught in Alaska in Clarence Strait and the Copper River delta during June 1963 extend the known range of this species 400 and 950 miles northward. At the time of capture, oceanic temperatures in the Gulf of Alaska were probably higher than usual.

## RADOVICH, JOHN.

1961. Relationships of some marine organisms of the northeast Pacific to water temperatures particularly during 1957 through 1959. *Calif. Dep. Fish Game, Fish Bull.* 112. 62 p.

During a period of abnormally warm oceanic temperatures off the Pacific coast from 1957 to 1959, many marine species wandered north of their usual range. This article notes the unusual occurrences of fish, including the capture of a bluefin tuna near Kodiak Island, Alaska, in July 1958, and mentions a record of barracuda off Kodiak Island in 1937.

## REEVES, J. E.

1972. Section 19. Groundfish of the Gulf of Alaska, p. 411-455. In Donald H. Rosenberg (ed.), A review of the oceanography and renewable resources of the northern Gulf of Alaska. Univ. Alaska, Fairbanks, Inst. Mar. Sci., IMS Rep. R72-23, Sea Grant Rep. 73-3.

The appendix (p. 448-451) contains a short review of the herring fishery in the Gulf of Alaska. It includes a table of the total herring catches in southeastern, central, and western Alaska for selected years from 1916 to 1941 and all years from 1960 to 1969.

## REID, GERALD M.

- \*1962. Studies of the summer herring fishery in southeastern Alaska, 1961. U.S. Fish Wildl. Serv., Biol. Lab., Auke Bay, Alaska, Manuscr. Rep. MR 62-2. 9 p. (Processed.)

No fishing for reduction purposes was carried out in Prince William Sound or Kodiak in 1961, but data were taken from southeastern Alaska. These include catch by area and by 10-day period and age composition.

1971. Age composition, weight, length, and sex of herring, Clupea pallasii, used for reduction in Alaska, 1929-66. U.S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 634. 25 p.

Sampling data from the reduction fisheries for herring, Clupea pallasii, in southeastern Alaska (1929-66), Prince William Sound (1937-58), and Kodiak (1936-59) are summarized. The data include the weight of the catches, the weight allowed by quota, and age composition, average weight, average length, and sex ratios. (Author's abstract).

REID, GERALD M.

1972. Alaska's fishery resources--the Pacific herring. U.S. Dep. Commer., Natl. Oceanic Atmos. Admin., Natl. Mar. Fish. Serv., Fish. Facts-2, 20 p.

Summarizes (in popular form) the history of the Alaskan herring fishery, the biology and life history of herring, and the nature of its population dynamics.

ROUNSEFELL, GEORGE A.

1930a. Contribution to the biology of the Pacific herring, Clupea pallasii, and the condition of the fishery in Alaska. Bull. U. S. Bur. Fish. 45: 227-320.

Discusses the history and condition of the fishery; contains information on racial studies and catch data analysis as well as descriptions of the size distribution, spawning habits, age, growth, and condition (fatness) of the herring of southeastern and central Alaska.

1930b. The existence and causes of dominant year classes in the Alaska herring. Contrib. Mar. Biol., p. 260-270. Stanford Univ. Press, Calif.

The existence of dominant year classes in Prince William Sound, Alaska, is demonstrated for the years 1924 to 1929. Year class strength is the reflection of the spawning success which was found to have a high correlation with the averages of the mean monthly temperatures in March to June. This correlation was suggested to be associated with food supply or predation.

1931. Fluctuations in the supply of herring (Clupea pallasii) in southeastern Alaska. Bull. U.S. Bur. Fish. 47 (Bull. 2 issued July 15, 1931): 15-56.

Contains an analysis of catch records from 1926 to 1929, with a discussion of the reasons for fluctuations in supply and a list of recommendations for fishery regulation.

\*1934. Report on scientific activities of the U.S. Bureau of Fisheries in Alaska and the Pacific Northwest. Unpubl. manuscript, report to Daniel C. Roper, Sec. Commerce, avail. Natl. Mar. Fish. Serv., Northwest Fish. Center Library, Seattle, Wash. 52 p. (Typescript.)

Report includes the status of the herring investigations in Alaska in 1934. Describes the utilization of herring, the localization of the fishing grounds, the life history of herring, the difference between races, the variation in abundance from year to year, and the studies being conducted to determine the mortality rate. Much of the information may have been included in Rounsefell and Dahlgren (1935).

ROUNSEFELL, GEORGE A., and EDWIN H. DAHLGREN.

