

FOODS OF BALEEN WHALES IN THE GULF OF ALASKA OF THE NORTH PACIFIC

TAKAHISA NEMOTO AND TOSHIO KASUYA

The foods of baleen whales in the North Pacific have been studied by Banner (1949), Ponomareva (1949) and Nemoto (1957: 1959: 1962). But these are results on the whales caught in the north west part of the North Pacific in general. In recent Japanese whaling, comparatively many baleen whales have been caught in the Gulf of Alaska and the foods of those baleen whales have been collected as the continuance of the works carried out up to these days.

The materials of foods of baleen whales have been collected in 1961, 1962 and 1963 on the factory ships as it has been done. Some materials were also collected on right whales in 1961, which were permitted to catch under the special permission for the scientific research.

The distribution of euphausiids, which is important for whales foods, have been studied by Banner (1949), Nemoto (1959: 1962) and Brinton (1962), and these results are of great help for the general consideration of the distribution of foods of baleen whales.

DISTRIBUTION OF BALEEN WHALES

The Gulf of Alaska waters was famous for the whaling ground for right whales in 19 century (Townsend, 1935). Fin and sei whales, however, mainly constitute the recent catch of baleen whales as illustrated in Fig. 1 and Fig. 2. Both fin and sei whales are common in the mid-gulf where right whales were caught, but the fin whale catch is sometimes restricted in the shore waters in a certain year, for example 1963, as shown in Fig. 1. But fin whales were caught in the off waters in 1962 possibly owing to the foods distributions in the Gulf of Alaska.

The distribution types of baleen whales were discussed in a previous report (Nemoto, 1959). Sei whales are ocean dinizen and they seem not to approach shallow inshore waters and the marginal sea. This is also confirmed in the recent catch as shown in Fig. 2. On the other hand, fin whales feed also in the shallow coastal waters and marginal seas as in the open ocean. Blue whales, the euphausiids feeder and ocean denizen, are caught in the edge of Alaskan continental shelf where euphausiids are most prosperous through the summer season.

FOODS OF BALEEN WHALES

Collected stomach contents of baleen whales have been examined and plotted in Figs. from 3 to 6. The occurrences of euphausiids and copepods in fin whales are given as the percentage occurrences in each 1 latitude and 2 longitudes square in Fig. 3. As it is clearly shown, copepods are observed in the off waters and

euphausiids are mainly distributed in the shore waters as the foods of fin whales in 1963.

Three species of euphausiids, *Euphausia pacifica*, *Thysanoessa inermis* and *T. spinifera* are main euphausiids occurred in the stomachs of baleen whales in the coastal waters.

The distributions of North Pacific euphausiids also have been discussed by Banner (1949), Brinton (1962) and Nemoto (1962). Six northern Pacific euphausiids *Euphausia pacifica*, *Thysanoessa inermis*, *T. longipes*, *T. raschii*, *T. spinifera* and *Tessarabrachion oculatus* are all common in the Alaskan Gulf although the depth and horizontal distributions are somewhat different.

