Comparison of the Infection Levels of *Lepeophtheirus salmonis* (Copepoda) on Chum Salmon Captured by Two Methods

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The salmon louse *Lepeophtheirus salmonis* (Krøyer, 1838) is a marine caligid parasite of most species of the genera *Salmo* and *Oncorhynchus* in the northern hemisphere (Kabata, 1979). In Japan, it is believed that salmonids damaged by *L. salmonis* develop secondary bacterial infections when they are kept in fresh waters for maturation (Kimura, 1970). Recently, this parasite has become an important pathogen in Norway (Hastein and Bergsjo, 1976) and Scotland (Wooten *et al.*, 1982).

Although *L. salmonis* is commonly found on the skin of salmonids, little is known about its occurrence on salmonids in the ocean. This study was intended to compare the infection levels of *L. salmonis* on chum salmon, *Oncorhynchus keta* (Walbaum), captured with gillnets and longlines, which are the major types of fishing gear used in Japanese high-seas salmon fishery.

Materials and methods

Chum salmon were collected in the western North Pacific Ocean southeast of Hokkaido during November 6–16, 1984 (Table 1). Fish were captured with gillnets and longlines operated from the RV *Hokushin maru* of the Hokkaido Fisheries Experimental Station. The gillnets consisted of two types: non-selective research gillnets which were composed of 10 different mesh sizes from 48 to 157 mm to eliminate the mesh selectivity (Takagi, 1975) and commercial gillnets (mesh sizes 112 and 138 mm).

Fish were processed by recording fork length, body weight, sex, gonad weight, and number and location of adult *Lepeophtheirus salmonis* soon after they were removed from the gillnets and longlines.

Data on infection levels are expressed as prevalence (percentage of infected hosts), mean intensity (mean number of parasites per infected host) and relative density (mean number of parasites per host examined) as defined by Margolis *et al.* (1982).

Results and discussion

During this study, 558 chum salmon were taken with gillnets and longlines and 331 (59.3%) were infected with *Lepeophtheirus salmonis*. Size distribution of chum salmon captured with the two types of fishing gear was similar and most catches consisted of fish between the lengths of 55 and 69 cm. Almost all fish were fully mature, indicating that they were returning to the rivers of Hokkaido

Table 1. Prevalence and intensity of infection of *Lepeophtheirus salmonis* on *Oncorhynchus keta* captured with gillnets and longlines in the western North Pacific Ocean southeast of Hokkaido, November 1984.

Fishing gear	Sample no.	Date	Fishing location	No. of fish examined	Prevalence (%)	Mean intensity	Relative density	Intensity range
Gillnet	1	Nov. 6	42°19′N, 145°51′E	63	30.2	3.4	1.0	1–16
	2	Nov. 6	42°21′N, 145°34′E	71	38.0	2.7	1.0	1–8
	3	Nov. 9	42°30′N, 145°35′E	102	39.2	3.0	1.2	1–16
	4	Nov. 11	42°33′N, 144°12′E	83	53.0	3.3	1.7	1–18
	5	Nov. 16	42°01′N, 143°58′E	68	48.5	3.6	1.8	1–13
			Total	387	42.1	3.2	1.4	1–18
Longline	1	Nov. 8	42°27′N, 145°25′E	26	100	16.0	16.0	2–39
	2	Nov. 9	42°30′N, 145°32′E	22	100	16.4	16.4	1–65
	3	Nov. 10	42°36′N, 144°15′E	19	94.7	10.3	9.7	2–26
	4	Nov. 11	42°34′N, 144°10′E	85	98.8	12.4	12.3	1–55
	5	Nov. 16	42°01′N, 143°58′E	19	94.7	9.8	9.3	2–31
			Total	171	98.2	13.0	12.8	1–65