1932. Fluctuations in the supply of herring, Clupea pallasii, in Prince William Sound, Alaska. Bull. U.S. Bur. Fish. 47(Bull. 9, issued May 12, 1932): 263-291.

The early history of the fishery, local populations, analysis of catch records from 1924 to 1930, seasonal changes in availability, weight composition, size and age composition, and recommendations for fishery regulation are presented.

1934. Occurrence of mackerel in Alaska. Copeia 1934(1): 42.

Record of a chub mackerel, Pneumatophorus diego, being taken in herring catches in Prince William Sound in July 1932 extended the known northern limit of its range a thousand miles. In August of the same year many mackerel were caught in the Dall Head salmon trap in southeast Alaska.

1935. Races of herring, Clupea pallasii, in southeastern Alaska. Bull. U.S. Bur. Fish. 48: 119-141.

Studies were conducted to differentiate herring races in southeast Alaska by means of spawning and feeding grounds, analysis of vertebral counts, growth rates, and tagging.

ROYCE, WILLIAM F.

1963. First record of white shark (Carcharodon carcharias) from southeastern Alaska. Copeia 1963(1): 179.

A great white shark was found on a beach on the east coast of the Queen Charlotte Islands in October 1961. About this time another was found on the beach at Craig, Alaska (55°28'N, 133°08'W), and fishermen reported numerous sightings off Prince of Wales Island.

RUDOMILOV, O. I.

1972. Plodovitost' sel'di vostochnoĭ chastĭ Beringova morya (Fecundity of herring of the eastern part of the Bering Sea). Izv. Tikhookean. Nauchno-issled. Inst. Rybn. Khoz. Okeanogr. 82: 321-332. In Russian, Engl. abstract.

Investigations on Russian research vessels in the Pribilof Island area in 1970 showed the absolute individual fecundity of female herring was 10.4 to 112.6 thousand eggs and averaged 46.2 thousand. Comparative fecundity was 130 to 385 eggs per gram of body weight (gutted). Egg diameters also are given. Absolute and comparative fecundities of Pribilof herring are compared to those of the Korfo-Karaginsk herring in the western Bering Sea.

RUMYANTSEV, A. I., and M. A. DARDA.

1970. Letnyaya sel'd' vostochnoi chasti Beringova morya (Summer herring in the eastern Bering Sea). Tr. Vses. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr. 70 (Izv. Tikhookean. Nauchno-issled. Inst. Rybn. Khoz. Okeanogr. 72): 402-432. In Russian. (Transl. by Israel Program Sci. Transl., 1972, p. 409-441 in P. A. Moiseev (ed.), Soviet fisheries investigations in the northeastern Pacific, Pt. 5, avail. Natl. Tech. Inf. Serv., Springfield, Va., as TT 71-50127.)

Investigations carried out by six USSR vessels in the summer of 1964 revealed the presence of herring throughout the eastern Bering Sea, but not in commercial quantities. The lack of high concentrations at this time was thought to be due to a scarcity of forage organisms. Studies on the age and size composition and growth rates suggest there is a mixture of herring populations in this area.

RUTENBERG, E. P.

1962. Obzor ryb semeïstva terpugovykh (Hexagrammidae). (Survey of the fishes of family Hexagrammidae). Akad. Nauk SSSR, Tr. Inst. Okeanol. 59: 3-100. (Transl. p. 1-103 in 208 p. transl. of T. S. Rass (editor), "Greenlings: taxonomy, biology, inter-oceanic transplanted", translated by Israel Program Sci. Transl. for U.S. Dep. Int. and Natl. Sci. Found., 1970, avail. Natl. Tech. Inf. Serv., Springfield, Va. as TT 69-55097.)

Treats the systematics and morphological descriptions of the family Hexagrammidae as a whole and the individual genera and species. In addition, gives the distribution, biology, and economic importance of each species and discusses the geographical distribution of the greenlings throughout the world's oceans.

SANO, OSAMU.

1959a. Notes on the salmon shark as a predator of salmon (Oncorhynchus spp.) in the North Pacific Ocean. Hoku Sui Shi Geppo (Hokkaido Prefectural Fish. Res. Lab., Mon. Rep.) 16(2): 65-75. In Japanese. (Transl. by M.P. Miyake, 14 p., avail. Univ. Washington, Seattle, Fish. Res. Inst.)

Discusses the relationship between salmon shark and salmon, especially in the area around the Aleutian Islands. Feeding habits of the salmon shark are noted. Salmon were found in 70% of the stomach contents of the North Pacific sharks which were examined. Study of the migration patterns of the Aleutian salmon sharks and those of the central Kuril Islands seems to indicate that there are at least two separate populations and that the migrations of at least the Aleutian Island sharks appear to be related to food availability.