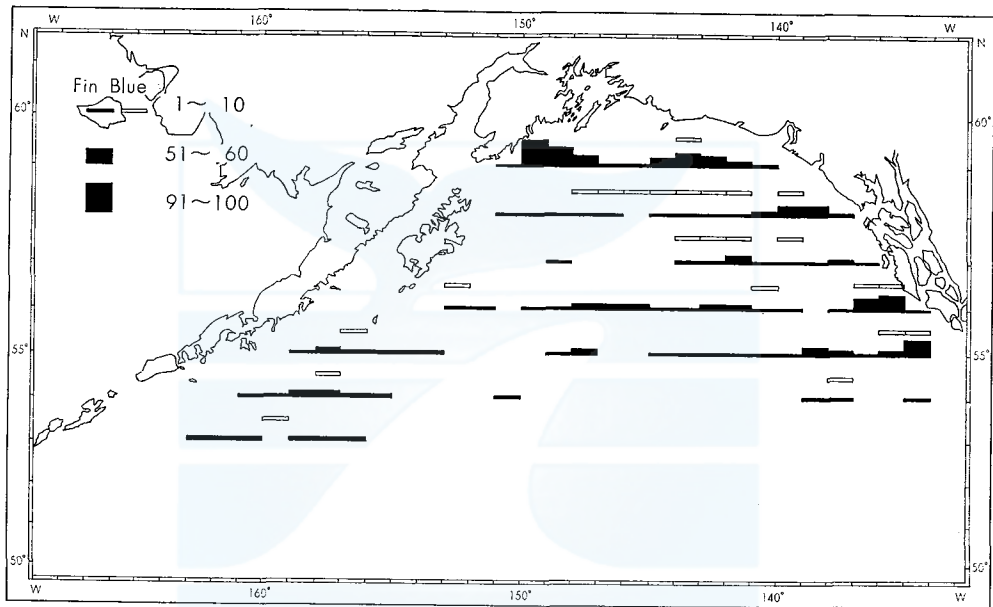


Fig. 1. Catch distribution of blue and fin whales by Japanese whaling expeditions in the Gulf of Alaska in 1963.

Euphausia pacifica is recorded from the most northern Gulf of Alaska by Banner (1949). The geographical distribution of *Euphausia pacifica* established by Brinton (1962) endorses the wide distribution of this species in the subarctic Pacific, and its importance for marine animals may be valid in the southern waters (Nemoto, 1959: Brinton, 1962). *Euphausia pacifica* is found in both oceanic and neritic waters in vast swarms (Banner, 1949), but baleen whales in the Gulf of Alaska took it mainly in the continental shelf edge of the gulf. The size of the collected specimens is larger comparing with specimens in southern waters (Unpublished data in the Whales Research Institute).

Thysanoessa spinifera is one of the most important euphausiids in the Alaskan Gulf as a food of baleen whales. It was found in the shore waters of the Aleutian Islands only in the eastern side (Nemoto 1959: 1962), but it was never found in the west

waters of the Bering sea and the North Pacific (Nemoto, 1959: 1962: Brinton, 1962). It distributes from the eastern part of the Aleutian Islands to the southern California along the shelf waters. It is considered to be the most dominant euphausiids species in the neritic waters of the Gulf of Alaska. Baleen whales, blue, fin and humpback whales, which are swallowing type in feeding (Nemoto, 1959) are possibly feed on this *T. spinifera* in those waters. *T. spinifera* appears to be restricted to depths of less than 100 meters (Brinton, 1962), and it is found also in the daytime in the shallower waters in near-shore waters.