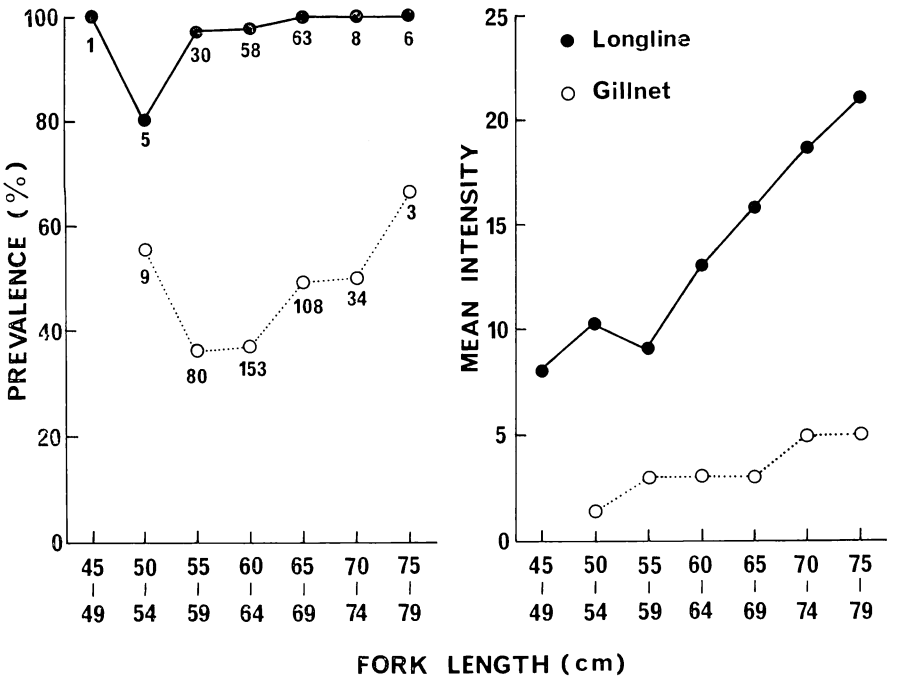

Fig. 1. Changes in the prevalence and mean intensity of infection of *Lepeophtheirus salmonis* in relation to size of *Oncorhynchus keta* captured with gillnets and longlines in the western North Pacific Ocean southeast of Hokkaido, November 1984. Numerals refer to the number of fish examined.

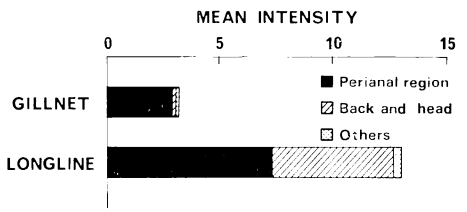

Fig. 2. Location of *Lepeophtheirus salmonis* on *Oncorhynchus keta* captured with gillnets and longlines in the western North Pacific Ocean southeast of Hokkaido, November 1984.

and northern Honshu for spawning. A comparison of the infection levels of *L. salmonis* revealed a marked difference between the two sampling methods (Table 1). Levels of prevalence, mean intensity and relative density in the gillnet samples were consistently lower than those in the longline samples.

Changes in the prevalence and mean intensity of infection of *L. salmonis* in relation to host size are shown in Fig. 1. In the longline samples, prevalence did not change markedly with fish size because most fish were infected. In the gillnet samples, however, the proportion of infected fish in each size class was lower than that in the longline samples and it increased with an increase in fish size. Mean intensity increased with length of fish in both samples, but there were great differences in the levels of mean intensity between the same size classes of the two samples.

It is clear that gillnet samplings consistently underestimated the infection levels of *L. salmonis* on chum salmon. In the longline samples, *L. salmonis* were found on the back and head and in the perianal region of chum salmon, but in the gillnet samples most *L. salmonis* occurred in the perianal region (Fig. 2). This indicates that almost all *L. salmonis* attaching to the dorsal side and some in the perianal region were lost while chum salmon were entangled with gillnets and when they were removed from the nets. Thus, the longline is the preferred sampling method when accurate levels of infection are desired.

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流し網とはえなわで漁獲したサケにおける *Lepeophtheirus salmonis* の寄生度の比較

長澤和也

北海道南東の北西太平洋で流し網とはえなわを用いてサケを漁獲し，橈脚類 *Lepeophtheirus salmonis* の寄生度を調べた．流し網で漁獲したサケにおける寄生率ははえなわのものより低く，平均寄生数も流し網で漁獲したサケの方が少なかった．これは，サケが羅網している時と網からサケを取りはずす時に *L. salmonis* が魚体から脱落することに原因すると考えられた．したがって，サケにおける *L. salmonis* の正確な寄生度を知るには，はえなわが流し網よりも好ましい漁獲方法と判断された．

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