## SANO, OSAMU.

- 1959b. The possible cause of diagonal slashes of the North Pacific salmon. Hoku Sui Shi Geppo (Hokkaido Prefectural Fish. Res. Lab., Mon. Rep.) 16(9): 348-350. In Japanese. (Transl. by Hack Chin Kim, 6 p., processed, 1959, avail. Northwest Fish. Center, NMFS, Seattle, Wash. as Transl. Ser. 27.)

Approximately 2 percent of Japanese salmon catches have diagonal body slashes. Examination of the mackerel sharks' stomach contents, mouth structure, and shape of slashes showed the marks may very possibly be caused by predatory attacks of the sharks. Localities not known.

1960. The investigation of salmon shark as a predator on salmon in the North Pacific, 1959. Bull. Hokkaido Reg. Fish. Res. Lab., No. 22: 68-82, pl. 1-2. In Japanese, Engl. abst. (Transl. by M. P. Miyake, 1961, 28 p., available Univ. Washington, Fish. Res. Inst., Seattle, Wash.)

Salmon sharks caught in gill nets during the 1959 salmon fishing season by 16 Japanese mothership fleets operating in the western Bering Sea and northwestern Pacific Ocean were studied. Information is given on location and abundance of shark catch, total lengths and body weights, stomach content analyses, and the proportion of injured salmon (from shark predation) found in offshore fisheries catches and river escapement.

1966. Predation of shark on salmon. (Abstract). Proc. 11th Pac. Sci. Congr., Tokyo, 7: 30.

Results of Japanese research during 1958-64 on predation of the salmon shark, Lamna ditropis, on salmon are summarized. Distribution of the shark is listed, and major food species in addition to salmon are mentioned.

## SCAGEL, R. F.

- 1949a. Report on the investigation of albacore (Thunnus alalunga): General description of scouting operations and fishing experiments. Fish. Res. Board Can., Pac. Biol. Stn., Nanaimo, B.C., Circ. 17: 2-4. (Processed.)

Exploratory fishing by Canadian scientists in 1948 resulted in the discovery of albacore in the Queen Charlotte Islands area. The occurrence was believed to possibly indicate that mass movements occur in the population or may be a response to changes in the Japan Current. Warm water of the Japan Current was encountered close to the edge of the continental shelf off Vancouver Island and the Washington coast.

- 1949b. Report on the investigation of albacore (Thunnus alalunga): Temperature conditions in relation to albacore occurrence and catches. Fish. Res. Board Can., Pac. Biol. Stn., Nanaimo, B.C., Circ. 17: 5-9. (Processed.)

Investigations in summer 1948 off the Queen Charlotte Islands showed the lowest water temperature at which albacore were caught was 56.8°F. and the highest was 63.0°F. Best fishing was at temperatures between 58°F. and 60°F. Total albacore catch was 513 fish. No water temperature over 60°F. was recorded close to Queen Charlotte Islands but such temperatures were found to the south.

SCATTERGOOD, LESLIE W., CARL J. SINDERMANN, and B. E. SKUD.

1959. Spawning of North American herring. *Trans. Am. Fish. Soc.* 88(3): 164-168.

Compares the spawning of the North American herring on the Atlantic vs. Pacific coasts with respect to season, time of spawning and water temperatures at spawning. Pacific coast data are grouped according to state, with Alaska divided into two regions: 1) southeastern Alaska and 2) central and western Alaska.

SCHEFFER, VICTOR B.

1940. Two recent records of Zaprora silenus Jordan from the Aleutian Islands. *Copeia* 1940(3): 203.

In 1938, only 13 specimens of the prowfish Zaprora silenus were known to science. Two additional specimens, caught in the Aleutian Islands in 1937 were subsequently identified, one of which was an immature fish found in close association with a large orange jellyfish.

1959. Invertebrates and fishes collected in the Aleutians, 1936-38. In Olas J. Murie, *Fauna of the Aleutian Islands and Alaska Peninsula*. U.S. Fish Wildl. Serv., North Am. Fauna 61: 365-406.

Marine algae, fish, and marine, freshwater and land invertebrates that live on the shores and slopes of the Aleutian Islands and in the surrounding seas are discussed from observations made in 1936-38.

SCHULTZ, LEONARD P.