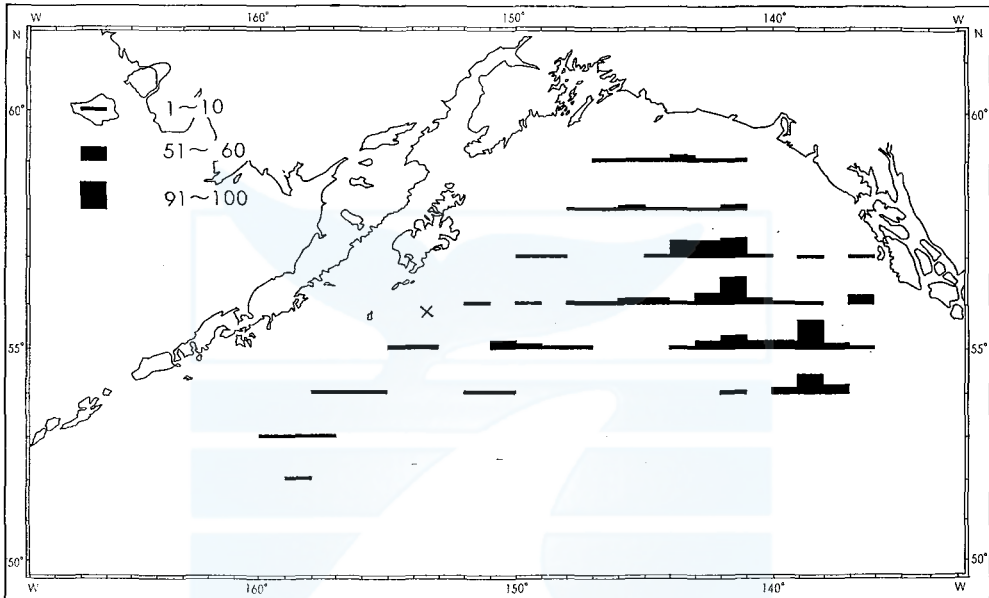


Fig. 2. Catch distribution of sei whales by Japanese whaling expeditions in the Gulf of Alaska in 1963.

The third species, *Thysanoessa inermis* is the most important euphausiids species in the waters of the east Bering Sea and off Kamtchatka waters (Nemoto, 1959), but it is rather scarce as the foods of baleen whales in the Gulf of Alaska. Banner reported it from the Gulf of Alaska and Brinton also noted the main range of *T. inermis* covers arctic boreal regions of the North Pacific north of 52°N in the eastern part. As for the morphological types of *T. inermis*, two spines form is dominant in these areas as considered in a previous report (Nemoto, 1959: 1962), and it amounts about 75% or more in the Gulf of Alaska waters, in the east side of the Pacific.

Another neritic species *Thysanoessa raschii* has been recorded in the shore waters of the Alaskan continental shelf by Banner (1949), but it has not been observed as foods of fin and other baleen whales in the Gulf of Alaska. Perhaps it distributes shallower and colder neritic waters along the Alaskan continent throughout winter and summer seasons.

Thysanoessa longipes on the other hand, distributes in the off waters. In 1962,

comparatively many fin whales had been caught when they were feeding on *T. longipes* in the mid-gulf. The concentration of *T. longipes* in the mid-gulf is also shown by plankton investigations (McAllister, 1961; Brinton, 1962). It is preliminarily suggested that the relative abundance of off shore species *T. longipes* may affect the migration of fin whales to those areas. The close related species, *T. inspinata* has not been found in the stomachs of baleen whales caught in the Gulf of Alaska. In 1963, *T. longipes* has not been found in the mid-Alaskan Gulf and fin whales had not been observed in the area in swarms. *T. longipes* is also important in the Bering Sea and southern waters of the Aleutian Islands, and annual fluctuations

