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The Abundance, Distribution, and Biological Characteristics of Chinook and Coho Salmon on the Fishing Banks off Southwest Vancouver Island, May 18 - 30, 1989 and April 23 - May 5, 1990

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THE ABUNDANCE, DISTRIBUTION, AND BIOLOGICAL CHARACTERISTICS OF CHINOOK AND COHO SALMON ON THE FISHING BANKS OFF SOUTHWEST VANCOUVER ISLAND, MAY 18 - 30, 1989 AND APRIL 23 - MAY 5, 1990

by

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ABSTRACT

Waddell, B. J., J. F. T. Morris, and M. C. Healey. 1992. The abundance, distribution and biological characteristics of chinook and coho salmon on the fishing banks off southwest Vancouver Island, May 18 - 30, 1989 and April 23 - May 5, 1990. Can. Tech. Rep. Fish. Aquat. Sci. 1891: 113 p.

We conducted surveys by commercial troll from May 18 - 30, 1989 and April 23 - May 5, 1990 to determine chinook (Oncorhynchus tshawytscha) and coho (O. kisutch) salmon distributions in our study area off southwest Vancouver Island and to obtain some biological parameters on these salmon populations. This report summarizes data gathered during these surveys.

The chinook catch rate decreased from a geometric mean of 8.8/hour in 1989 to 5.3/hour in 1990. Conversely, the coho catch rate increased from 3.3/hour to 5.0/hour. In 1989, catch rates of large chinook were highest to the northwest of the study area, ie. in the Gullies and on 7 and 12 Mile Bank, South Bank and Amphitrite Bank; catch rates of smaller chinook were highest to the southeast, ie. on Swiftsure Bank and in the Eddy region. Catch rates of coho were highest on Swiftsure Bank, South Bank, and 7 and 12 Mile Bank. In 1990, catch rates of all chinook size classes were highest on Finger Bank and 7 and 12 Mile Bank and lowest on Swiftsure Bank and Pachena. Catch rates of coho were high over most areas. Chinook caught in 1989 and 1990 ranged from 22 to 97 cm in fork length. The mean sizes of chinook aged 0.1+, 0.2+, 0.3+, and 0.4+ were 40.5, 58.9, 70.3 and 80.2 cm, respectively, in 1989, and 36.2, 55.0, 65.7, and 74.8 cm in 1990. Coho ranged from 23 to 63 cm in length over the two years, and averaged 45.3 cm in 1989 and 42.7 cm in 1990. Almost all the coho were age 1.1+. Chinook sex ratios changed with age in both 1989 and 1990; there were significantly more chinook males in the 0.1+ age class, but significantly more chinook females in the 0.4+ age class. Chinook and coho were captured at mean depths of 35.3 and 13.3 m, respectively, averaged over the two years. More than 80% of coded-wire tagged chinook and coho originated from United States hatcheries. Fish and euphausiids were the major diet items for chinook and coho during both years. Chinook diets shifted with increasing size from euphausiids to fish. Crab larvae were a major diet item for both species in 1989 only. Chinook stomach dry weight to fish wet weight ratios (SW/FW ratios) were highest in the Gullies, where large chinook were feeding mainly on fish. Chinook SW/FW ratios were lowest in the Eddy where small chinook were feeding mainly on euphausiids. Coho SW/FW ratios on Swiftsure Bank were highest of all the areas in 1989, and lowest in 1990.

RÉSUMÉ

Waddell, B. J., J. F. T. Morris, and M. C. Healey. 1992. The abundance, distribution and biological characteristics of chinook and coho salmon on the fishing banks off southwest Vancouver Island, May 18 - 30, 1989 and April 23 - May 5, 1990. Can. Tech. Rep. Fish. Aquat. Sci. 1891: 113 p.

Nous avons effectué du 18 au 30 mai 1989 et du 23 avril au 5 mai 1990, en utilisant la pêche à la traîne commerciale, des études visant à déterminer la distribution du quinnat (Oncorhynchus tshawytscha) et du coho (O. kisutch) dans notre zone d'étude, située au sud-ouest de l'île de Vancouver, et à obtenir certains paramètres biologiques sur ces populations de saumon. La présent rapport résume les données recueillies pendant les études.

Le taux de capture du quinnat a baissé, passant d'une moyenne géométrique de 8,8/heure en 1989 à 5,3/heure en 1990. Par contre, le taux de capture du coho a augmenté, passant de 3,3/heure à 5,0/heure. En 1989, les taux de capture des gros quinnats étaient les plus élevés au nord-ouest de la région d'étude, c'est-à-dire dans les Gullies et sur le banc 7 and 12 Mile, le banc South et le banc Amphitrite; les taux de capture des petits quinnats étaient les plus élevés au sud-est, c'est-à-dire sur le banc Swiftsure et dans la région de l'Eddy. Les taux de capture des cohos étaient les plus élevés sur le banc Swiftsure, le banc South et le banc 7 and 12 Mile. En 1990, les taux de capture de toutes les classes de taille de quinnats étaient les plus élevés sur le banc Finger et le banc 7 and 12 Mile, et les plus bas sur le banc Swiftsure et à Pachena. Les taux de capture des cohos étaient élevés dans la plupart des régions. Les quinnats capturés en 1989 et 1990 mesuraient de 22 à 97 cm de longueur à la fourche. La taille moyenne des quinnats âgés de 0.1+, 0.2+, 0.3+, et 0.4+ était respectivement de 40,5, 58,9, 70,3 et 80,2 cm en 1989, et 36,2, 55,0, 65,7 et 74,8 cm en 1990. La taille des cohos allait de 23 à 63 cm de longueur sur les deux années, avec une moyenne de 45,3 cm en 1989 et 42,7 cm en 1990. Presque tous les cohos étaient d'âge 1.1+. Chez les quinnats, le rapport des sexes changeait en fonction de l'âge en 1989 comme en 1990; il y avait un nombre significativement plus élevé de quinnats mâles dans la classe d'âge 0.1+, mais un nombre significativement plus élevé de femelles dans la classe d'âge 0.4+. Les quinnats et les cohos ont été capturés à des profondeurs moyennes de 35,8 et 13,3 m respectivement (moyenne calculée sur deux ans). Plus de 80% des quinnats et des cohos portant des micromarques codées provenaient des piscicultures des États-Unis. Les poissons et les euphausiacés étaient les principales composantes de l'alimentation du quinnat et du coho pendant les deux années. L'alimentation du quinnat, à mesure que la taille augmentait, passait des euphausiacés aux poissons. Les larves de crabes étaient, en 1989 seulement, une composante important de la nourriture chez les deux espèces. Chez les quinnats, les rapports poids sec du contenu stomacal/poids humide du poisson (SW/FW) étaient au plus haut dans les Gullies, où les gros quinnats se nourrissaient principalement de poisson. Ces rapports étaient au plus bas dans l'Eddy, où les petits quinnats se nourraissaient principalement d'euphausiacés. Les rapports SW/FW chez les cohos sur la banc Swiftsure étaient les plus élevés de tous les secteurs en 1989, et les plus bas en 1990.

INTRODUCTION

The surveys described in this report were a major part of the Chinook and Coho on the Offshore Banks project of the Marine Survival of Salmon (MASS) program in 1989 and 1990. The aim of the project is to investigate oceanographic effects on chinook and coho survival. Our hypothesis is that the survival of juvenile chinook and coho salmon in their first year in the ocean is closely connected to their aggregating behaviour on the offshore banks and that oceanographic events influence these aggregations. This is based on the widely accepted assumption that oceanographic events can affect survival through their influence on the interactions of juvenile salmon, prey, and predator distributions. To test this hypothesis, we planned to first determine specific juvenile salmon distributions and then to relate them to concurrent oceanographic events. We will then search for correlations between those oceanographic events that influence local salmon distributions, and interannual variation in ocean survival.

In the spring of 1989 and 1990, we chartered three commercial trollers to conduct surveys of the chinook and coho salmon populations on the continental shelf off southwest Vancouver Island. Similar troll surveys were conducted with just one troll vessel in the fall of 1987 and the spring and fall of 1988, and have already been published (Olsen et al., 1989; Morris and Healey, 1990). Our report summarizes the 1989 and 1990 data gathered on chinook and coho distributions, depths of capture, size composition, age composition, country of origin, feeding activity, and diet. It also compares the 1989 and 1990 catch rate data with data collected in the 1988 spring survey (Morris and Healey, 1990), and presents coded-wire tag data for fish collected in the 1987 and 1988 surveys.

METHODS

SURVEY AREA

We chartered three commercial trollers in the spring of 1989 (May 18-30) and 1990 (April 23 - May 5) to conduct surveys of the chinook and coho populations off the southwest coast of Vancouver Island. This provided more comprehensive coverage than the single vessel we chartered in 1987 (Olsen et al., 1989) and 1988 (Morris and Healey, 1990). The trollers were the FV Cowichan, Early Mist, and Surfrider in 1989, and the Cowichan, Early Mist, and Dalmacian Star II in 1990.

We designed the sampling of chinook and coho to take advantage of concurrent oceanographic surveys by the Institute of Ocean Sciences (IOS). Our study area off southwest Vancouver Island included the following areas: Amphitrite Bank; South Bank; the entrance to Barkley Sound; Pachena; 7 and 12

Mile Bank; the "Gullies"; the "Southwest Corner" of La Perouse Bank; North Bank; West Bank; Finger Bank; the "Eddy"; and Swiftsure Bank (Fig. 1). The 1988 spring survey (May 23-June 5) was conducted on Swiftsure Bank, 7 and 12 Mile Bank, Finger Bank and Pachena (Morris and Healey, 1990). In 1989 (May 18-30), we fished all areas except West Bank, while in 1990 (April 23-May 5), we fished all areas except Amphitrite Bank, the entrance to Barkley Sound, Southwest Corner, North Bank and West Bank. We concentrated the fishing effort in 1990 on areas south of Cape Beale to determine catch rate variabilities within areas. This also provided more catch information within the region of the Tully Eddy. The 1989 and 1990 fishing tacks are shown in Fig. 2a and 2b.

In addition to the survey, we conducted experiments designed to determine the influence of vessel density on catch rates. In 1989, we conducted 18 experiments on 7 and 12 Mile Bank, and in 1990, we conducted five experiments on Swiftsure Bank, 7 and 12 Mile Bank and the Gullies. We incorporated the catch results from these experiments into the survey databases. This resulted in a disproportionately intensive fishing effort on 7 and 12 Mile Bank in 1989. The results of the 1989 and 1990 vessel density experiments will be presented in another report.

DATA COLLECTION

The trollers fished using a standard commercial gear arrangement of six lines with nine lures per line. We usually fished with 30 fm (54.9 m) of line, with the following gear arrangement: small manistees (5 cm, brightly-painted spoons with large black spots) to selectively catch coho on 9 ft (2.7 m) leaders at 1.5, 3, and 4.5 fm (2.7, 5.5 and 8.2 m); plugs or spoons on 30 ft (9.1 m) leaders at 9, 13.5, 18 and 22.5 fm (16.5, 24.7, 32.9 and 41.1 m); a flasher and hootchie combination on a 21 ft (6.4 m) leader at 27 fm (49.4 m); and, another flasher and hootchie combination on a 9 ft (2.7 m) leader at 30 fm (54.9 m). The gear spacing and leader lengths varied slightly among the vessels. Also, the trollers removed one or two pieces of gear when fishing at depths shallower than 30 fm (54.9 m) and increased the gear spacing when fishing deeper than 45 fm (82.3 m). Barbless hooks were used to minimize coho and juvenile chinook mortalities.

For every chinook and coho that was caught, we recorded fork length, line (ie. starboard or port side; main line, long pig, or short pig), and capture depth. We retained and sold all chinook greater than or equal to 67 cm ("legal size") to help cover charter costs. We recorded the sex of these fish as they were being dressed. In 1989, we also collected scales and preserved stomachs from most of the legal size chinook, but in 1990 we reduced the number of these samples. We also recorded sex, collected scale samples and retained stomachs from a sample of chinook less than 67 cm and coho of all sizes (maximum of 25 per day of each species per vessel in 1989 and ten per day of each species per vessel in 1990) and from all adipose-clipped fish. We preserved all stomachs in 10% formalin and froze the heads from all adipose-clipped (coded-wire tagged) fish.

Our surveys coincided with IOS CTD and Acoustic Doppler Current Profiler (ADCP) surveys to enable us to relate our catch results to coastal oceanography. Robin Brown, Ocean Data Management, IOS, has archived the oceanography data under the cruise indentifiers 89-11 and 90-11.

DATA PROCESSING

We categorized chinook into the following size classes: "legal size" (greater than or equal to 67 cm); 61 - 66 cm; 51 - 60 cm; 41 - 50 cm; 31 - 40 cm; and, 21 - 30 cm. We used these size classes when analyzing the catch rates, the mean depths of capture and the diet composition. Coho were not analyzed by different size classes.

We expressed catch rates as the number of fish caught per hour. We calculated average catch rates for each year or each area by summing catch rates and dividing by the number of contributing observations.

We followed three rules to determine the duration for each catch rate observation:

1) Each day was divided into three fishing time periods; from start time to 10:00, from 10:00 to 13:00, and from 13:00 to stop time. Each time period represented a catch observation.
2) However, a new catch rate observation started if we crossed an area boundary during one of these daily time periods.
3) Separate catch rates were recorded for each of the vessel density versus catch rate experiments. Most of these took 1.0 to 1.35 hours.

We log-transformed the catch rates before ANOVA tests to moderate the strong correlations between means and variances within areas. As a consequence, we report the central tendency of the catch rate as the geometric mean.

We calculated mean fork lengths for coho and each age class of chinook from length frequency data. Length frequencies were weighted by the proportion of each length group sampled for age to obtain true age length frequencies.

To obtain depth of capture information, we recorded the lure position for each fish. The distance along the line to the lure position was greater than the depth of capture because the lines trailed behind the fishing vessel at an angle that was a function of the weight of the cannon ball at the end of the line, the number and type of lures on each line, the speed and direction of the tide in relation to the vessel, and the speed of the fishing vessel. We estimated this angle to be 30° most of the time. Therefore, we multiplied the distance on the line corresponding to the recorded lure position by the cosine of 30° to obtain depth of capture information.