1934. Zaprora silenus Jordan from Alaska. *Copeia* 1934(2): 98.

The date, method, and location of capture of each of eight prowfish (Zaprora silenus) specimens are given. All were collected in 1931; one at Akutan Island in the Aleutian Islands, and seven in the vicinity of Kodiak Island (previously known western limit of the fishes' range).

SHABONEEV, I. E.

1965. O biologii i promysle sel'di vostochnoĭ chasti Beringova morya (Biology and fishing of herring in the eastern part of the Bering Sea). *Tr. Vses. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr.* 58(Izv. Tikhookean. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr. 53): 139-154. In Russian. (Transl. by Israel Prog. Sci. Transl., 1968, p. 130-146 in P. A. Moiseev (ed.), *Soviet fisheries investigations in the northeast Pacific*, Pt. 4, avail. Natl. Tech. Inf. Serv., Springfield, Va. as TT 67-51206.)

Russian exploratory fishing vessels found commercial quantities of herring in the eastern Bering Sea during 1957-1963. This paper analyzes results of research, primarily during winter, by the vessels Alatyr and Alazeya in 1961-1963. Data include those on distribution and behavior of herring on wintering grounds, maturation, size and age composition, growth rate, evaluation of resources by echo-sounding surveys, and catches.

## SHIMAZU, TAKESHI.

1975. A description of the adult of Nybelinia surmenicola with discussions on its life history (Cestoda: Trypanorhyncha: Tentaculariidae). Bull. Jap. Soc. Sci. Fish. 41(8): 823-830. In Japanese, with Engl. abstract.

The final stage of the cestode, Nybelinia surmenicola, has been found in the stomach of the salmon shark, Lamna ditropis, taken from the Bering Sea. Intermediate forms of the cestode have been found in euphausiids, squid, walleye pollock, and sockeye salmon.

## SHUNTOV, V. P.

1963. Osobennosti raspredeleniya ikhtiofauny v yugovostochnoy chasti Beringova morya (Peculiarities of ichthyofauna distribution in the south-eastern Bering Sea). Zool. Zh. 42(5): 704-715. In Russian. (Transl. by Joint Publ. Res. Serv., 1963, avail. Natl. Tech. Inf. Serv., Springfield, Va., as JPRS 20623, OTS 63-31519.)

Fish distribution in the southeastern Bering Sea is described from observations made during the Far Eastern Long-Range Survey of the Pacific Research Institute of Marine Fisheries and Oceanography (TINRO) during Sept.-Oct. 1959 and April-Oct. 1960. Distribution of various species is noted with respect to depth, temperature, and the influence of currents. Salinity, oxygen content, bottom type, and food abundance are also discussed.

## SKUD, BERNARD EINAR.

1959. Herring spawning surveys in southeastern Alaska. U.S. Fish Wildl. Serv., Spec. Sci. Rep. Fish. 321. 16 p.

Aerial surveys were used as a means of assessing the extent of herring spawning. Maps of spawning areas were prepared from surveys, and information is given on the time of spawning and physical characteristics of the beaches.

1963. Herring tagging experiments in southeastern Alaska. U.S. Fish Wildl. Serv., Fish. Bull. 63(1): 19-32.

Results of 1934-37 experiments indicated extensive movement and intermingling between Sitka and Craig stocks. Both migration extent and total mortality appeared to increase with the age of the fish.

## SKUD, BERNARD E., HENRY M. SAKUDA, and GERALD M. REID.

1960. Statistics of the Alaska herring fishery, 1878-1956. U.S. Fish Wildl. Serv., Stat. Dig. 48. 21 p.

Contains maps of the statistical areas for each of the three major fishing districts in Alaska (Southeastern, Prince William Sound, and Kodiak). Tables give the tonnage of herring catch by statistical area for each district (1929 to 1956 for Southeast Alaska; 1937 to 1956 for Prince William Sound and Kodiak). Production statistics for 1878 to 1956, and operating units and persons engaged in fishery 1906-1956 are also shown.

SMITH, HUGH M.

1896. A review of the history and results of the attempts to acclimatize fish and other water animals in the Pacific States. Bull. U.S. Fish Comm. 15: 379-472, pls. 73-83.

Contains (p. 404-427) a historical account of the introduction of the shad in the Sacramento and Columbia Rivers and of its subsequent dissemination along the Pacific Coast from Los Angeles County, California to Wrangell Island, Alaska. Includes remarks on the modification of the behavior of shad by the new environmental conditions, as well as notes on its migrations and movements, spawning, abundance, length and weight, feeding habits, and information on the west coast shad fisheries.

SOKOLOVSKII, A. S.