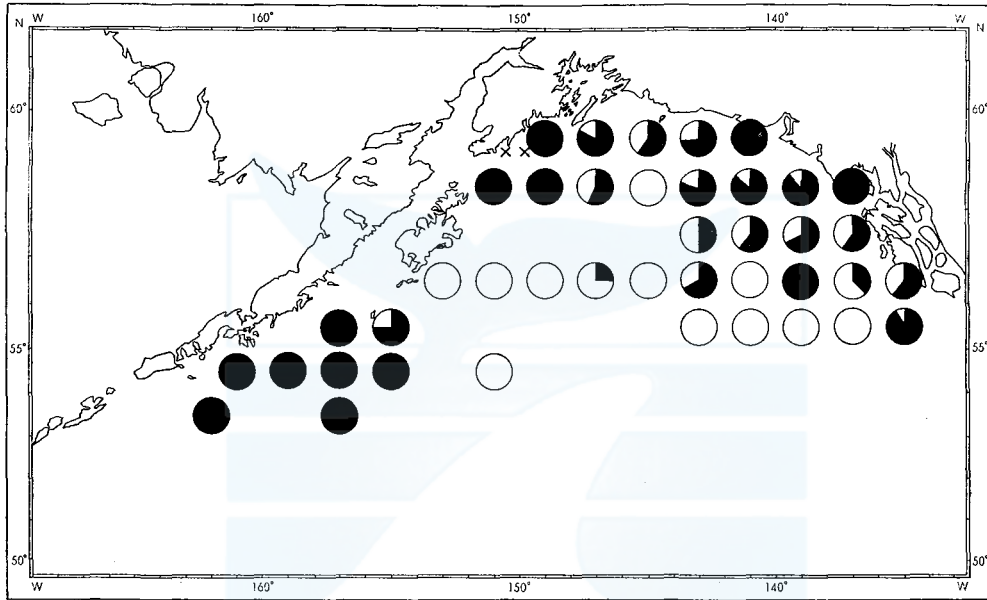


Fig. 3. Percentage occurrences of euphausiids (Black) and copepods (White) in the stomachs of fin whales caught in the Gulf of Alaska in 1963. Cross—Position of right whale capture.

were also observed in comparing with other euphausiids such as *T. inermis* and *T. raschii* (Nemoto, 1959), which form the stable feeding grounds every year. Two species of copepods, *Calanus cristatus* and *C. plumchrus*, are common as the foods of baleen whales in the Gulf of Alaska as in the Bering Sea (Nemoto, 1962). Fin whales prefer *Calanus cristatus* as the swallowing feeding type, but a few fin whales also take *Calanus plumchrus*.

Sei whales are mostly skimming feeder in the North Pacific (Nemoto, 1959), feeding on copepods. As it is illustrated in Fig. 4, they exclusively feed on copepods in the off waters of the Gulf of Alaska. *Calanus cristatus* and *Calanus plumchrus* are observed as the foods of sei whales. *C. cristatus* is more dominant in the off waters, although sei whales have taken *C. plumchrus* in the western waters of Kamtchatka region and southern off waters of the Aleutian Islands.

Two cases of right whales which have taken *Calanus plumchrus* in the coastal

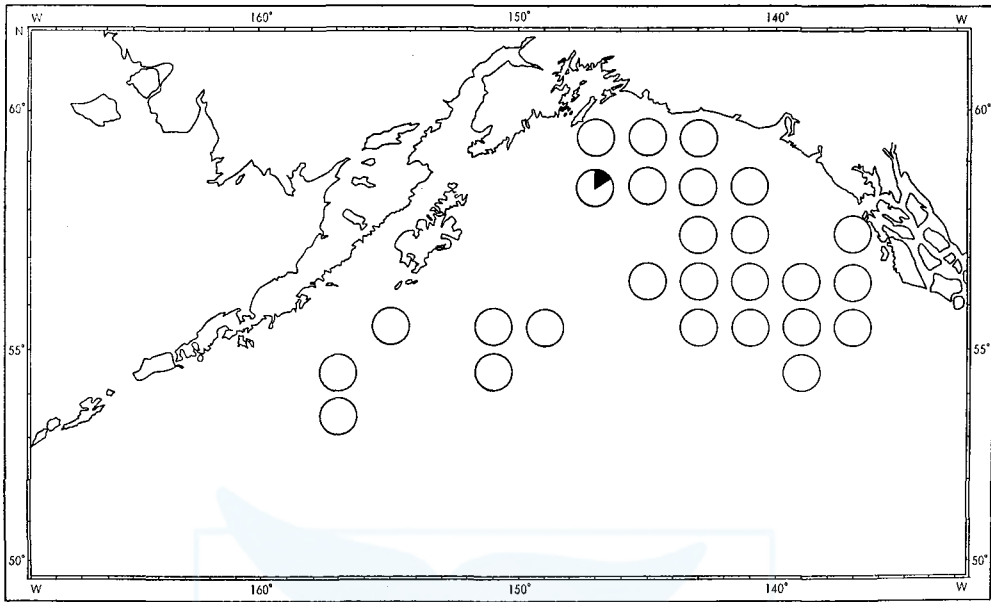


Fig. 4. Percentage occurrences of copepods (White) and euphausiids (Black) in the stomachs of sei whales caught in the Gulf of Alaska in 1963.