The number of fish caught at each depth was probably slightly over-estimated except at the shallowest depth. This positive bias increased with depth because the deeper, unoccupied lures could have caught fish as they were pulled up through shallower depth strata each time a line was checked. We do not consider this bias to be serious.

We identified the major diet items of each species and categorized them as follows: (1) all fish, including herring, sandlance, rockfish juveniles, unidentified larval fish and unidentified fish remains; (2) euphausiids; (3) crab larvae, including megalopae and zoeae; (4) pteropods; (5) squid; and (6) shrimp, including larval stages. We calculated the percent frequency of occurrence for each of these categories, based only on stomachs with contents.

We calculated the ratio of stomach content dry weight (g) to fish wet weight (kg), and refer to it as the SW/FW ratio in the text. Based on Godfrey and Ball's biosampling data from the west coast of Vancouver Island (Brian Riddell, pers. comm.), we derived the following formula to estimate chinook body weights from fork length data:

$$W = 3.3\times10^{-6}(FL)^{3.29078}$$

where W = weight in kg and FL = fork length in cm. We estimated coho body weights from fork length data using a formula derived from Wright (1970):

$$W = 1.77\times10^{-5}(FL)^{2.93409}$$

where again W = weight in kg and FL = fork length in cm.

We performed ANOVA tests on catch rate, fork length and depth of capture data to determine significant differences among data groupings, and used Tukey's studentized range test to compare among group means. We performed Kruskal-Wallis rank sum tests to determine if stomach content dry weight to fish wet weight ratios (SW/FW ratios) were different among areas for each year. We used this non-parametric test rather than analysis of variance because the distributions of the SW/FW ratio were negatively skewed with a high proportion of values at or close to zero.

We performed Student t tests on corrected chinook size frequency data to determine significant differences among age classes, within years and between years, and on 1.1+ aged coho size frequency data to determine significant differences between years.

We statistically analyzed the data with VMS SAS version 5.18 software. The significance level for all tests was 0.05.

RESULTS AND DISCUSSION

I. CATCH PER UNIT OF EFFORT

Histograms of catch rates for the five areas with the highest sample sizes for both years are shown geographically in Figures 3a to 3g.

(a) 1989 Catch Results

Fishing tacks of the FV Cowichan, Early Mist, and Surfrider during the May 18-30, 1989 survey are shown in Fig. 2a. We concentrated most of the fishing effort on 7 and 12 Mile Bank, Swiftsure Bank, the Eddy and the Gullies. These areas contributed 55.4, 13.2, 10.7, and 7.4% of the catch rate observations, respectively.

The overall geometric mean of the catch rate of all chinook on the offshore areas was 8.8/hour in 1989 (Table 2), which was down from 10.4/hour in 1988 (Table 1). Chinook size classes greater than 40 cm made up 93.9% of the chinook catch. The overall geometric means of catch rates for each size class of chinook were as follows: legal size, 1.9/hr; 61 to 66 cm, 2.1/hr; 51 to 60 cm, 2.3/hr; 41 to 50 cm, 0.9/hr; 31 to 40 cm, 0.5/hr; and 21 to 30 cm, 0.00/hr (Table 2).

The geographic distribution of large and small chinook differed over the survey area. Catch rates of legal size chinook were highest to the northwest, ie. on 7 and 12 Mile Bank, the Gullies, Amphitrite Bank and South Bank (Table 2 and Fig. 3a), while catch rates of chinook from 41 to 50 cm were highest to the southeast, ie. on Swiftsure Bank and the Eddy (Fig. 3b). On 7 and 12 Mile Bank, catch rates of legal size chinook, chinook from 61 to 66 cm, and 51 to 60 cm were the highest among the areas at 3.2, 3.4 and 3.1/hr (Fig. 3a, 3b and 3c). In the Gullies, catch rates of legal size chinook were high at 2.9/hr, but catch rates of the smaller class sizes were low. On Swiftsure Bank, catch rates of chinook from 51 to 60 cm and 41 to 50 cm were high at 2.9 and 1.5/hr. In the Eddy, catch rates of chinook from 51 to 60 cm and 41 to 50 cm were also high at 2.5/hr and 2.4/hr. The catch rates of the four size classes greater than 40 cm were significantly different among the areas. The catch rates of chinook from 31 to 40 cm and 21 to 30 cm were very low and did not differ significantly among the areas (Fig. 3e and 3f).

The overall geometric mean of coho catch rates was 3.3/hr during the 1989 survey (Table 2), more than twice as high as in 1988 (1.5/hr, Table 1). Catch rates were high on South Bank and Swiftsure Bank at 5.8 and 5.4/hr; intermediate on 7 and 12 Mile Bank, the Eddy and the Gullies at 3.9, 2.7 and 2.2/hr; and low on Amphitrite Bank, Barkley Sound, Finger Bank, Pachena, Southwest Corner and North Bank where they ranged from 1.8 to 0.4/hr (Table 2). Coho catch rates differed significantly among the areas.

Coho catch rates were weakly, but positively correlated with those of chinook from size classes 61 to 66 cm, 51 to 60 cm, 41 to 50 cm, and 31 to 40 cm ($r=0.21$, $df=119$, $P>r=0.021$; $r=0.33$, $df=119$, $P>r=0.0002$; $r=0.33$, $df=120$, P>r=0.0002; r=0.23, df=119, P>r=0.0125). This suggests that coho were sharing the same geographic areas as similarly sized chinook.

(b) 1990 Catch Results

Fishing tacks for the FV Cowichan, Dalmacian Star II, and the Early Mist during the April 23 to May 7, 1990 survey are shown in Fig. 2b. Within the primary areas, fishing effort was more equally distributed than in 1989; 29 of the 100 catch rate observations were made in the Gullies, 28 on 7 and 12 Mile Bank, 20 on Swiftsure Bank, 11 in the Eddy; 7 on Finger Bank, 3 on South Bank, and 2 on Pachena.

The overall geometric mean of the chinook catch rate in the survey area was lower, at 5.3/hr, in 1990 than in 1989 (Table 3). The overall catch rates for each size class of chinook were as follows: legal size, 1.4/hr; 61 to 66 cm, 0.8/hr; 51 to 60 cm, 1.3/hr; 41 to 50 cm, 0.7/hr; 31 to 40 cm, 0.9/hr; and 21 to 30 cm, 0.1/hr.

Unlike 1989, the geographic distributions of large and small chinook were similar in 1990. Catch rates of legal size chinook and chinook 61 to 66 cm were high on Finger Bank, 7 and 12 Mile Bank and the Gullies, and low on Swiftsure Bank (Fig. 3a and 3b). Catch rates of chinook 51 to 60 cm, 41 to 50 cm and 31 to 40 cm were high on Finger Bank, 7 and 12 Mile Bank and the Eddy, and low on Swiftsure Bank (Fig. 3c, 3d and 3e). Catch rates for each of these five size classes were significantly different among the areas. Catch rates of chinook 21 to 30 cm were very low in all of the areas and were not significantly different (Fig. 3f).

Coho catch rates were higher in 1990, at 5.0/hr, than in 1989. In 1990, coho catch rates were highest in Pachena and the Eddy at 15.8 and 13.9/hr, intermediate on 7 and 12 Mile Bank and the Gullies at 6.2 and 4.2/hr, and low on Finger Bank, Swiftsure Bank and South Bank at 3.5, 3.2 and 0.9/hr (Table 3). Coho catch rates were significantly different among the areas. Coho catch rates were not significantly correlated with catch rates of chinook of any size class, unlike 1989.

Two-way analyses of variance demonstrated that the catch rates of coho and each size class of chinook were not similar among the areas and the years 1988, 1989 and 1990. The area by year interactions were significant in each case.

II. AGE CLASSES

(i) Chinook

In 1989, we observed nine age categories of chinook in the survey (0.1+, 0.2+, 0.3+, 0.4+, 1.0+, 1.1+, 1.2+, 1.3+ and 1.4+; Table 4), whereas we only observed seven age categories in 1990 (0.1+, 0.2+, 0.3+, 0.4+, 1.1+, 1.2+ and 1.3+).

Most of the chinook caught in our surveys (91.7% in 1989 and 93.5% in 1990) migrated to sea as 0. age smolts, and represented four of the age categories. In 1989, the highest frequency of chinook caught were aged 0.2+ (63.9%; Table 4), followed by 0.3+ fish (15.0%), whereas in 1990 there was a higher frequency of 0.3+ aged chinook (40.9%), followed by 0.2+ fish (31.3%).

(ii) Coho

Most of the coho caught in our surveys were aged 1.1+ (98.7% in 1989 and 90.1% in 1990; Table 4). The remainder were aged either 0.1+ or 2.1+.

III. FORK LENGTHS

In 1989, chinook fork lengths ranged from 22 to 97 cm, and the mean fork length was 59.2 cm (Table 5). In 1990, chinook fork lengths ranged from 26 to 92 cm, and the mean fork length was 56.2 cm (Table 5). In 1989, chinook length frequencies were normally distributed, whereas in 1990 they were bimodally distributed due to a high number of small chinook that were mostly 0.1+ age (Fig. 4a and 4b). These 0.1+ chinook had similar catch rates in all areas, indicating that this was likely a strong year class and not a result of unequal fishing effort in different areas.

Coho fork lengths in 1989 ranged from 23 to 61 cm, and the mean fork length was 45.3 cm (Table 5). In 1990, the coho fork lengths ranged from 26 to 63 cm, and the mean fork length was 42.7 cm (Table 5). The length frequency distributions for coho were normally distributed in both 1989 and 1990 (Fig. 5a and 5b).

The chinook and coho mean fork lengths were smaller in 1990 than in 1989, possibly because we collected the samples approximately one month earlier in 1990.

(a) Size at Age

(i) Chinook

In 1989, chinook aged 0.1+ ranged in fork length from 25 to 60 cm, and had a mean fork length of 40.5 cm (Table 4). In 1990, this same age category ranged in length from 26 to 45 cm, and had a mean fork length of 36.2 cm. The 0.1+ aged chinook had a significantly larger mean fork length in 1989 than in 1990 ($t=3.67$, $p>t=0.05$).

In 1989, chinook aged 0.2+ ranged in fork length from 43 to 86 cm, and had a mean fork length of 58.9 cm (Table 4). In 1990, they ranged in length from 40 to 77 cm, and had a mean fork length of 55.0 cm. The 0.2+ aged chinook had a significantly larger mean fork length in 1989 than in 1990 ($t=4.50$, $p>t=0.05$).

In 1989, chinook aged 0.3+ ranged in fork length from 50 to 94 cm, and had a mean fork length of 70.3 cm (Table 4). In 1990, they ranged in length from

40 to 92 cm, and had a mean fork length of 65.7 cm. The 0.3+ aged chinook had a significantly larger mean fork length in 1989 than in 1990 ($t=3.82$, $p>t=0.05$).

In 1989, chinook aged 0.4+ ranged in fork length from 69 to 97 cm, and had a mean fork length of 80.2 cm (Table 4). In 1990, they ranged from 67 to 91 cm, and had a mean fork length of 74.8 cm. There was no significant difference between the 1989 and 1990 mean fork lengths, probably due to the small sample sizes.

We did not perform between year size comparisons for the other age categories due to their small sample sizes.

The mean fork lengths for the 0.1+, 0.2+ and 0.3+ aged chinook were probably significantly larger in 1989 than in 1990 because we started the survey 25 days later in the season in 1989 than in 1990.

(ii) Coho

In 1989, 1.1+ aged coho ranged in fork length from 34 to 58 cm and had a mean fork length of 45.3 cm (Table 4), whereas in 1990, they ranged from 35 to 54 cm and had a mean fork length of 42.6 cm. The mean fork length was significantly greater in 1989 than 1990 ($t=4.11$, $p>t=0.05$). The 1.1+ aged coho were significantly larger in 1989 than in 1990, and again this is probably due to the later sampling period in 1989.

We did not perform between year size comparisons for coho aged 0.1+, 1.2+ and 2.1+ because of their small sample sizes.

(b) Comparison of Mean Fork Lengths Between Areas

(i) Chinook

Chinook in 1989 had the largest mean fork length in the Southwest Corner (74.7 cm) and in the Gullies (71.6 cm; Fig. 6a). They had intermediate fork lengths (52.4 to 64.3 cm) on Finger Bank, Swiftsure Bank, Pachena, Amphitrite, North Bank, 7 and 12 Mile Bank and South Bank. They had the smallest mean fork length in Barkley Sound (49.5 cm) and the Eddy (51.1 cm).

In 1990, chinook had the largest mean fork length on South Bank (60.5 cm) and the Gullies (59.6 cm; Fig. 6b). They had intermediate fork lengths (49.1 to 57.8 cm) on Pachena, Swiftsure Bank, 7 and 12 Mile Bank and Finger Bank. They had the smallest mean fork length on West Bank (47.2 cm) and the Eddy (48.8 cm).

We combined the data for 1989 and 1990 chinook and restricted the fork length comparisons to the areas we sampled during both years (i.e. 7 and 12 Mile Bank, the Eddy, Finger Bank, the Gullies, Pachena, South Bank and Swiftsure Bank). We found that chinook had the largest mean fork lengths on South Bank (62.6 cm), in the Gullies (62.3 cm) and on 7 and 12 Mile Bank (60.0 cm), and the significantly smallest mean fork length in the Eddy (50.1 cm; Fig. 6c). Then we combined the data for 1988, 1989 and 1990 chinook and restricted the fork length comparisons to the areas we sampled during all three surveys (i.e. 7 and 12 Mile Bank, the Eddy, Finger Bank, Pachena and Swiftsure Bank). In this case, chinook had the largest mean fork lengths on 7 and 12 Mile Bank (60.2 cm) and

Finger Bank (57.8 cm), and the significantly smallest mean fork length in the Eddy (50.0 cm; Fig. 6d).