1969. K voprosu o stadakh saŭry v Tikhom okeane (Stocks of saury in the Pacific Ocean). Izv. Tikhookean. Nauchno-issled. Inst. Rybn. Khoz. Okeanogr. 69: 203-208. In Russian. (Transl., 1971, 12 p., Fish. Res. Board Can., Mar. Ecol. Lab., Dartmouth, N.S., Transl. Ser. 1614.)

Pacific saury are classified into three populations--Asian, Aleutian, and American--on the basis of differences in morphometry, parasites, and biological characteristics (fecundity, spawning temperature) found in data collected by Soviet vessels in 1965-67.

\*STRATY, RICHARD R., and HERBERT W. JAENICKE.

1971. Studies of the estuarine and early marine life of sockeye salmon in Bristol Bay, 1965-67. U.S. Dep. Commer., Natl. Mar. Fish. Serv., Biol. Lab., Auke Bay, Alaska, Manuscr. Rep.--File, MR-F 83. 137 p. (Typescript.)

Lists numbers of sand lance, rainbow smelt, and herring caught in Bristol Bay by seine and tow net from June 6 to Sept. 5, 1966, and numbers of sand lance and rainbow smelt caught by lampara net from June 14 to Aug. 14, 1967. Also has data on sand lance found in the stomach contents of juvenile sockeye and silver salmon.

SVETOVIDOV, A. N.

1949. O nekotorykh biologicheskikh osobennostyakh Tikhookeanskoŭ sel'di i o prichinakh, ikh obuslovivshikh (Biological features of the Pacific herrings and the factors causing them). Izv. Tikhookean. Nauchno-issled. Inst. Rybn. Khoz. Okeanogr. 31: 59-64. In Russian. (Transl. by Kr. Fred. Wiborg avail. Natl. Mar. Fish. Serv., Lang. Serv. Div., Washington, D.C.)

Compares behavior and biological features of Atlantic and Pacific herring, principally those concerning reproduction, including time of spawning, relation of water temperature and salinity to spawning, spawning depths and substrates, morphological characteristics. Reasons for observed differences are given.

SVETOVIDOV, A. N.

1952. Sel'devye (Clupeidae) [The herrings (Clupeidae)]. Akad. Nauk SSSR, Zool. Inst., Fauna SSSR, Ryby, 2(1), N.S. 48. 331 p. In Russian. (Transl. by Israel Program Sci. Transl. for U.S. Natl. Sci. Found. and Smithsonian Inst., 1963, 428 p., avail. Natl. Tech. Inf. Serv., Springfield, Va. as OTS 61-11435.)

The herring family, treated as a whole, is discussed in the first section in relation to the history of its classification, taxonomy and principles of classification, geographic distribution, biology, and economic importance. In the second section, a review of each species is given, arranged according to the preceding topics. Pacific herring stocks and their biological features in Asian and American waters are compared.

TAKAHASHI, TOYOMI, and MITUO KONDA.

1974. On the age composition and the hourly changes of the catch of the herring by the trawl net in the northwestern sea area of the Pribilof Islands in the 1971/1972 winter. Bull. Fac. Fish. Hokkaido Univ. 25(1): 47-54. In Japanese, Engl. abst.

During the herring trawling operations in winter 1971/1972 in an area northwest of the Pribilofs, 6,650 herring were obtained for analysis. Hourly changes in the catch rate indicated a peak in fishing efficiency around noon, after which, the herring were thought to leave the bottom to feed. The age five and nine fish, which were spawned in warm years, dominated the catches, and 4-year-olds (spawned in a cold year) were few in number.

TANNER, Z. L.

1890. Explorations of the fishing grounds of Alaska, Washington Territory, and Oregon, during 1888, by the U.S. Fish Commission steamer Albatross, Lieut. Comdr. Z. L. Tanner, U.S. Navy, Commanding. Bull. U.S. Fish Comm. 8: 1-95.

Includes an account of the first systematic assessment of the fishing grounds from Unalaska Island to Prince William Sound, July 19 to Aug. 27, 1888. The state of the existing fisheries is reviewed, in addition to notes on exploratory fishing, hydrography and navigation.

TAYLOR, F. H. C.

1967. Midwater trawl catches from Queen Charlotte Sound and the open ocean adjacent to the Queen Charlotte Islands. Fish. Res. Board Can., Tech. Rep. 11. 44 p.

The Canadian research vessel G. B. Reed conducted three cruises in Queen Charlotte Sound and off the west coast of the Queen Charlotte Islands (including the Bowie Seamount in the Gulf of Alaska) during 1964 and 1965. The report lists data on fish collected by midwater trawls by species, geographic area, date, bottom type, depth and other information.