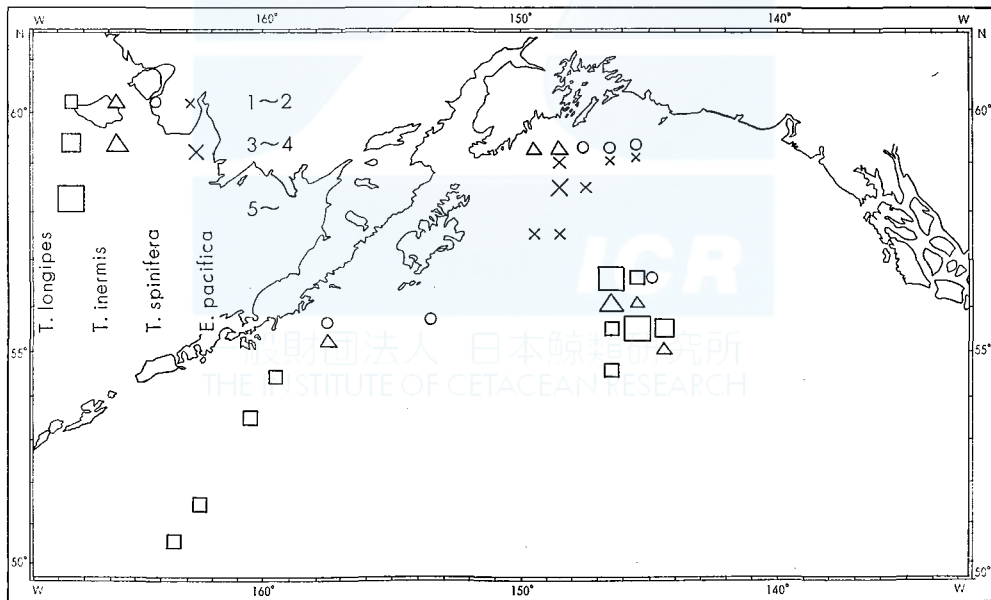


Fig. 5. Euphausiids occurrences in the stomachs of baleen whales in 1962.

waters of Kodiak Islands show that they were skimming feeder, which coincides with the results obtained in the waters off Japan.

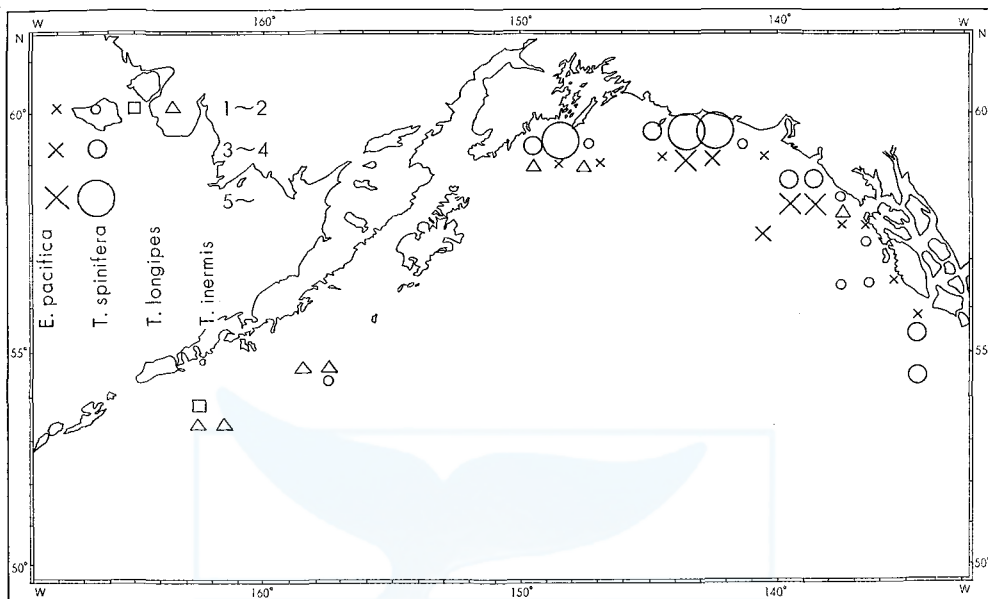


Fig. 6. Euphausiids occurrences in the stomachs of baleen whales in 1963.