(ii) Coho

In 1989, coho had larger mean fork lengths in areas further offshore. They were largest on Finger Bank (54.3 cm; Fig. 7a) and intermediate in mean fork length in the Gullies, North Bank, South Bank and Southwest Corner (47.5 to 50.0 cm). They had the smallest mean fork lengths (42.8 to 46.2 cm) in Pachena, Swiftsure Bank, Barkley Sound, Amphitrite, the Eddy and 7 and 12 Mile Bank.

There was a significant difference in coho mean fork lengths among areas in 1990 (F=11.75, PR>F=0.0001), but Tukey's studentized range test, used to compare differences in the means, failed to resolve which areas were different. However, when we restricted the 1990 analysis to areas with large sample sizes, ie. the Eddy, 7 and 12 Mile Bank, Swiftsure Bank and the Gullies, we found that coho again generally had larger mean fork lengths in areas further offshore. Coho from the Gullies and the Eddy had the largest mean fork lengths (43.7 and 43.3 cm), coho from 7 and 12 Mile Bank were smaller (42.3 cm), and coho from Swiftsure Bank had the smallest mean fork length (41.4 cm; Fig. 7b) (all significantly different).

When we combined the 1989 and 1990 coho data, the mean fork lengths were significantly largest on South Bank (46.9 cm, Fig. 7c). The smallest mean fork length (but not significant) was in Pachena (41.9 cm).

When we combined the 1988, 1989 and 1990 data, coho had significantly larger mean fork lengths on 7 and 12 Mile Bank (44.5 cm), Finger Bank (44.4 cm) and the Eddy (43.7 cm) than on Swiftsure Bank (42.2 cm) and Pachena (41.8 cm; Fig. 7d).

(c) Comparison of Mean Fork Lengths Between Years

We restricted mean fork length comparisons between 1988 (Morris and Healey, 1990), 1989 and 1990 to fish captured in areas that we sampled during all three years.

(i) Chinook

There was no significant difference between the 1988 and 1989 mean fork lengths (59.1 cm, N=1,071 and 58.7 cm, N=2,226, respectively), but the 1990 mean fork length (54.7 cm, N=937) was significantly smaller than both (F=46.51, df=2, PR>F=0.0001).

(ii) Coho

There was no significant difference between the 1988 and 1990 mean fork lengths (42.7 cm, N=147 and 42.5 cm, N=1,277, respectively), but the 1989 mean fork length (45.0 cm, N=928) was significantly larger than both (F=102.94, df=2, PR>F=0.0001).

IV. SEX DATA

(a) Sex Ratios by Age Class

We performed chi-square tests to determine whether there were significant differences between the number of males and females by species and by age class within each year.

(i) Chinook

In 1989, there were significantly greater numbers of males in the 0.1+ and 0.2+ age classes (Table 6). Conversely, during this same year, there were significantly greater numbers of females in the 0.3+ and 0.4+ age classes. There was no significant difference in the numbers of males and females for all age classes combined.

Similar to the 1989 results, there was a significantly greater number of males in 1990 in the 0.1+ age class (Table 6). Additionally, there was a significantly greater number of females in 1990 in the 0.3+ age class. There were no significant differences between numbers of males and females during 1990 in the 0.2+ and 0.4+ age classes or in all age classes combined.

(ii) Coho

There were no significant differences between the numbers of 1.1+ aged male and female coho in either 1989 or 1990 (Table 6). There were also no significant differences between the numbers of male and female coho of all age classes combined in 1989 and in 1990.

V. DEPTH OF CAPTURE

(a) Mean Depth of Capture by Age Class

(i) Chinook

We calculated 1989 and 1990 chinook mean depth of capture by age class based only on those fish that were aged (Table 7).

In 1989, the mean depth of capture of chinook increased with age. The mean depth of capture increased from 26.0 m for the 0.1+ age class to 41.0 m for the 0.4+ age class, and from 18.5 m for the 1.0+ age class to 45.2 m for the 1.3+ age class (Table 7).

In 1990, the mean depth of capture of chinook increased from 33.3 m for the 0.1+ age class to 39.8 m for the 0.2+ age class (Table 7). The mean depth of capture decreased to 36.5 m for the 0.3+ age class, and decreased even further to 34.8 m for the 0.4+ age class. The mean depth of capture increased from 37.4 m for the 1.1+ age class to 41.8 m for the 1.2+ age class.

(ii) Coho

The mean depth of capture of 1.1+ aged coho was 13.2 m in 1989 and 10.0 m in 1990 (Table 7).

(b) Mean Depth of Capture by Fork Length Interval

(i) Chinook

In 1989, the mean depth of capture increased with chinook size (Table 8; Figures 8 and 9). The mean depth of capture ranged from 19.4 m for the smallest size class (21 to 30 cm) to 39.6 m for the largest size class (>=67 cm; Table 8). The mean depth of capture for all size classes of chinook in 1989 was 35.8 m.

In 1990, the mean depth of capture increased from 28.4 m for the smallest size class (21 to 30 cm) to 38.6 m for the 61 to 66 cm size class (Table 8). The mean depth of capture for the largest size class (>=67 cm) was slightly shallower at 37.3 m. The mean depth of capture for all size classes of chinook in 1990 was 36.7 m.

(ii) Coho

The mean depth of capture of coho in 1989 (all sizes combined) was 13.3 m, whereas it was 13.4 in 1990 (Table 8).

(c) Mean Depth of Capture by Area

(i) Chinook

In 1989, the mean depths of capture of chinook salmon were shallowest in Pachena (28.8 m), Barkley Sound (29.5 m) and on South Bank (30.4 m), and deepest in the Gullies (42.0 m; Fig. 10a).

In 1990, the mean depth of capture of chinook salmon was significantly swallower on South Bank (22.4 m, Fig. 10b) than on other areas, where the mean depth of capture ranged from 35.0 m on 7 and 12 Mile Bank to 42.9 m on Pachena.

(ii) Coho

In 1989, there were no significant differences in mean depths of capture of coho salmon between the sampling areas.

Similar to the 1990 chinook observations, the mean depth of capture of 1990 coho salmon was shallowest on South Bank (6.7 m) and deepest at Pachena (18.0 m; Fig. 11).

VI. CODED-WIRE TAG (CWT) RECOVERIES

In the fall of 1987, we caught four chinook CWT's (7.5 % of total chinook catch) and 15 coho CWT's (3.4% of total coho catch; Table 9a). All of these were from Washington and Oregon hatcheries except for one coho from British Columbia (refer to Table 9f and 9g for the agency and production area keys).

Of the 29 chinook CWT's Morris and Healey (1990) caught in the spring of 1988 (2.8% of total chinook catch), 23 were from Washington State and six were from Oregon (Table 9b). There were four coho CWT's caught in the spring of 1988 (2.8% of total coho catch); one coho was from B.C. and the other three were from Washington State. In the fall of 1988, Morris and Healey (1990) caught seven chinook CWT's (2.1% of total chinook catch); one from B.C., five from Washington State and one from Oregon (Table 9c). Of the seven coho CWT's Morris and Healey (1990) caught in the fall of 1988 (2.9% of total coho catch), one was from B.C. and six were from Washington State.

In the spring of 1989, there were 44 chinook CWT's caught (1.8% of total chinook catch; Table 9d). This included six chinook from B.C., 26 from Washington State, 11 from Oregon and one from California. There were also 15 coho CWT's caught at this time (1.4% of total coho catch), including three from B.C., 11 from Washington State, and one from Oregon.

There were 43 chinook CWT's caught in the spring of 1990 (3.2% of total chinook catch; Table 9e). The CWT's included eight chinook from B.C., 24 from Washington State, ten from Oregon and one from California. There were also 34 coho CWT's (2.2% of the total coho catch), including nine from B.C. and 25 from Washington State.

For the entire sampling period, 1987 to 1990, there were more chinook CWT's (127) than coho CWT's (75) in our study area. The majority of both chinook and coho CWT's originated from American hatcheries, Washington State in particular (Figures 12a-12d). However, there was a higher percentage of coho CWT's originating from B.C. than the chinook CWT's. 56.7% of the CWT chinook recovered from our surveys originated from the Columbia River system, 20.5% from the Georgia Strait - Puget Sound - Hood Canal production areas in Washington State, 3.9% from coastal rivers in Washington State, 5.5 % from coastal rivers in Oregon, 1.6% from the Sacramento River system in California, 10.2% from the Fraser River system, and 1.6% from the east coast of southern Vancouver Island. 63.7% of the coho CWT's recovered from our survey originated from Georgia Strait - Puget Sound - Hood Canal production areas in Washington State, 13.3% from the Columbia River system, 10.7% from the lower Fraser River system, and 9.3% from rivers on the east coast of southern Vancouver Island. Of the chinook and coho CWT's caught in B.C., there were no salmon originating from hatcheries on the west coast of Vancouver Island or from hatcheries on the B.C. coast, north of Vancouver Island (Figures 12a and 12c).

VII. STOMACH CONTENT DATA

(A) Percent Frequency of Occurrence of Prey Items

We calculated the percent frequencies of occurrence of prey items from only those stomachs with contents (ie. we did not include empty stomachs).

In 1989, the principal diet items of chinook were fish, euphausiids and crab larvae that were found in 54.3, 51.5 and 26.6% of the stomachs, respectively (Table 10). Shrimp, pteropod molluscs and squid were found in only a small percentage of stomachs. 19.9% of the stomachs were empty.

In 1990, the principal diet items of chinook were fish and euphausiids that were observed in 68.4 and 38.9% of stomachs, respectively (Table 10). Squid and pteropod molluscs were again minor components of the diet. There were no observations of crab larvae in the stomachs. 34.5% of the stomachs were empty.

In 1989, the principal diet items of coho were euphausiids, crab larvae, fish and pteropod molluscs that were found in 58.3, 56.1, 48.2 and 36.7 % of stomachs (Table 10). Squid were a minor diet item. 29.1% of the stomachs were empty.

In 1990, euphausiids, fish and pteropod molluscs were the principal diet items in chinook and were found in 51.0, 49.7 and 43.9% of the stomachs, respectively (Table 10). Crab larvae were only observed in 0.7% of coho stomachs. 39.9% of coho stomachs in 1990 were empty.

In 1988 and 1989, crab larvae were a major component of chinook and coho diets. They were found in 45.3% and 26.6% of chinook stomachs in 1988 and 1989, respectively (Morris and Healey, 1990; Table 10), and in 84.5% and 56.1% of coho stomachs in 1988 and 1989 (Morris and Healey, 1990; Table 10). We sampled earlier in 1990 than in the previous years, therefore crab larvae were probably not available as a diet item to salmon in our study area.

(i) By Chinook Fork Length Interval

The percent frequency of fish in chinook stomachs increased with fork length. In 1989, the frequencies ranged from 20.0% for 31-40 cm chinook to 63.7% for chinook >67 cm in length (Table 11). In 1990, the frequencies ranged from 33.3% for 21-30 cm chinook to 91.7% for 61-66 cm chinook.

Although euphausiids were a major food item for chinook of all sizes, their occurrence in stomachs tended to decrease as chinook fork lengths increased. In 1989, the frequency of euphausiids ranged from 100% for 21-30 cm chinook to 43.4% for chinook >67 cm (Table 11). In 1990, the frequency of euphausiids ranged from 100% for the 21-30 cm chinook to 31.9% for 61-66 cm chinook.

In 1989, crab larvae were also an important diet item for chinook of all sizes and there was no noticeable change in preference for crab larvae with chinook size (Table 11). In 1990, the chinook sampled had not consumed crab larvae, probably due to the month earlier survey date.

During both years, pteropod molluscs, squid and shrimp were only incidental food items, and their occurrences were not related to chinook size (Table 11).

In general, the percent frequency of empty chinook stomachs decreased as chinook fork lengths increased. In 1989, percent frequency of empty stomachs ranged from 4.0% in 61-66 cm chinook to 60.0% in 21-30 cm chinook (Table 11). In 1990, the percent frequency of empty stomachs ranged from 20.2% for chinook >67 cm to 80.0% for 21-30 cm chinook.

(ii) By Year and Sampling Area

We calculated the percent frequencies of occurrence of chinook and coho diet items for each sampling area during each year (Tables 12 and 13). The sample sizes of stomachs with food items were small for many of the areas. Therefore, we have limited the following discussion to the areas with the largest sample sizes for both chinook and coho in 1989 and 1990, ie. 7 and 12 Mile Bank, the Gullies, Swiftsure Bank and the Eddy.

(1) Chinook

(a) All Size Classes Combined

The occurrence of fish and euphausiids as diet items in chinook were inversely related among the areas. In 1989 and 1990, fish occurred most frequently (90.0 and 93.0%) and euphausiids occurred least frequently (12.2 and 8.5%) in chinook collected from the Gullies (Table 12). In 1989, fish occurred least frequently (19.4%) and euphausiids occurred most frequently (88.9%) in chinook collected in the Eddy. In 1990, fish occurred least frequently (21.9%) and euphausiids occurred most frequently (69.0%) in chinook caught on 7 and 12 Mile Bank. This inverse relationship can be explained in part by chinook size; as chinook grow their diet changes from euphausiids to fish. In 1989 and 1990, chinook with the highest fish diet, ie. those from the Gullies, also had the highest mean fork lengths (Fig. 6a and 6b). In 1989, chinook with the highest euphausiid diet, ie. from the Eddy, also had the lowest mean fork lengths (Fig. 6a). In 1990, chinook with the highest euphausiid diet, ie. from 7 and 12 Mile Bank, did not have the lowest mean fork lengths, however, their mean fork lengths were lower than the chinook from the Gullies (Fig. 6b).

The percentage of empty stomachs among the areas was related to chinook size; larger chinook had fewer empty stomachs. During 1989 and 1990, empty stomachs occurred least frequently in chinook collected from the Gullies and 7 and 12 Mile Bank, ie. fish with the largest mean fork lengths (Table 12). Empty stomachs occurred most frequently in chinook collected from Swiftsure Bank and the Eddy in 1989 and 1990, ie. fish with the smallest mean fork lengths.