TAYLOR, F. H. C., M. FUJINAGA, and FORD WILKE.

1955. Distribution and food habits of the fur seals of the North Pacific Ocean: Report of cooperative investigations by the Governments of Canada, Japan, and the United States of America, February-July 1952. U.S. Dep. Int., Fish Wildl. Serv., Washington, D.C. 86 p.

Stomach contents of 116 fur seals collected in the Gulf of Alaska from February 14 to July 3, 1952 were analyzed. Capelin made up more than 90% of the food; hake, squid, sand lance, and unidentified fish composed the remainder.

TESTER, ALBERT L.

1944. Echo sounding for summer herring. Fish. Res. Board Can., Prog. Rep. Pac. Coast Stn. 61: 17-20.

Echosounding surveys for herring were conducted from the Canadian vessel A. P. Knight in southeastern Alaska and along the British Columbia coast during June and July, 1944. No extensive concentrations of herring schools were recorded in southeastern Alaskan waters, only indications of small individual schools and faint echo markings which were interpreted as representing dispersed herring.

1946. Comparison of the Atlantic and Pacific herring and herring fisheries. Fish. Res. Board Can., Prog. Rep. Pac. Coast Stn. 66: 4-8.

The similarities and differences between the two species (Clupea harengus and Clupea pallasii), including lengths of fish, racial characters, spawning, egg size, availability and fishing methods, handling and processing, and size of catch, are reviewed.

THOMPSON, SETON H.

1950-1957. Alaska fishery and fur-seal industries: [1947-1955]. U.S. Dep. Int., Fish Wildl. Serv., Stat. Dig. No's. 20, 23, 26, 31, 33, 35, 37, 40. Various pagination.

For annotation, see Bower (1919-1941).

THOMPSON, SETON H., and DONALD W. ERICKSON.

1960. Alaska fishery and fur-seal industries: 1956. U.S. Fish Wildl. Serv., Stat. Dig. 45. 88 p.

For annotation, see Bower (1919-1941).

\*TRUMBLE, ROBERT JASPER.

1973. Distribution, relative abundance, and general biology of selected underutilized fishery resources of the eastern North Pacific Ocean. M. S. Thesis, Univ. Washington, Seattle, Wash. 178 p.

Reviews the available literature on a number of underexploited resources of the northeast Pacific, including capelin, jack mackerel, mesopelagic species, pomfret, sand lance, and saury. Also discusses the procedure and problems of assessing stock size from fishing surveys, echo sounding, egg and larvae studies, and predator stomach content analyses.

TURNER, L. M.

1886. Researches in Alaska, pt. IV. Fishes. In his: Contributions to the natural history of Alaska: Results of investigations made chiefly in the Yukon district and the Aleutian Islands; conducted under the auspices of the Signal Service, U.S. Army, extending from May, 1874, to August, 1881, p. 87-113. No. II, Arctic Series of Publs. issued in connection with the Signal Service, U.S. Army. Gov. Print. Off., Washington, D.C.

Contains annotated notes on a collection of 47 species of fish made by Turner during his service in Alaska in 1874-1881, as well as information on fish biology, behavior, and native fishing methods that he observed.

VAN CLEVE, RICHARD, and W. F. THOMPSON.

1938. A record of the pomfret and barracuda from Alaska. *Copeia* 1938(1): 45-46.

During September 1937, one specimen each of barracuda (*Sphyræna argentea*) and pomfret (*Brama raii*) were taken in a salmon trap at Cape Uyak (57°38'N, 145°21'W) off Kodiak Island. This represented a northern extension of the known range of both species. In addition, 70 pomfret were reported taken by a cod-fishing schooner 100-600 miles east of Unimak Pass in 1937.

VANYAEV, N. A.

1963. Predislovie (Forword). Tr. Vses. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr. 48 (Izv. Tikhookean. Nauchno-issled. Inst. Morsk. Rybn. Khoz. Okeanogr. 50): 5-6. In Russian. (Transl. by Israel Program Sci. Transl., 1968, p. v-vi in P. A. Moiseev (ed.), Soviet fisheries investigations in the northeast Pacific, Pt. 1, avail. Natl. Tech. Inf. Serv., Springfield, Va. as TT 67-51203.)

Various fish and shellfish resources, including Pacific herring, currently being exploited in the Bering Sea by the Soviets, and their relative commercial importance, are mentioned briefly.