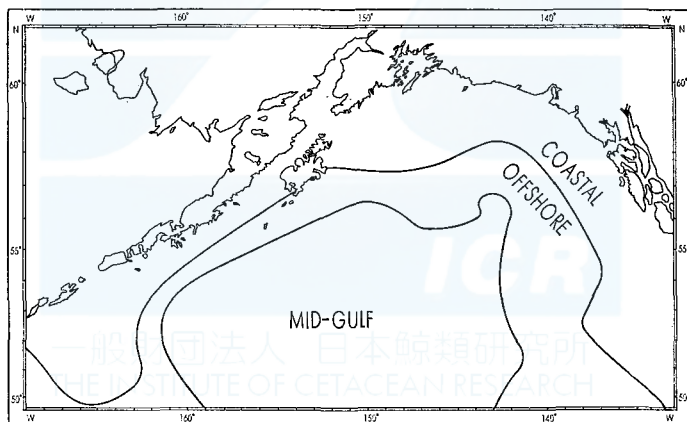


Fig. 7. Water masses in the Gulf of Alaska (After Doe, 1955).

The water mass of the Alaskan Gulf is described by many authors, and one example is given by Doe (1955). It fairly well coincided with the main distributions of the euphausiids species and copepods. *Thysanoessa spinifera*, *T. raschii* and *T. inermis* are coastal species, whereas *T. longipes* is offshore species. The life cycle of the former species may be brought up in the neritic domain, but *T. longipes* has some

connections with the west waters where it is found along the boundary of the water masses, between subarctic and Aleutian neritic waters.

SUMMARY

The foods of baleen whales in the Gulf of Alaska have been examined. The main species of euphausiids are *Euphausia pacifica*, *Thysanoessa spinifera*, *T. longipes* and *T. inermis*. *Calanus cristatus* and *C. plumchrus* are also important as foods of baleen whales. The distribution of each species is discussed and possible relations between the natural regions of the Gulf of Alaska waters and euphausiid distributions are stated.

REFERENCES

- BANNER, A. H. (1949). A taxonomic study of the Mysidacea and Euphausiacea (Crustacea) of the North Pacific. Pt. 3. Euphausiacea. *Trans. Roy. Soc. Canadian Inst.*, 28 (58) : 2-49.
- BRINTON, E. (1962). The distribution of Pacific euphausiids. *Bull. Scripps Inst. Oceanogr.*, 8 (2) : 51-270.
- DOE, L. A. E. (1955). Off shore waters of the Canadian Pacific coast. *J. Fish. Res. Bd. Canada*, 12 (1) : 1-34.
- MCALLISTER, C. D. (1961). Zooplankton studies at ocean weather station P in the northern Pacific ocean. *J. Fish. Res. Bd. Canada*, 18 (1) : 1-29.
- NEMOTO, T. (1959). Food of baleen whales with reference to whale movements. *Sci. Rep. Whales Res. Inst.*, 14 : 149-290.
- (1962). Distribution of five main euphausiids in the Bering and the northern part of the North Pacific. *J. Oceanogr. Soc. Japan 20th Ann.*, 1962 : 615-27.
- (1963). Some aspects of the distribution of *Calanus cristatus* and *C. plumchrus* in the Bering and its neighbouring waters, with reference to the feeding of baleen whales. *Sci. Rep. Whales Res. Inst.*, 17 : 157-70.
- PONOMAREVA, L. A. (1949). On the food planktons of baleen whales in the Bering sea. *Dokl. Acad. Sci. U.S.S.R.*, 68 (2) : 401-3.
- TOWNSEND, C. H. (1935). The distribution of certain whales as shown by logbook records of American whaling. *Zoologica*, 19 (1) : 1-50.

ICR

一般財団法人 日本鯨類研究所
THE INSTITUTE OF CETACEAN RESEARCH