In 1989, we found crab larvae in 40.0, 28.4, 8.3 and 7.3% of chinook stomachs collected in the Gullies, 7 and 12 Mile Bank, the Eddy and Swiftsure Bank, respectively (Table 12). Since crab larvae preference is not related to chinook size, the frequency of crab larvae in chinook stomachs probably reflects their relative abundance among the areas.

(b) Chinook >=67 cm

This was the only size class with a significant sample size of stomachs. The percentages of each food item consumed were relatively the same for each area for this size class as for all size classes combined in both 1989 and 1990 (Table 12). The only difference occurred on Swiftsure Bank in 1989; the percentages of fish and euphausiids were 49.3% and 63.8%, respectively, for all size classes combined, whereas they were 61.1% and 41.7% for chinook >=67 cm (ie. the importance of fish and euphausiids reversed). The probable reason for no differences on 7 and 12 Mile Bank and the Gullies was that the overall percentage of chinook >=67 cm sampled was high (81.5% and 88% of all size classes combined), whereas chinook >=67 cm on Swiftsure only represented 49% of all size classes combined. The fact that chinook >=67 cm captured on Swiftsure Bank had a higher percentage of fish in their stomachs than euphausiids agrees with our previous findings that larger chinook eat more fish. There was only a very small number of chinook >=67 cm captured in the Eddy (8% of all size classes combined).

(2) Coho

Fish occurred most frequently in coho stomachs collected on 7 and 12 Mile Bank in 1989 (52.4%) and in the Gullies in 1990 (85.0%) and least frequently in the Gullies in 1989 (44.4%) and on Swiftsure Bank in 1990 (25.0%; Table 13).

Euphausiids occurred most frequently in coho stomachs collected in the Eddy in 1989 (80.0%) and on 7 and 12 Mile Bank in 1990 (71.1%) and least frequently in the Gullies in 1989 (44.4%) and in the Eddy in 1990 (32.3%; Table 13).

Pteropods occurred most frequently in coho stomachs collected on 7 and 12 Mile Bank in 1989 (57.1%) and in the Eddy in 1990 (61.3%) and least frequently in the Gullies in 1989 (5.6%) and on 7 and 12 Mile Bank and the Gullies in 1990 (40.0%; Table 13).

We observed crab larvae only in the 1989 stomach samples. Crab larvae occurred most frequently in coho collected in the Gullies (77.8%) and least frequently in the Eddy (36.0%; Table 13).

(B) Stomach Dry Weight/Fish Wet Weight Ratios (SW/FW Ratios)

(i) By Year and Sampling Area

We have limited the following discussion to those areas with the largest sample sizes, ie. the Gullies, Swiftsure Bank, 7 and 12 Mile Bank and the Eddy. We included Finger Bank in the 1990 analysis for chinook because their catch rate was very high in this area in 1990.

We observed chinook with the highest median SW/FW ratio in the Gullies (where large chinook had high fish diets), in both 1989 and 1990 (Table 14). This ratio was lowest in chinook collected from the Eddy in both years (where small chinook had high euphausiid diets). In 1989, the median SW/FW ratio for chinook was significantly highest in the Gullies, whereas in 1990, the chinook SW/FW ratios were significantly higher in the Gullies and 7 and 12 Mile Bank than in the Eddy.

In 1989, coho mean SW/FW ratios were not significantly different on Swiftsure Bank, the Gullies and 7 and 12 Mile Bank, but this ratio was significantly higher on Swiftsure Bank than in the Eddy (Table 14). In 1990, they were significantly higher in the Gullies and 7 and 12 Mile Bank than in the Eddy and Swiftsure Bank.

(ii) By Year and Time Period

The 1989 chinook mean SW/FW ratio for the early morning period (0600-0859) was significantly lower than for the late morning and early afternoon periods (0900-1159 and 1200-1459; Table 15). The mean ratio for the late afternoon period (1500-1759) was not significantly different from any of the other periods.

There were no significant differences in mean SW/FW ratios between time periods for the 1990 chinook and the 1989 and 1990 coho.

SUMMARY

Catch rates of chinook over the survey area decreased each year. They have changed from a geometric mean of 10.4/hr in 1988, to 8.8/hr in 1989, to 5.3/hr in 1990.

In 1989, 93.9% of the chinook catch were fish >=40 cm in length. Chinook 51-60 cm had the highest catch rate in this year (2.3/hr), while chinook 21-30 cm had the lowest (0.04/hr). In 1990, legal size chinook (>=67 cm) had the highest catch rate (1.4/hr), while chinook 21-30 cm, like in 1989, had the lowest (0.1/hr).

Chinook tended to aggregate on 7 and 12 Mile Bank, Finger Bank, Swiftsure Bank, the Eddy and the Gullies, but these aggregations were not consistently found in the same locations over the years. Also, aggregations of large and intermediate size chinook did not always coincide within each year. In 1988, legal size chinook and intermediate size classes of chinook 51 to 65 cm were abundant on 7 and 12 Mile Bank and Swiftsure Bank, and scarce on Finger Bank. In 1989, the distributions of legal size chinook and intermediate size chinook were different. Legal size chinook were abundant to the northwest of the survey area, ie. 7 and 12 Mile Bank, the Gullies, Amphitrite Bank and South Bank. Intermediate size chinook 41 to 60 cm were abundant to the southeast, ie. 7 and 12 Mile Bank, Swiftsure Bank and the Eddy. In 1990, similar to 1988 but in contrast to 1989, legal size and intermediate size chinook distributions were similar. These chinook were abundant on 7 and 12 Mile Bank, the Gullies, Finger Bank and the Eddy, and were scarce on Swiftsure Bank. In all three years, small chinook (21-30 cm) were widely dispersed and very low in abundance.

Coho catch rates increased dramatically each year from a geometric mean of 1.5/hr in 1988, to 3.3/hr in 1989, to 5.0/hr in 1990.

Coho also tended to form aggregations that changed locations over the survey area from year to year. Coho were abundant on South Bank and Swiftsure Bank in 1989, but scarce there in 1990, whereas they were abundant on Pachena and the Eddy in 1990, but scarce there in 1989. In both 1989 and 1990, coho abundances were intermediate on 7 and 12 Mile Bank and the Gullies. In 1988, coho were very low in abundance and widely dispersed (Morris and Healey, 1990).

The majority of chinook caught in our survey migrated to sea as 0. age smolts (91.7% in 1989 and 93.5% in 1990). Most of the coho caught were aged 1.1+ (98.7% in 1989 and 90.1% in 1990).

Chinook and coho mean fork lengths were smaller in 1990 than in 1989, but this was probably due to an earlier sampling date in 1990. In 1989, chinook caught in the Southwest Corner and the Gullies had the largest mean fork lengths, while chinook caught in Barkley Sound had the smallest. In 1990, the largest chinook mean fork lengths were observed on South Bank and in the Gullies, whereas the smallest mean fork lengths were found on West Bank and in the Eddy. When we combined the data for 1988, 1989 and 1990 chinook, we found that the largest chinook mean fork lengths occurred on 7 and 12 Mile Bank and Finger Bank, while the significantly smallest mean fork length was in the Eddy. Coho had larger mean fork lengths in areas further offshore in 1989 and 1990. When the 1988, 1989 and 1990 were combined, we found that coho had significantly larger mean fork lengths on 7 and 12 Mile Bank, Finger Bank and the Eddy than on Swiftsure Bank and Pachena.

The mean depth of capture of chinook increased with age in 1989, but this was not as obvious in 1990. The mean depth of capture also increased with chinook size in 1989 and 1990.

The majority of chinook and coho CWT's originated from American hatcheries, especially from Washington State. 56.7% chinook CWT's and 13.3% coho CWT's originated from the Columbia River system, 20.5% chinook and 63.7% coho came from the Georgia Strait - Puget Sound - Hood Canal production areas in Washington State, 10.2% chinook and 10.7% coho came from the Fraser River system, and 1.6% chinook and 9.3% coho originated from rivers on the east coast of Vancouver Island. Chinook CWT's also originated from coastal rivers in Washington State (3.9%) and Oregon (5.5%), and from the Sacramento River system in California.

The principal diet items for chinook were fish and euphausiids, while for coho they were euphausiids, fish and pteropods. Crab larvae were also important diet items for both chinook and coho, but they were only found in the stomachs in 1989. They were probably absent in 1990 because we conducted the survey earlier that year, so the crab larvae may not have been available to the fish at that time.

The percent frequency of fish consumed by chinook increased with fork length, while the percent frequency of euphausiids decreased. Fish were consumed most frequently, and euphausiids least frequently, by chinook captured in the Gullies (ie. where chinook had the highest mean fork lengths in 1989 and 1990). There was no noticeable difference in preference for crab larvae with chinook size increases.

The percent frequency of empty stomachs decreased with chinook size increase. Empty stomachs occurred most frequently in chinook collected from Swiftsure Bank and the Eddy in 1989 and 1990, where chinook had the lowest mean fork lengths. There was a higher percentage of empty chinook and coho stomachs in 1990 than in 1989.

The highest 1989 and 1990 mean SW/FW ratios were observed for chinook collected from the Gullies (where fish were largely consumed), while the lowest mean SW/FW ratios for both years were observed in chinook collected in the Eddy (where euphausiids were consumed heavily). The coho mean SW/FW ratio was significantly higher on Swiftsure Bank than in the Eddy in 1989, whereas in 1990, it was significantly higher in the Gullies and 7 and 12 Mile Bank than in the Eddy and on Swiftsure Bank. In 1989, the early morning mean SW/FW ratio for chinook was significantly lower than the late morning and early afternoon ratio. There were no significant differences in mean SW/FW ratios between time periods for coho or for 1990 chinook.

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TABLE 1. 1988 chinook and coho geometric mean CPUE (number caught per hour) for each area by fish size interval (N = # of time intervals; GMEAN = geometric mean).

	AREA	N	GMEAN CPUE	MIN CPUE	MAX CPUE
ALL CHINOOK	PACHENA	1	17.8	-	-
	7 & 12 MILE BANK	4	17.1	11.3	22.7
	SWIFTSURE	9	10.1	4.0	17.1
	FINGER BANK	3	4.9	3.6	6.2
	ALL AREAS	17	10.4	3.6	22.7
		(F=7.50, df= 3/13, P>F=0.0037)			
LEGAL SIZE CHINOOK	7 & 12 MILE BANK	4	4.8	1.0	8.4
	SWIFTSURE BANK	9	2.1	0.9	4.5
	PACHENA	1	1.5	-	-
	FINGER BANK	3	0.5	0.0	2.5
	ALL AREAS	17	2.1	0.0	8.4
		(F=3.73, df=3/13, P>F=0.0390)			
ALL UNDERSIZED CHINOOK	PACHENA	1	16.2	-	-
	7 & 12 MILE BANK	4	11.8	10.3	14.4
	SWIFTSURE BANK	9	8.0	3.1	12.6
	FINGER BANK	3	3.8	3.6	4.0
	ALL AREAS	17	8.1	3.1	16.2
		(F=7.94, df=3/13, P>F=0.0029)			
CHINOOK 61 - 66 cm	7 & 12 MILE BANK	4	3.6	1.3	6.5
	PACHENA	1	3.0	-	-
	SWIFTSURE BANK	9	2.2	0.6	5.0
	FINGER BANK	3	0.9	0.5	1.4
	ALL AREAS	17	2.2	0.5	6.5
		(F=2.13, df=3/13, P>F=0.1452)			
CHINOOK 51 - 60 cm	PACHENA	1	6.8	-	-
	7 & 12 MILE BANK	4	4.2	3.0	5.5
	SWIFTSURE BANK	9	3.2	0.9	4.9
	FINGER BANK	3	0.4	0.0	1.0
	ALL AREAS	17	2.8	0.0	6.8
		(F=11.82, df=3/13, P>F=0.0005)			

TABLE 1 (cont'd)

	AREA	N	GMEAN CPUE	MIN CPUE	MAX CPUE
CHINOOK	PACHENA	1	3.7	-	-
41 - 50 cm	7 & 12 MILE BANK	4	1.7	1.1	3.0
	SWIFTSURE BANK	9	1.2	0.0	1.8
	FINGER BANK	3	0.9	0.6	1.2
	ALL AREAS	17	1.4	0.0	3.7
		(F=2.08, df=3/13, P>F=0.1524)			
CHINOOK	PACHENA	1	4.5	-	-
31 - 40 cm	7 & 12	4	1.4	0.5	2.7
	FINGER BANK	3	1.3	0.6	2.0
	SWIFTSURE BANK	9	1.2	0.6	3.2
	ALL AREAS	17	1.3	0.5	3.2
		(F=0.75, df=3/13, P>F=0.5391)			
CHINOOK	PACHENA	1	0.3	-	-
21 - 30 cm	7 & 12 MILE BANK	4	0.2	0.0	0.4
	SWIFTSURE BANK	9	0.0	0.0	0.1
	FINGER BANK	3	0.0	0.0	0.2
	ALL AREAS	17	0.1	0.0	0.4
		(F=2.97, df=3/13, P>F=0.0709)			
COHO	PACHENA	1	4.5	-	-
	FINGER BANK	3	2.2	1.3	3.8
	7 & 12 MILE BANK	4	1.5	0.9	3.3
	SWIFTSURE BANK	9	1.2	0.0	3.3
	ALL AREAS	17	1.5	0.0	4.5
		(F=1.70, df=3/13, P>F=0.2166)			

TABLE 2. 1989 chinook and coho geometric mean CPUE (number caught per hour) for each area by fish size interval (N = # of time intervals; GMEAN = geometric mean).