WARNER, IRVING M.

1976. Annual report, Outer Continental Shelf Assessment Project: Herring spawning survey - southern Bering Sea. In: Environmental assessment of the Alaskan continental shelf, Vol. 6, Fish, plankton, benthos, littoral: Principal Investigator's reports for the year ending March 1976, p. 1-15. Natl. Oceanic Atmos. Admin., Environ. Res. Lab., Boulder, Colo.

Unpublished sources of observations about herring, smelt, and capelin local fisheries or spawning along the north side of the Alaska Peninsula, Unalaska Island, Bristol Bay, Norton Sound and Arctic areas are cited.

WELANDER, ARTHUR D.

1940. Notes on the dissemination of shad, *Alosa sapidissima* (Wilson), along the Pacific coast of North America. *Copeia* 1940(4): 221-223.

The dissemination of the shad along the Pacific coast from its introduction into the Sacramento River, California in 1871 southward to off San Diego, California, by 1916 and northward and westward to Kodiak Island by 1926 (another sample was taken at the latter in 1937) is reviewed briefly.

WILIMOVSKY, NORMAN J.

1954. List of the fishes of Alaska. Stanford Ichthyol. Bull. 4(5): 279-294.

Consists of a list, in taxonomic order, of 379 species known to occur in Alaskan waters. Brief statements about ranges of distribution are included.

1964. Inshore fish fauna of the Aleutian archipelago. Science in Alaska, 1963, Proc. 14th Alaska Sci. Conf.: 172-190. Alaska Div., Am. Assoc. Advance Sci.

The distribution of fish found in the intertidal area of the Aleutian Islands is listed by species and by island group. The Aleutian inshore environment is described briefly and the relationships and origins of the fauna found there are discussed.

1974. Fishes of the Bering Sea: the state of existing knowledge and requirements for future effective effort, Chapt. 11, p. 243-256. In: D. W. Hood and E. J. Kelley (eds.), Oceanography of the Bering Sea. Univ. Alaska, Inst. Mar. Sci., Occas. Publ. 2.

Most of the knowledge of the approximately 300 species of fishes of the Bering Sea is limited to forms exploited commercially. This paper has a brief historical review of sources of knowledge of fishes of this area, the origins of the fish fauna, and numerical distribution by family. No specific data are given on species. The author concludes there is an overriding need for gathering together available information into a synthesized form.

WILKE, FORD, and KARL W. KENYON.

1954. Migration and food of the northern fur seal. Trans. 19th North Am. Wildl. Conf.: 430-440.

Summarizes the data on pelagic fur seal migration and stomach contents from 1896 to 1954. Cod and squid appeared to comprise the greater part of the diet in the Bering Sea; squid, rockfish, eulachon, capelin, whiting, hake, and salmon were found in Gulf of Alaska seals; and herring predominated in the diet of southeastern Alaska seals.

1957. The food of fur seals in the eastern Bering Sea. J. Wildl. Manage. 21(2): 237-238.

Capelin made up 52% by volume of the stomach contents of 117 fur seals collected pelagically in the Bering Sea in June-July 1955. Pollock and squid formed most of the remainder of the food items. Salmon, pollock, and sandfish comprised the food items found in three stomachs of fur seals killed on St. Paul Island.

WISNER, ROBERT L.

1959. Distribution and differentiation of the North Pacific myctophid fish Tarletonbeania taylori. Copeia 1959(1): 1-7.

Collections of Tarletonbeania taylori and T. crenularis from the northeastern Pacific were examined and meristic counts of each were compared. The studies indicate that the two species are geographically separated, the population in the Gulf of Alaska being predominantly T. taylori. Previous records of T. crenularis from the Gulf of Alaska may have actually been of T. taylori.

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Tester, 1944

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Skud, Sakuda, and Reid, 1960

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Skud, 1963

Svetovidov, 1952

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Fraser, 1922

International North Pacific Fisheries Commission, 1961e, 1961j

Rounsefell, 1934

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Dahlgren and Kolloen, 1943a, 1944

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International North Pacific Fisheries Commission, 1961g

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 Gilbert, 1895  
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Bean, 1889  
 Fiscus, Baines, and Wilke, 1964  
 Marine Mammal Biological Laboratory, 1970  
 North Pacific Fur Seal Commission, 1962, 1971, 1975  
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Clemens and Wilby, 1961  
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Fedorov, 1973a, 1973b

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Larkins, 1964

Machidori and Nakamura, 1971

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Mead and Haedrich, 1965

Neave and Hanavan, 1960

Parin, 1968

Pinchard, 1957

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Van Cleve and Thompson, 1938