	AREA	N	GMEAN CPUE	MIN CPUE	MAX CPUE
ALL CHINOOK	7 & 12 MILE BANK	67	12.2	2.4	34.7
	AMPHITRITE	2	8.0	7.3	8.7
	SWIFTSURE	16	7.9	1.7	18.0
	THE EDDY	13	6.4	1.3	16.3
	PACHENA	2	6.2	5.5	6.8
	FINGER BANK	2	5.6	3.5	8.7
	BARKLEY SOUND	2	5.3	2.9	9.2
	SOUTH BANK	2	4.9	4.6	5.3
	THE GULLIES	9	4.0	2.0	11.3
	NORTH BANK	4	3.8	1.9	7.0
	SOUTHWEST CORNER	2	1.5	1.3	1.6
	ALL AREAS	121	8.8	1.3	34.7
		(F=6.67, df= 10/120, P>F=0.0001)			
LEGAL SIZE CHINOOK	7 & 12 MILE BANK	67	3.2	0.0	15.3
	THE GULLIES	9	2.9	1.1	8.8
	AMPHITRITE	2	2.7	2.1	3.4
	SOUTH BANK	2	2.1	1.1	3.5
	SOUTHWEST CORNER	2	1.5	1.3	1.6
	SWIFTSURE BANK	16	0.9	0.0	4.0
	NORTH BANK	4	0.7	0.0	2.3
	PACHENA	2	0.3	0.2	0.5
	BARKLEY SOUND	2	0.2	0.0	0.5
	THE EDDY	13	0.2	0.0	3.2
	FINGER BANK	2	0.0	0.0	0.0
	ALL AREAS	121	1.9	0.0	15.3
		(F=10.52, df=10/120, P>F=0.0001)			
ALL UNDERSIZED CHINOOK	7 & 12 MILE BANK	67	8.3	1.7	28.0
	SWIFTSURE BANK	16	6.6	1.3	18.0
	THE EDDY	13	5.9	1.3	16.0
	PACHENA	2	5.8	5.0	6.6
	AMPHITRITE	2	5.2	5.2	5.3
	BARKLEY SOUND	2	5.1	2.9	8.5
	NORTH BANK	4	2.4	0.7	7.0
	FINGER BANK	2	2.1	0.0	8.7
	SOUTH BANK	2	1.9	0.9	3.4
	THE GULLIES	9	1.0	0.0	2.5
	SOUTHWEST CORNER	2	0.0	0.0	0.0
	ALL AREAS	121	5.9	0.0	28.0
		(F=9.07, df=10/120, P>F=0.0001)			

TABLE 2 (cont'd)

	AREA	N	GMEAN CPUE	MIN CPUE	MAX CPUE
CHINOOK 61 - 66 cm	7 & 12 MILE BANK	67	3.4	0.0	13.3
	PACHENA	2	2.0	1.0	3.6
	NORTH BANK	4	1.6	0.7	5.0
	SWIFTSURE BANK	16	1.4	0.0	4.0
	AMPHITRITE	2	1.3	1.1	1.4
	BARKLEY SOUND	2	1.2	0.8	1.6
	THE GULLIES	9	0.8	0.0	1.8
	FINGER BANK	2	0.7	0.0	2.0
	SOUTH BANK	2	0.7	0.0	1.7
	THE EDDY	13	0.5	0.0	2.0
	SOUTHWEST CORNER	2	0.0	0.0	0.0
	ALL AREAS	121	2.1	0.0	13.3
		(F=8.18, df=10/120, P>F=0.0001)			
CHINOOK 51 - 60 cm	7 & 12 MILE BANK	67	3.1	0.0	13.5
	FINGER BANK	2	3.0	1.5	5.3
	SWIFTSURE BANK	16	2.9	0.3	8.8
	THE EDDY	13	2.5	0.0	8.0
	PACHENA	2	2.3	2.0	2.7
	AMPHITRITE	2	1.9	1.7	2.3
	BARKLEY SOUND	2	0.9	0.0	2.6
	NORTH BANK	4	0.6	0.0	2.4
	SOUTH BANK	2	0.5	0.4	0.6
	THE GULLIES	9	0.1	0.0	0.8
	SOUTHWEST CORNER	2	0.0	0.0	0.0
	ALL AREAS	121	2.3	0.0	13.5
		(F=6.01, df=10/120, P>F=0.0001)			
CHINOOK 41 - 50 cm	THE EDDY	13	2.4	0.5	7.3
	SWIFTSURE BANK	16	1.5	0.0	7.5
	BARKLEY SOUND	2	1.3	0.4	2.6
	AMPHITRITE	2	1.1	0.7	1.5
	7 & 12 MILE BANK	67	0.9	0.0	4.5
	FINGER BANK	2	0.8	0.7	1.0
	PACHENA	2	0.5	0.4	0.7
	NORTH BANK	4	0.3	0.0	1.0
	THE GULLIES	9	0.0	0.0	0.0
	SOUTH BANK	2	0.0	0.0	0.0
	SOUTHWEST BANK	2	0.0	0.0	0.0
	ALL AREAS	121	0.9	0.0	7.5
		(F=4.17, df=10/120, P>F=0.0001)			

TABLE 2 (cont'd)

	AREA	N	GMEAN CPUE	MIN CPUE	MAX CPUE
CHINOOK 31 - 40 cm	BARKLEY SOUND	2	1.2	0.8	1.6
	FINGER BANK	2	0.8	0.7	1.0
	AMPHITRITE	2	0.8	0.4	1.4
	SOUTH BANK	2	0.8	0.4	1.1
	THE EDDY	13	0.6	0.0	2.0
	7 & 12	67	0.5	0.0	3.2
	SWIFTSURE BANK	16	0.5	0.0	1.7
	PACHENA	2	0.4	0.3	0.4
	NORTH BANK	4	0.1	0.0	0.2
	THE GULLIES	9	0.0	0.0	0.0
	SOUTHWEST CORNER	2	0.0	0.0	0.0
	ALL AREAS	121	0.5	0.0	3.2
		(F=1.86, df=10/120, P>F=0.0582)			
CHINOOK 21 - 30 cm	BARKLEY SOUND	2	0.4	0.0	0.8
	PACHENA	2	0.3	0.2	0.3
	7 & 12 MILE BANK	67	0.1	0.0	0.8
	SWIFTSURE BANK	16	0.0	0.0	0.3
	AMPHITRITE	2	0.0	0.0	0.0
	THE GULLIES	9	0.0	0.0	0.0
	NORTH BANK	4	0.0	0.0	0.0
	FINGER BANK	2	0.0	0.0	0.0
	SOUTH BANK	2	0.0	0.0	0.0
	SOUTHWEST CORNER	2	0.0	0.0	0.0
	THE EDDY	13	0.0	0.0	0.0
	ALL AREAS	121	0.0	0.0	0.8
		(F=1.74, df=10/120, P>F=0.0814)			
COHO	SOUTH BANK	2	5.8	4.4	7.4
	SWIFTSURE BANK	16	5.4	1.3	26.0
	7 & 12 MILE BANK	67	3.9	0.0	14.6
	THE EDDY	13	2.7	0.5	7.3
	THE GULLIES	9	2.2	0.0	11.6
	AMPHITRITE	2	1.8	0.5	4.2
	BARKLEY SOUND	2	1.2	1.2	1.2
	FINGER BANK	2	0.9	0.5	1.3
	PACHENA	2	0.8	0.5	1.2
	SOUTHWEST CORNER	2	0.6	0.0	1.6
	NORTH BANK	4	0.4	0.0	1.0
	ALL AREAS	121	3.3	0.0	26.0
		(F=4.34, df=10/120, P>F=0.0001)			

TABLE 3. 1990 chinook and coho geometric mean CPUE (number caught per hour) for each area by fish size interval (N = # of time intervals; GMEAN = geometric mean).

	AREA	N	GMEAN CPUE	MIN CPUE	MAX CPUE
ALL CHINOOK	FINGER BANK	7	17.9	7.6	30.3
	7 & 12 MILE BANK	28	9.8	1.8	28.6
	THE EDDY	11	6.1	2.7	12.5
	THE GULLIES	29	5.8	0.0	19.8
	PACHENA	2	2.5	1.4	4.1
	SOUTH BANK	3	1.3	1.1	1.6
	SWIFTSURE BANK	20	1.1	0.0	3.8
	ALL AREAS	100	5.3	0.0	30.3
		(F=24.71, df=6/99, P>F=0.0001)			
LEGAL SIZE CHINOOK	FINGER BANK	7	2.9	0.0	8.3
	THE GULLIES	29	2.3	0.0	6.9
	7 & 12 MILE BANK	28	2.2	0.0	7.2
	THE EDDY	11	0.6	0.0	3.1
	SOUTH BANK	3	0.4	0.3	0.8
	SWIFTSURE BANK	20	0.3	0.0	1.5
	PACHENA	2	0.2	0.0	0.5
	ALL AREAS	100	1.4	0.0	8.3
		(F=9.82, df=6/99, P>F=0.0001)			
ALL UNDERSIZED CHINOOK	FINGER BANK	7	13.3	6.2	30.3
	7 & 12 MILE BANK	28	7.2	1.7	21.4
	THE EDDY	11	5.3	2.7	8.4
	THE GULLIES	29	3.1	0.0	13.7
	PACHENA	2	2.3	1.4	3.6
	SOUTH BANK	3	0.9	0.8	1.0
	SWIFTSURE BANK	20	0.8	0.0	2.8
	ALL AREAS	100	3.7	0.0	30.3
		(F=21.59, df=6/99, P>F=0.0001)			

TABLE 3 (cont'd)

	AREA	N	GMEAN CPUE	MIN CPUE	MAX CPUE
CHINOOK 61 - 66 cm	FINGER BANK	7	3.3	0.9	7.7
	7 & 12 MILE BANK	28	1.6	0.0	5.9
	THE GULLIES	29	0.9	0.0	3.9
	THE EDDY	11	0.4	0.0	1.5
	PACHENA	2	0.2	0.0	0.5
	SWIFTSURE BANK	20	0.1	0.0	0.8
	SOUTH BANK	3	0.0	0.0	0.0
	ALL AREAS	100	0.8	0.0	7.7
		(F=12.57, df=6/99, P>F=0.0001)			
CHINOOK 51 - 60 cm	FINGER BANK	7	3.6	1.4	18.2
	7 & 12 MILE BANK	28	2.4	0.0	7.2
	THE EDDY	11	1.5	0.3	2.9
	PACHENA	2	1.0	0.5	1.8
	THE GULLIES	29	1.0	0.0	6.8
	SOUTH BANK	3	0.5	0.3	0.8
	SWIFTSURE BANK	20	0.2	0.0	2.3
	ALL AREAS	100	1.3	0.0	18.2
		(F=9.51, df=6/99, P>F=0.0001)			
CHINOOK 41 - 50 cm	FINGER BANK	7	2.0	0.9	3.6
	7 & 12 MILE BANK	28	1.3	0.0	5.6
	THE EDDY	11	1.2	0.4	2.4
	THE GULLIES	29	0.5	0.0	1.7
	SOUTH BANK	3	0.2	0.0	0.5
	PACHENA	2	0.2	0.0	0.5
	SWIFTSURE BANK	20	0.1	0.0	0.9
	ALL AREAS	100	0.7	0.0	5.6
		(F=9.60, df=6/99, P>F=0.0001)			

TABLE 3 (cont'd)

	AREA	N	GMEAN CPUE	MIN CPUE	MAX CPUE
CHINOOK 31 - 40 cm	FINGER BANK	7	2.8	0.5	6.5
	THE EDDY	11	1.8	0.7	3.3
	7 & 12 MILE BANK	28	1.2	0.0	4.5
	PACHENA	2	0.7	0.5	0.9
	THE GULLIES	29	0.7	0.0	3.2
	SWIFTSURE BANK	20	0.1	0.0	1.7
	SOUTH BANK	3	0.1	0.0	0.3
	ALL AREAS	100	0.9	0.0	6.5
		(F=10.05, df=6/99, P>F=0.0001)			
CHINOOK 21 - 30 cm	FINGER BANK	7	0.3	0.0	1.9
	PACHENA	2	0.2	0.0	0.5
	7 & 12 MILE BANK	28	0.2	0.0	1.7
	SWIFTSURE BANK	20	0.1	0.0	0.9
	THE EDDY	11	0.1	0.0	0.4
	THE GULLIES	29	0.1	0.0	0.8
	SOUTH BANK	3	0.0	0.0	0.0
	ALL AREAS	100	0.1	0.0	1.9
		(F=0.54, df=6/99, P>F=0.7760)			
COHO	PACHENA	2	15.8	7.4	32.3
	THE EDDY	11	13.9	2.4	42.3
	7 & 12 MILE BANK	28	6.2	1.6	19.0
	THE GULLIES	29	4.2	0.7	16.0
	FINGER BANK	7	3.5	0.0	27.8
	SWIFTSURE BANK	20	3.2	0.0	36.0
	SOUTH BANK	3	0.9	0.3	1.4
	ALL AREAS	100	5.0	0.0	42.3
		(F=5.35, df=6/99, P>F=0.0001)			

TABLE 4. Mean, minimum, maximum and standard deviations of fork lengths (cm) for scale-sampled chinook and coho salmon in 1989 and 1990 by age class (scale sample frequency corrected to represent the total sample; * = uncorrected sample; Ncorr = sum of corrected frequencies; %fcorr = % frequency of Ncorr; STD = standard deviation).

YEAR	SPECIES	AGE	N	Ncorr	%fcorr	MEAN	STD	MIN	MAX
1989	CHINOOK	0.1+	50	50.3	9.9	40.5	8.2	25	60
		0.2+	215	324.5	63.9	58.9	7.4	43	86
		0.3+	162	76.4	15.0	70.3	8.7	50	94
		0.4+	41	14.8	2.9	80.2	7.6	69	97
		1.0+	3	1.2	0.2	29.4	3.7	22	32
		1.1+	12	17.4	3.4	46.2	6.4	32	69
		1.2+	19	21.0	4.1	63.3	4.8	51	75
		1.3+	5	2.0	0.4	71.8	5.1	66	77
		1.4+ *	1	0.4	0.1	78.0	-	78	78
1990	CHINOOK	0.1+	45	56.3	19.7	36.2	3.1	26	45
		0.2+	55	89.5	31.3	55.0	7.5	40	77
		0.3+	167	117.2	40.9	65.7	7.8	40	92
		0.4+	10	4.6	1.6	74.8	6.8	67	91
		1.1+	8	10.0	3.5	37.4	4.2	33	42
		1.2+	5	8.2	2.9	60.2	5.3	55	71
		1.3+ *	1	0.5	0.2	71.0	-	71	71
1989	COHO	0.1+ *	1	0.8	0.6	40.0	-	40	40
		1.1+	140	141.7	98.7	45.3	4.9	34	58
		2.1+ *	1	0.8	0.6	39.0	-	39	39
1990	COHO	0.1+	3	1.9	2.2	39.5	6.1	26	48
		1.1+	76	77.5	90.1	42.6	3.9	35	54
		2.1+	6	6.4	7.4	42.0	3.5	37	48

TABLE 5. Mean, minimum and maximum and standard deviations of fork lengths (cm) for chinook and coho in 1989 and 1990 (represents the whole sample, including scale-sampled fish; N = sample size; STD = standard deviation).