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Aron, 1958, 1960b

Clemens and Wilby, 1961

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Scheffer, 1940, 1959

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Clemens and Wilby, 1961

Fedorov, 1973b

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Okada and Kobayashi, 1968

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Andriyashev, 1937

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 Kashkina, 1970  
 Kobayashi, 1961  
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Bean, 1889  
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 Marine Mammal Biological Laboratory, 1970  
 North Pacific Fur Seal Commission, 1962, 1975  
 Straty and Jaenicke, 1971  
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Baxter, 1975  
 Clemens and Wilby, 1961  
 Faculty of Fisheries, Hokkaido University, 1970d  
 Fedorov, 1973a, 1973b  
 Gilbert, 1895  
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 International Pacific Halibut Commission, 1964  
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 Larkins, 1964  
 Musienko, 1970  
 Scheffer, 1959  
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Kenyon, 1956  
 Marine Mammal Biological Laboratory, 1970  
 North Pacific Fur Seal Commission, 1962, 1975  
 Wilke and Kenyon, 1957

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Browning, 1974  
 Clemens and Wilby, 1961  
 Fedorov, 1973b  
 Hart, 1973  
 Wilimovsky, 1954

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## saury, Pacific

Alverson, 1968  
 Browning, 1974  
 Clemens and Wilby, 1961  
 Fedorov, 1973a, 1973b  
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 International Pacific Halibut Commission, 1964  
 Larkins, 1964  
 LeBrasseur, 1964b, 1970  
 Parin, 1960, 1968  
 Sokolovskii, 1969  
 Trumble, 1973  
 Wilimovsky, 1954

## as forage

Marine Mammal Biological Laboratory, 1970  
 North Pacific Fur Seal Commission, 1975

Scomber japonicus (see mackerel, chub)

## shad, American

Browning, 1974  
 Clemens and Wilby, 1961  
 Fedorov, 1973b  
 Hart, 1973  
 Leggett and Whitney, 1972  
 Smith, 1896  
 Welander, 1940  
 Wilimovsky, 1954

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Alverson, Pruter, and Ronholt, 1964  
 Anderson and Peterson, 1952-1954  
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 Browning, 1974  
 Faculty of Fisheries, Hokkaido University, 1970d  
 Fiedler, 1942-1943, 1945  
 Fiedler, Manning, and Johnson, 1934  
 Hart, 1973  
 International Pacific Halibut Commission, 1964  
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Browning, 1974  
Clemens and Wilby, 1961  
Hart, 1973  
Larkins, 1964  
Parin, 1968

## shark, blue

Browning, 1974  
Clemens and Wilby, 1961  
Hart, 1973  
Larkins, 1964  
LeBrasseur, 1964a  
Neave and Hanavan, 1960  
Parin, 1968

## shark, mackerel (see shark, salmon)

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Bright, 1959  
Clemens and Wilby, 1961  
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Jordan and Gilbert, 1899  
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Okada and Kobayashi, 1968  
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Clemens and Wilby, 1961  
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Larkins, 1964

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Hart, 1973  
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 Anderson and Peterson, 1952-1954  
 Anderson and Power, 1946-1951, 1955-1967  
 Bean, 1887  
 Fedorov, 1973a  
 Fiedler, 1931-1932, 1934-1936, 1938-1941; 1942-1943, 1945  
 Fiedler, Manning, and Johnson, 1934  
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Marine Mammal Biological Laboratory, 1970  
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## smelt, boreal (see smelt, rainbow)

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Clemens and Wilby, 1961  
 Fedorov, 1973b  
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Fedorov, 1973b  
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 Takahashi and Konda, 1974  
 Wilimovsky, 1954

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Andriyashev, 1937  
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 Hart, 1973  
 Jordan and Gilbert, 1899  
 Musienko, 1970  
 Nelson and Bean, 1887  
 North Pacific Fur Seal Commission, 1962, 1975  
 Okada and Kobayashi, 1968  
 Straty and Jaenicke, 1971  
 Turner, 1886  
 Wilimovsky, 1954

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## smelt, surf

Bean, 1889  
 Browning, 1974  
 Clemens and Wilby, 1961  
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Hart, 1973  
 International Pacific Halibut Commission, 1964  
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 Phinney and Dahlberg, 1968  
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 Fedorov, 1973b  
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- Tanner, 1890

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  - Alverson, Pruter, and Ronholt, 1964
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  - Administration of Alaska Commercial Fisheries, 1956
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