SPECIES	YEAR	N	MEAN	STD	MIN	MAX
Chinook	1989	2,507	59.2	11.4	22	97
	1990	1,362	56.2	14.0	26	92
Coho	1989	1,063	45.3	5.0	23	61
	1990	1,516	42.7	3.8	26	63

TABLE 6. Number and percent composition of males and females, male to female ratios and results of x^2 tests for 1989 and 1990 chinook and coho (* = significant difference, where $P>X^2 <= 0.05$).

YEAR	SPECIES	AGE	# MALES	% MALES	# FEMALES	% FEMALES	M/F RATIO	X^2
1989	CHINOOK	0.1+ *	32	88.9	4	11.1	8.00	21.78
		0.2+ *	125	61.0	80	39.0	1.56	9.88
		0.3+ *	67	41.9	93	58.1	0.72	4.23
		0.4+ *	13	32.5	27	67.5	0.48	4.90
		1.2+	12	63.2	7	36.8	1.71	1.32
		ALL	257	53.9	220	46.1	1.17	2.87
1990	CHINOOK	0.1+ *	35	79.5	9	20.5	3.89	15.36
		0.2+	28	53.8	24	46.2	0.86	0.31
		0.3+ *	61	37.7	101	62.3	1.66	9.88
		0.4+	5	50.0	5	50.0	1.00	-
		ALL	134	47.7	147	52.3	0.91	0.60
1989	COHO	1.1+	65	50.8	63	49.2	1.03	0.03
		ALL	67	50.8	65	49.2	1.03	0.03
1990	COHO	1.1+	41	53.9	35	46.1	0.85	0.47
		ALL	49	53.8	42	46.2	0.86	0.54

TABLE 7. Mean, minimum, maximum and standard deviations of the depth of capture (m) of chinook and coho salmon in 1989 and 1990 by age class (N = sample size; STD = standard deviation).

YEAR	SPECIES	AGE	N	MEAN DEPTH	STD	MIN DEPTH	MAX DEPTH
1989	CHINOOK	0.1+	47	26.0	26.0	4.0	49.9
		0.2+	199	37.1	12.6	3.2	59.4
		0.3+	137	39.0	10.6	7.9	49.9
		0.4+	37	41.0	9.5	19.8	49.9
		1.0+	3	18.5	13.9	4.0	31.7
		1.1+	10	32.1	13.0	9.5	47.5
		1.2+	14	40.0	9.8	23.8	49.9
		1.3+	5	45.2	3.5	41.2	49.9
		1.4+	1	27.7	-	27.7	27.7
		ALL	453	36.8	12.5	3.2	59.4
1990	CHINOOK	0.1+	45	33.3	13.7	7.1	49.1
		0.2+	55	39.8	8.3	15.9	49.1
		0.3+	166	36.5	10.6	2.4	49.1
		0.4+	10	34.8	12.2	15.9	47.5
		1.1+	8	37.4	13.6	9.5	29.1
		1.2+	5	41.8	6.5	31.7	47.5
		1.3+	1	31.7	-	31.7	31.7
		ALL	290	36.7	10.9	2.4	49.1
1989	COHO	0.1+	1	3.2	-	3.2	3.2
		1.1+	136	13.2	12.1	3.2	61.8
		2.1+	1	15.9	-	15.9	15.9
		ALL	138	13.1	12.0	3.2	61.8
1990	COHO	0.1+	3	5.0	2.3	2.4	6.3
		1.1+	76	10.0	11.1	2.4	42.8
		2.1+	6	10.7	18.1	2.4	47.5
		ALL	85	9.9	11.4	2.4	47.5

TABLE 8. Mean, minimum, maximum and standard deviation of the depth of capture (m) of chinook and coho in 1989 and 1990 by size class (N = sample size; STD = standard deviation).

YEAR	SPECIES	FORK LENGTH INTERVAL (cm)	N	MEAN DEPTH	STD	MIN DEPTH	MAX DEPTH
1989	CHINOOK	21 - 30	13	19.4	10.3	4.0	43.6
		31 - 40	147	25.8	12.4	4.0	49.9
		41 - 50	351	28.5	13.8	3.2	61.8
		51 - 60	760	36.3	11.9	3.2	61.8
		61 - 66	575	38.8	11.0	3.2	61.8
		>= 67	546	39.6	9.9	7.9	49.9
		ALL	2392	35.8	12.5	3.2	61.8
1990	CHINOOK	21 - 30	34	28.4	12.4	9.5	47.5
		31 - 40	225	33.7	12.8	3.2	49.1
		41 - 50	192	35.8	11.9	2.4	49.1
		51 - 60	319	38.3	10.3	4.8	49.1
		61 - 66	218	38.6	9.5	9.5	49.1
		>= 67	373	37.3	9.7	2.4	49.1
		ALL	1361	36.7	11.0	2.4	49.1
1989	COHO	ALL	1051	13.3	12.5	3.2	61.8
1990	COHO	ALL	1513	13.4	12.9	2.4	49.1

TABLE 9. 1987 to 1990 coded-wire tag (CWT) recovery information. (* = August, September and October Oregon and Washington chinook releases go to sea directly and form a marine annulus in their first year. These are ocean-type chinook and go to sea as 0. smolts. SPEC = species; BY = brood year; LAST REL DATE = last release date; PROD AREA = production area; FL = fork length (cm)).

(a) FALL, 1987

SPEC	PROV/ STATE	BY	LAST REL DATE	PROD AREA	HATCHERY	STOCK	RELEASE	CAPTURE DATE	CAPT SITE	AGE	FL	SEX	AGEN	TAGCODE
CHIN	WASH	85	--/B7			COLUMBIA R.		11/10/B7	SWIF	1.0	2B	M	?	B-1-3-9
CHIN	WASH	85	04/87	SNAK	LYONS FERRY	SNAKE R/WA	SNAKE R/WA	11/10/B7	SWIF	1.0	31	M	WDF	634156R2
CHIN	WASH	85	04/87	SNAK	LYONS FERRY	SNAKE R/WA	SNAKE R/WA	09/10/87	AMPH	1.0	30	M	WDF	634156R2
CHIN	ORE	85	09/86	LWOR	BUTTE FALLS	COOS R.	COOS R.	23/11/87	AMPH	0.1*	43	F	ODFW	073609
COHO	B.C.	84	05/86	LWFR	KANAKA CR. PIP	KANAKA CR.	KANAKA CR.	10/10/87	SWIF	1.1	38	F	CDFO	022851
COHO	WASH	85	03/87	WA04	GREEN R/PUGET	GREEN R/PUGET	GREEN R/PUGET	27/09/87	SWIF	1.0	34	F	WDF	633709
COHO	WASH	85	04/B7	WA04	PUYALLUP R.	PUYALLUP R.	PUYALLUP R.	11/10/87	SWIF	1.0	31	M	WDF	633706
COHO	WASH	85	04/87	WA05	GEORGE ADAMS R.	GEORGE ADAMS R.	PURDY CR.	11/10/87	SWIF	1.0	31	F	WDF	634226R1
COHO	WASH	85	05/87	WA03	SKYKOMISH R.	WALLACE R.	WALLACE R.	10/10/B7	SWIF	1.0	31	M	WDF	634228R2
COHO	WASH	85	05/B7	WA03	OAK HARBOUR PENS	CLARK CR.	OAK HARBOUR	10/10/87	SWIF	1.0	31	F	WDF	633623
COHO	WASH	85	05/87	LOCO	COWLITZ R.	COWLITZ TYPE-N	COWLITZ R.	25/11/87	SWIF	1.0	35	F	WDF	634138R1
COHO	WASH	85	05/B7	WA04	PUYALLUP R.	PUYALLUP R.	VOIGHT CR.	11/10/87	SWIF	1.0	31	F	WDF	633704
COHO	WASH	85	06/87	LOCO	KLICKITAT R.	COWLTIZ TYPE-N	KLICKITAT R.	10/10/B7	SWIF	1.0	32	M	WDF	633649
COHO	WASH	85	06/87	LOCO	KLICKITAT R.	COWLITZ TYPE-N	KLICKITAT R.	25/11/B7	SWIF	1.0	35	M	WDF	633649
COHO	ORE	85	04/87	LOCO	SANDY R.	SANDY R.	CEDAR CR.-SANDY	10/10/B7	SWIF	1.0	34	F	ODFW	074114R1
COHO	ORE	85	05/87	LOCO	KLASKANINE R.	TANNER CR.	KLASKANINE R.	10/10/B7	SWIF	1.0	33	M	ODFW	073614
COHO	ORE	85	05/87	LWOR	BUTTE FALLS	UNKNOWN	FERRY CR.	11/10/87	SWIF	1.0	34	F	ODFW	073613
COHO	ORE	85	05/87	LOCO	BIG CR.	BIG CR.	COLUMBIA R/OR	11/10/87	SWIF	1.0	29	M	ODFW	073963
COHO	ORE	85	06/B7	LOCO	BIG CR.	BIG CR.	BIG CR.	27/09/87	SWIF	1.0	33	F	ODFW	073548

1987 TOTALS:	B.C.	WASH.	ORE.	CAL.	ALL	% OF TOTAL CATCH
CHINOOK	0	3	1	0	4	7.5
COHO	1	9	5	0	15	4.4

TABLE 9 (cont'd)

(b) MAY 23 - JUNE 5, 1988

SPEC	PROV/ STATE	BY	LAST REL DATE	PROD AREA	HATCHERY	STOCK	RELEASE	CAPTURE DATE	CAPT SITE	AGE	FL	SEX	AGEN	TAGCODE
CHIN	WASH	84	05/85	WA04	COLL FISHERIES	UNIV. OF WASH.	PORTAGE BAY	31/05/88	SWIF	0.3	49	M	UW	111721
CHIN	WASH	84	06/85	LOCO	WASHOUGAL R.	GRAYS R.	WASHOUGAL R.	23/05/88	SWIF	0.3	57	M	WDF	633428
CHIN	WASH	84	06/85	LOCO	WASHOUGAL R.	WASHOUGAL R.	WASHOUGAL R.	01/06/88	7+12	0.3	55	F	WDF	633335
CHIN	WASH	84	06/85	LOCO	WASHOUGAL R.	WASHOUGAL R.	WASHOUGAL R.	05/06/88	SWIF	0.3	57	-	WDF	633334
CHIN	WASH	84	10/85	LOCO	LEWIS R.	LEWIS R.	LEWIS R. N FK	28/05/88	SWIF	0.3*	57	F	WDF	633410
CHIN	WASH	84	05/86	HDCO	ROCKY REACH	SNAKExPRIEST	COLUMBIA R/WA	01/06/88	7+12	1.2	52	F	WDF	632858
CHIN	WASH	85	05/86	WA04	GROVERS CR.	GROVERS CR.	GROVERS CR.	01/06/88	7+12	0.2	53	F	SUQ	211901R1
CHIN	WASH	85	05/86	WA05	GEORGE ADAMS R.	S SOUND/HOOD CAN	PURDY CR.	29/05/88	SWIF	0.2	57	M	COOP	633504
CHIN	WASH	85	05/86	WA05	ENETAI CR.	DESCHUTES R/WA	ENETAI CR.	31/05/88	SWIF	0.2	54	M	SKOK	211917
CHIN	WASH	85	06/86	WA01	LUMMI SEA PONDS	SAMISH R.	LUMMI BAY	31/05/88	SWIF	0.2	42	F	LUMM	211902R3
CHIN	WASH	85	06/86	LOCO	WASHOUGAL R.	WASHOUGAL R.	WASHOUGAL R.	29/05/88	SWIF	0.2	52	M	WDF	634113R1
CHIN	WASH	85	06/86	LOCO	WASHOUGAL R.	WASHOUGAL R.	WASHOUGAL R.	23/05/88	SWIF	0.2	51	M	WDF	634113R3
CHIN	WASH	85	06/86	LOCO	ELDKOMIN R.	ELOKOMIN + KALAMA	ELOKOMIN R.	28/05/88	SWIF	0.2	55	M	WDF	633819
CHIN	WASH	85	09/86	LOCO	WASHOUGAL R.	WASHOUGAL R.	WASHOUGAL R.	01/06/88	7+12	0.2*	48	F	WFD	633830
CHIN	WASH	85	04/87	SNAK	LYONS FERRY	SNAKE R/WA	SNAKE R/WA	28/05/88	SWIF	1.1	44	M	WDF	634159R1
CHIN	WASH	85	04/87	LOCO	COWLITZ R.	COWLITZ R.	COWLITZ R.	27/05/88	7+12	1.1	54	-	WDF	633835
CHIN	WASH	85	04/87	LOCO	COWLITZ R.	COWLITZ R.	COWLITZ R.	29/05/88	SWIF	1.1	53	F	WDF	633834
CHIN	WASH	85	04/87	SNAK	LYONS FERRY	SNAKE/WA	SNAKE/WA	28/05/88	SWIF	1.1	45	-	WDF	634156R3
CHIN	WASH	85	06/87	WA04	HUPP SPRINGS	WHITE R/WA	HUPP SPRINGS	24/05/88	SWIF	1.1	44	-	WDF	633131
CHIN	WASH	86	04/87	LOCO	SPRING CR. NFH	SPRING CR.	CDLUMBIA R/WA	23/05/88	SWIF	0.1	41	F	FWS	051861
CHIN	WASH	86	04/87	LOCO	SPRING CR. NFH	SPRING CR.	COLUMBIA R/WA	25/05/88	SWIF	0.1	40	M	FWS	051861
CHIN	WASH	86	04/87	LOCO	SPRING CR. NFH	SPRING CR.	COLUMBIA R/WA	23/05/88	SWIF	0.1	39	M	FWS	051861
CHIN	WASH	86	07/87	LOCO	MCNARY	COLUMBIA R/WA	COLUM R BEL BONNEV	26/05/88	7+12	0.1	33	M	NMFS	232001
CHIN	ORE	84	05/86	LOCO	KLASKANINE R. S F	BONNEVILLE DAM	YOUNGS BAY	28/05/88	SWIF	1.2	54	-	ODFW	072935
CHIN	ORE	85	09/B6	UPOR	ELK R.	ELK R.	ELK R.	29/05/88	SWIF	0.2*	49	-	ODFW	073940
CHIN	ORE	85	10/86	LOCO	BONNEVILLE DAM	UPRIGHT BRIGHT	TANNER CR.	28/05/88	SWIF	0.2*	48	M	ODFW	073634
CHIN	ORE	85	10/B6	LOCO	BONNEVILLE DAM	UPRIVER BRIGHT	TANNER CR.	01/06/88	SWIF	0.2*	48	F	ODFW	073634
CHIN	ORE	86	08/87	UPOR	FALL CR/ALSEA	FALL CR/ALSEA	FALL CR/ALSEA	29/05/88	SWIF	0.1*	34	-	ODFW	074425R1
CHIN	ORE	86	10/87	LOCO	BIG CR.	ROGUE R.	BIG CR.	05/06/88	SWIF	0.1	33	M	ODFW	073460
COHO	B.C.	85	07/86	GSVI	MILLSTONE R. SPU	MILLSTONE R.	MILLSTONE R.	25/05/88	FING	1.1	48	-	CDFO	023918
COHO	WASH	85	04/87	WA05	GEORGE ADAMS R.	GEORGE ADAMS R.	PURDY CR.	23/05/88	SWIF	1.1	41	M	WDF	634226R3
COHO	WASH	85	05/87	WA01	NOOKSACK R.	NOOKSACK R.	KENDALL CR.	04/06/88	7+12	1.1	48	F	WDF	633626
COHO	WASH	85	06/B7	WA02		SKAGIT R.	ETACH CR.	24/05/88	SWIF	1.1	42	-	SSC	212137R3

SPRING 1988 TOTALS:

	B.C.	WASH.	ORE.	CAL.	ALL	% OF TOTAL CATCH
CHINOOK	0	23	6	0	29	2.8
COHO	1	3	0	0	4	2.8

TABLE 9 (cont'd)

(c) FALL, 1988

SPEC	PROV/ STATE	BY	LAST REL DATE	PROD AREA	HATCHERY	STOCK	RELEASE	CAPTURE DATE	CAPT SITE	AGE	FL	SEX	AGEN	TAGCODE
CHIN	B.C.	86	05/87	LWFR	CHEHALIS R/BC	HARRIS + CHEHALIS	CHEHALIS R/BC	24/10/88	SWIF	0.1	53	M	CDFO	024406
CHIN	WASH	85	04/87	SNAK	LYONS FERRY	SNAKE R/WA	SNAKE R/WA	29/09/88	SOUT	1.1	57	F	WDF	634159R3
CHIN	WASH	85	04/87	LOCO	COWLITZ R.	COWLITZ R.	COWLITZ R.	28/10/88	SWIF	1.1	54	F	WDF	633833
CHIN	WASH	86	05/87	WA04	GROVERS CR.	GROVERS CR.	GROVERS CR.	24/10/88	SWIF	1.1	45	M	SUQ	211961
CHIN	WASH	86	06/87	LOCO	COWLITZ R.	COWLITZ R.	COWLITZ R.	24/10/88	SWIF	0.1	41	F	WDF	634126R2
CHIN	WASH	86	05/88	UPWA	SOLEDUCK HATCH	SOLEDUCK R.	SOLEDUCK R.	23/10/88	SWIF	0.1	38	M	WDF	633322
CHIN	ORE	86	09/87	LOCO	BONNEVILLE DAM	COLUMBIA R TULE/OR	TANNER CR.	23/10/88	SWIF	0.1*	43	F	ODFW	074735R1
COHO	B.C.	85	05/87	LWFR	CHILLIWACK R.	CHILLIWACK R.	CHILLIWACK R.	/09/88	SWIF	1.1			CDFO	023953
COHO	WASH	85	05/87	LOCO	COWLITZ R.	TYPE-N	COWLITZ R.	25/11/88	SWIF	1.1	35	F	WDF	634138R1
COHO	WASH	85	06/87	WA03	TULALIP CR.	SKYKOMISH R.	TULALIP CR.	/09/88	SWIF	1.1			TULA	211942R4
CDHO	WASH	86	04/88	WA04	GREEN R. HATCH	BIG SOOS CR.		27/09/88	7+12	1.0	34	F	WDF	633716
COHO	WASH	86	05/88	WA03	SKYKOMISH HATCH	WALLLACE R.	WALLACE R.	26/09/88	SWIF	1.0	29	F	WDF	634701R1
COHO	WASH	86	05/88	UPWA	QUINAULT LAKE H.	QUINAULT R.	SALMON R. (MF SAL)	24/10/88	SWIF	1.0	40	F	QDNR	212516R4
COHO	WASH	86	06/88	WA06	DUNGENESS HATCH	DUNGENESS R.	DUNGENESS R.	25/10/88	7+12	1.0	37	M	WDF	634728

FALL 1988 TOTALS:

	B.C.	WASH.	ORE.	CAL.	ALL	% OF TOTAL CATCH
CHINOOK	1	5	1	0	7	2.1
COHO	1	6	0	0	7	2.9

TABLE 9 (cont'd)

(d) MAY 18 - 30, 1989

SPEC	PROV/ STATE	BY	LAST REL DATE	PROD AREA	HATCHERY	STOCK	RELEASE	CAPTURE DATE	CAPT SITE	AGE	FL	SEX	AGEN	TAGCODE
CHIN	B.C.	85	05/86	GSVI	CHEMAINUS R.	CHEMAINUS R.	CHEMAINUS R.	26/05/89	NORT	0.3	66	F	CDFO	023519
CHIN	B.C.	86	04/87	LWFR	CHEHALIS R/B.C.	HARRIS + CHEHALIS	CHEHALIS R/B.C.	29/05/89	SWIF	0.2	53	F	CDFO	024403
CHIN	B.C.	86	05/87	LWFR	CHEHALIS R/B.C.	HARRIS + CHEHALIS	CHEHALIS R/B.C.	18/05/89	SWIF	0.2			CDFO	024406
CHIN	B.C.	86	05/87	LWFR	CHEHALIS R/B.C.	HARRIS + CHEHALIS	CHEHALIS R/B.C.	19/05/89	7&12	0.2	49		CDFO	024408
CHIN	B.C.	86	05/87	LWFR	CHEHALIS R/B.C.	HARRIS + CHEHALIS	CHEHALIS R/B.C.	21/05/89	7&12	0.2	64		CDFO	024407
CHIN	B.C.	86	05/87	LWFR	CHEHALIS R/B.C.	HARRIS + CHEHALIS	CHEHALIS R/B.C.	27/05/89	7&12	0.2	54	F	CDFO	024408
CHIN	WASH	84	04/86	SNAK	LYONS FERRY	SNAKE R./WA	SNAKE R./WA	21/05/89	7&12	1.3			WDF	632841
CHIN	WASH	85	05/86	WA05	GEORGE ADAMS R.	S SOUND/HOOD C	PURDY CR.	21/05/89	7&12	0.3	73		COOP	633503
CHIN	WASH	85	09/86	LOCO	GRAYS R.	KALAMA FALLS	GRAYS R. W FK	20/05/89	7&12	0.3	60		WDF	633761
CHIN	WASH	85	04/87	LOCO	COWLITZ R.	COWLITZ R.	COWLITZ R.	22/05/89	SOUT	1.2	64	M	WDF	633835
CHIN	WASH	85	04/87	SNAK	LYONS FERRY	SNAKE/WA	SNAKE/WA	21/05/89	7&12	1.2	70	F	WDF	634156R3
CHIN	WASH	85	04/87	SNAK	LYONS FERRY	SNAKE/WA	SNAKE/WA	24/05/89	FING	1.2	51	F	WDF	634156R3
CHIN	WASH	85	04/87	SNAK	LYONS FERRY	SNAKE/WA	SNAKE/WA	28/05/89	EDDY	1.2	62	M	WDF	634159R1
CHIN	WASH	85	04/87	WA02	SKAGIT R.	SKAGIT R.	SKAGIT R.	26/05/89	NORT	1.2	67	F	WDF	633323
CHIN	WASH	85	06/88	LOCO		LEWIS R.	LEWIS R.	21/05/89	7&12	0.3	70	M	WDF	633822
CHIN	WASH	86	05/87	WA01	LUMMI SEA PONDS	SAMISH R.	LUMMI BAY	28/05/89	FING	0.2	63	M	LUMM	212232R2
CHIN	WASH	86	05/87	WA01	LUMMI SEA PONDS	SAMISH R.	LUMMI BAY	29/05/89	SWIF	0.2	51	F	LUMM	212232R3
CHIN	WASH	86	05/87	WA04	DESCHUTES R/WA	DESCHUTES R/WA	CAPITOL LAKE	18/05/89	SWIF	0.2	81		WDF	634114R3
CHIN	WASH	86	05/87	WA04	DESCHUTES R/WA	DESCHUTES R/WA	CAPITOL LAKE	24/05/89	EDDY	0.2	47		WDF	634114R4
CHIN	WASH	86	05/87	WA04	DESCHUTES R/WA	DESCHUTES R/WA	CAPITOL LAKE	26/05/89	PACH	0.2	52	F	WDF	634114R4
CHIN	WASH	86	05/87	WA04	GREEN R/PUGET	GREEN R/PUGET	GREEN R/PUGET	27/05/89	7&12	0.2	54	F	WDF	634116R1
CHIN	WASH	86	05/87	WA04	GROVERS CR.	GROVERS CR.	GROVERS CR.	28/05/89	EDDY	0.2	50	M	SUQ	211961R3
CHIN	WASH	86	05/87	WA04	ISSAQUAH CR.	ISSAQUAH CR.	ISSAQUAH CR.	20/05/89	7&12	0.2	49		WDF	634121R2
CHIN	WASH	86	06/87	LOCO		UNKNOWN	COLUMBIA R. (GEN.)	29/05/89	SWIF	1.1	45	F	WDF	634152R3
CHIN	WASH	86	06/87	LOCO	COWLITZ R.	COWLITZ R.	COWLITZ R.	21/05/89	7&12	0.2	44	M	WDF	634161R3
CHIN	WASH	86	06/87	LOCO	COWLITZ R.	COWLITZ R.	COWLITZ R.	28/05/89	EDDY	0.2	43	F	WDF	634161R3
CHIN	WASH	86	06/87	SNAK	LYONS FERRY	SNAKE/WA	SNAKE/WA	19/05/89	7&12	0.2	86	M	WDF	634262R6
CHIN	WASH	86	06/87	SNAK	LYONS FERRY	SNAKE/WA	SNAKE/WA	21/05/89	7&12	0.2	54	M	WDF	634401R5
CHIN	WASH	86	06/87	SNAK	LYONS FERRY	SNAKE/WA	SNAKE/WA	25/05/89	EDDY	0.2	50	M	WDF	634259R1
CHIN	WASH	86	04/88	HEAD	TURTLE ROCK POND	WELLS DAM	COLUMBIA R. (GEN.)	29/05/89	SWIF	1.1	42	M	WDF	632843
CHIN	WASH	86	04/88	SNAK	LYONS FERRY HATCH	SNAKE R./WA	COLUMBIA R. (GEN.)	21/05/89	7&12	1.1	48	F	WDF	634408R1
CHIN	WASH	86	04/88	SNAK	LYONS FERRY HATCH	SNAKE R./WA	SNAKE R./WA	29/05/89	SWIF	1.1	44	F	WDF	634411R1
CHIN	ORE	84	02/86	LOCO	BONNEVILLE DAM	UPRIVER BRIGHT	TANNER CREEK	19/05/89	7&12	1.3	73	F	ODFW	073317
CHIN	ORE	85	09/86	UPOR	ELK R.	ELK R.	ELK R.	21/05/89	7&12	0.3	72	F	ODFW	073943
CHIN	ORE	85	03/87	LOCO	BONNEVILLE DAM	COLUMBIA R.	UMATILLA R.	27/05/89	7&12	1.2	70	M	ODFW	073826
CHIN	ORE	85	03/87	LOCO	BONNEVILLE DAM	COLUMBIA R/WA	UMATILLA R.	27/05/89	7&12	1.2	66	M	DDFW	073830
CHIN	ORE	86	07/86	LOCO	BONNEVILLE DAM	UPRIGHT BRIGHT	BONNEVILLE DAM	27/05/89	BARK	0.3	62	F	NMFS	232211
CHIN	ORE	86	05/87	LOCO	BIG CR.	BIG CR.	BIG CR.	29/05/89	SWIF	0.2	59		ODFW	073817
CHIN	ORE	86	07/87	LOCO	BONNEVILLE HATCH	UPRIVER BRIGHT	BONNEVILLE DAM	29/05/89	SWIF	0.2	50	F	NMFS	Z232154
CHIN	ORE	86	09/87	LOCO	BONNEVILLE DAM	COLUMBIA R TULE/O	TANNER CR.	28/05/89	EDDY	0.2	51	M	ODFW	074721RI
CHIN	ORE	86	10/87	LOCO	BIG CR.	ROGUE R.	BIG CR.	24/05/89	FING	0.2	53	M	ODFW	073460
CHIN	ORE	87	08/88	UPOR	SALMON R.	UNKNDWN		21/05/89	7&12	0.1	37	M	ODFW	074636
CHIN	ORE	87	08/88	UPOR	TRASK	TRASK R.	TRASK R.	28/05/89	EDDY	0.1	33	F	ODFW	074155
CHIN	CAL	85	05/86	SACR	FEATHER R.	FEATHER R.	SACRAMENTO R COURT	21/05/89	7&12	0.3	83	F	CDFG	066243

SPRING 1989 TOTALS:

	B.C.	WASH.	ORE.	CAL.	ALL	% OF TOTAL CATCH
CHINOOK	6	26	11	1	44	1.8

TABLE 9 (cont'd)

(d) MAY 18 - 30, 1989 (cont'd)

SPEC	PROV/ STATE	BY	LAST REL DATE	PROD AREA	HATCHERY	STOCK	RELEASE	CAPTURE DATE	CAPT SITE	AGE	FL	SEX	AGEN	TAGCODE
COHD	B.C.	86	05/88	GSVI		BLACK CR.	BLACK CR.	28/05/89	7&12	1.1	39	F	CDFR	082443
COHD	B.C.	86	05/88	LWFR	CHEHALIS R/B.C.	CHEHALIS R/B.C.	CHEHALIS R/B.C.	27/05/89	7&12	1.1	42	F	CDFO	024852
COHO	B.C.	87	06/88	GSVI	CHEMAINUS R.	CHEMAINUS R.	CHEMAINUS R.	29/05/89	SWIF		40	F	CDFO	025443
COHO	WASH	86	07/87	WA06	LOWER ELWHA HATCH	ELWHA R.	ELWHA R.	19/05/89	7&12		47		FWS	051908R1
COHO	WASH	86	04/88	WA04	PUYALLUP R.	VDIGHT CR.	VDIGHT CR.	28/05/89	EDDY	1.1	48	M	WDF	635011R1
CDHD	WASH	86	04/88	WA04	PUYALLUP R.	VDIGHT CR.	VDIGHT CR.	29/05/89	SWIF	1.1	41	M	WDF	635011R2
COHO	WASH	86	04/88	WA05	GEORGE ADAMS HAT	GEO. ADAMS (PURDY)	PURDY CR.	28/05/89	EDDY	1.1	39	F	WDF	633720
CDHO	WASH	86	05/88	WA03		STILLAGUAMISH R+SF	MCGDVERN CR.	25/05/89	SWIF	1.1	37	F	TULA	212637R1
CDHD	WASH	86	06/88	UNKN	LAEBUGTEN WHARF	CLARK CR.	LAEBUGTEN WHARF	25/05/89	EDDY	1.1	48	F	WDF	633337
COHD	WASH	86	06/88	WA02	SWINOMISH CHAN. PD	CLARK CR.	SWINOMISH CHAN. PD	18/05/89	SWIF	1.1	42		SKAG	212508R1
COHO	WASH	86	06/88	WA03	TULALIP HATCH	SNOHOMISH R.	TULALIP CR.	28/05/89	EDDY	1.1	43	F	TULA	212261R2
CDHD	WASH	86	06/88	WA04	S. SOUND NET PENS	UNKNOWN	S. SOUND NET PENS	20/05/89	SWIF	1.1	43		WDF	635007R6
COHO	WASH	86	06/88	WA05	SKAGIT HAT (CLARK)	CLARK CR.	CLARK CR.	29/05/89	SWIF	1.1	37	M	WDF	633711
COHO	WASH	86	07/88	WA04	S. SDUND NET PENS	UNKNOWN	S. SOUND NET PENS	29/05/89	SWIF	1.1	39	M	WDF	635002R1
COHO	ORE	86	05/88	LDCO	SANDY	SANDY R (SANDY HT)	CEDAR CR.	29/05/89	SWIF	1.1	47	M	ODFW	074426R1

SPRING 1989 TOTALS:

	B.C.	WASH.	ORE.	CAL.	ALL	% OF TOTAL CATCH
COHO	3	11	1	0	15	1.4

TABLE 9 (cont'd)

(e) APR. 23 - MAY 5, 1990

SPEC	PROV/ STATE	BY	LAST REL DATE	PROD AREA	HATCHERY	STOCK	RELEASE	CAPTURE DATE	CAPT SITE	AGE	FL	SEX	AGEN	TAGCODE
CHIN	B.C.	86	05/87	LWFR	CHILLIWACK R.	CHILLIWACK R.	CHILLIWACK R.	26/04/90	7&12	0.3	76	F	CDFO	024547
CHIN	B.C.	87	05/88	THOM	CLEARWATER R/UPR	CLEARWATER R UPR	SALMON SLOUGH	01/05/90	GULL	0.2	31	M	CDFD	025519R1
CHIN	B.C.	87	03/89	THOM	SPIUS CR.	NICOLA R.	NICOLA R.	29/04/90	EDDY	1.1	40	F	CDFD	025432
CHIN	B.C.	87	04/89	UPFR	PENNY CDP	DOME CR.	DOME CR.	29/04/90	EDDY	1.1	35	M	CDFO	025042
CHIN	B.C.	88	04/B9	GSVI	COWICHAN R. CDP	COWICHAN R.	COWICHAN R.	04/05/90	WEST	0.1	32	M	CDFO	025016
CHIN	B.C.	88	05/89	LWFR	CHEHALIS R/B.C.	HARRISON R.	CHEHALIS R/B.C.	27/04/90	7&12	0.1	35	M	CDFO	025761
CHIN	B.C.	88	06/89	LWFR	CHILLIWACK R.	CHILLIWACK R.	CHILLIWACK R.	02/05/90	EDDY	0.1	39	M	CDFO	025747
CHIN	B.C.	88	06/89	LWFR	CHILLIWACK R.	CHILLIWACK R.	CHILLIWACK R.	2B/04/90	PACH	0.1	36	M	CDFO	025747
CHIN	WASH	86	05/87	WA01	LUMMI HATCH-POND	SAMISH R.	LUMMI BAY	01/05/90	EDDY	0.3	62	F	LUMM	212232R1
CHIN	WASH	86	05/87	WA01	SAMISH R.	SAMISH R.	FRIDAY CR.	02/05/90	FING	0.3	66		WDF	634122R1
CHIN	WASH	86	05/87	WA04	GREEN R. HATCH	GREEN R./PUGET	GREEN R./PUGET	02/05/90	EDDY	0.3	64	F	WDF	634116R2
CHIN	WASH	86	05/87	WA04	GROVERS CR. HATCH	GROVERS CR.	GRDVERS CR.	04/05/90	GULL	0.3	60	F	SUQ	211961R3
CHIN	WASH	86	05/87	WA04	GROVERS CR. HATCH	GROVERS CR.	GROVERS CR.	04/05/90	GULL	0.3	65	M	SUQ	211961R2
CHIN	WASH	86	05/87	WA05	GEORGE ADAMS HAT	GEORGE ADAMS R.	PURDY CR.	04/05/90	7&12	0.3	52	F	COOP	634119R2
CHIN	WASH	86	06/87	LOCO		UNKNOWN	COLUMBIA R (GEN.)	26/04/90	7&12	0.3	63	F	WDF	634152R1
CHIN	WASH	86	06/87	LOCO	KLICKITAT HATCH	PRIEST RAPIDS	KLICKITAT R.	01/05/90	GULL	0.3	67	F	WDF	633315
CHIN	WASH	86	04/88	SNAK	LYONS FERRY HATCH	SNAKE R./WA	SNAKE R./WA	02/05/90	EDDY	1.2	60	F	WDF	634408R3
CHIN	WASH	86	04/88	LOCO	COWLITZ R.	COWLITZ R.	COWLITZ R.	29/04/90	7&12	1.2	61	M	WDF	634161R3
CHIN	WASH	86	05/B8	UPWA	SOLEDUCK R.	SOLEDUCK R.	SDLEDUCK R.	27/04/90	7&12	1.2	58	F	WDF	633322
CHIN	WASH	87	05/88	WA04	GROVERS CR. HATCH	GROVERS CR.	GROVERS CR.	/04/90		0.2			SUQ	212542R3
CHIN	WASH	87	05/88	WA04	GROVERS CR. HATCH	GROVERS CR.	GROVERS CR.	04/05/90	7&12	0.2	43		SUQ	212542R3
CHIN	WASH	87	06/88	LOCO		LEWIS R.	LEWIS R.	2B/04/90	SWIF	0.2	40		WDF	635061R3
CHIN	WASH	87	06/88	WA05	GEORGE ADAMS HAT.	UNKNOWN	PURDY CR.	02/05/90	EDDY	0.2	51	F	WDF	635208R3
CHIN	WASH	87	07/88	LDCO	BONNEVILLE HATCH	TANNER CR.	N BONNEVILLE BYPASS	26/04/90	7&12	0.2	47	F	NMFS	232602R1
CHIN	WASH	87	04/89	HEAD	WELLS DAM SP CHAN	WELLS DAM	COLUMBIA R. (GEN.)	28/04/90	PACH	1.1	37	M	WDF	635037R4
CHIN	WASH	87	04/89	HEAD	WELLS DAM SP CHAN	WELLS DAM	COLUMBIA R. (GEN.)	27/04/90	7&12	1.1	36	M	WDF	635038R3
CHIN	WASH	87	04/89	HEAD	WELLS DAM SP CHAN	WELLS DAM	COLUMBIA R. (GEN.)	01/05/90	GULL	1.1	42	M	WDF	635038R5
CHIN	WASH	87	04/89	LOCO	COWLITZ HATCH	CDWLITZ R.	LOWER COWLITZ R.	27/04/90	7&12	1.1	50	M	WDF	634204R2
CHIN	WASH	87	04/89	LOCO	COWLITZ HATCH	COWLITZ R.	LOWER COWLITZ R.	26/04/90	7&12	1.1	51	M	WDF	634204R3
CHIN	WASH	87	05/89	UPWA	SOLEDUCK HATCH	SOLEDUCK R.	SOLEDUCK R.	26/04/90	7&12	1.1	41	F	WDF	634707R2
CHIN	WASH	88	06/89	UPWA	QUINAULT LAKE HAT.	QUINAULT R.	QUINAULT R.	01/05/90	GULL	0.1	30	M	QDNR	212549R3
CHIN	WASH	88	07/89	LWWA	HUMPTULIPS HATCH	HUMPTULIPS R.	STEVENS CR.	26/04/90	7&12	0.1	33	M	WDF	635259R4
CHIN	ORE	86	07/86	LOCO	BDNNEVILLE DAM	UPRIVER BRIGHT	BONNEVILLE DAM	26/04/90	7&12	0.4	84	F	NMFS	232209
CHIN	ORE	86	09/87	LOCO	BONNEVILLE DAM	COLUMBIA R TULE/OR	TANNER CR.	03/05/90	7&12	0.3	59	F	ODFW	074741R2
CHIN	ORE	86	09/87	LOCO	BONNEVILLE HATCH	COLUMBIA R TULE/OR	TANNER CR.	01/05/90	GULL	0.3	63	M	ODFW	074722R2
CHIN	ORE	86	10/87	LOCD	BIG CR.	ROGUE R.	BIG CR.	26/04/90	7&12	1.2	70	M	ODFW	073461
CHIN	ORE	86	11/87	LOCO	BDNNEVILLE HATCH	UNKNOWN	TANNER CR.	02/05/90	EDDY	1.2	60	F	ODFW	074129
CHIN	ORE	86	03/88	LOCO	BONNEVILLE HATCH	UNKNOWN	UMATILLA R.	01/05/90	GULL	1.2	64	F	ODFW	074038
CHIN	ORE	87	04/88	LOCO	BONNEVILLE HATCH	TANNER CR.	TANNER CR.	02/05/90	EDDY	0.2	60	M	ODFW	074558
CHIN	ORE	87	05/88	WILL	STAYTON POND	TANNER CR.	WILLAMETTE R & TRIB	27/04/90	7&12	0.2	66	M	ODFW	074527
CHIN	ORE	87	11/88	LOCO	8ONNEVILLE HATCH	WASHINGTON BRIGHTS	UMATILLA R.	01/05/90	GULL	1.1	49	M	ODFW	074536
CHIN	ORE	88	09/89	UPOR	OAF, YAQUINA 8AY	ANADROMOUS	SOUTH BEACH	27/04/90	7&12	0.1	36	M	OAF	604004
CHIN	CAL	87	06/88	SACR	NIMBUS FISH HATCH	AMERICAN R.	BENECIA	02/05/90	FING	0.2	58	M	COFG	065409

SPRING 1990 TOTALS:

	B.C.	WASH.	ORE.	CAL.	ALL	% OF TOTAL CATCH
CHINOOK	8	24	10	1	43	3.2

TABLE 9 (cont'd)

(e) APR. 23 - MAY 5, 1990 (cont'd)

SPEC	PROV/ STATE	BY	LAST REL DATE	PROD AREA	HATCHERY	STOCK	RELEASE	CAPTURE DATE	CAPT SITE	AGE	FL	SEX	AGEN	TAGCODE
COHO	B.C.	87	01/89	GSVI		MESACHIE CR.	MESACHIE CR.	02/05/90	EDDY	1.1	48	M	CDFR	082454
COHO	B.C.	87	04/89	THOM	EAGLE R.	EAGLE R.	EAGLE R.	02/05/90	EDDY	1.1	42	F	CDFO	025127
COHO	B.C.	87	04/89	THOM	SPIUS CR.	COLDWATER R.	COLDWATER R.	03/05/90	GULL	1.1	41	F	CDFO	025433
COHO	B.C.	87	05/89	GSML	CAPILANO R.	CAPILANO R.	CAPILANO R.	02/05/90	EDDY	1.1	42	M	CDFO	025057
COHO	B.C.	87	05/89	GSVI		TRENT R.	TRENT R.	26/04/90	7&12	1.1	44	M	CDFR	082640
COHO	B.C.	87	05/89	GSVI	MALASPINA COLL PIP	CHASE R.	CHASE R.	02/05/90	EDDY	1.1	38	M	CDFO	025234
COHO	B.C.	87	05/89	GSVI	MALASPINA COLL PIP	CHASE R.	CHASE R.	27/04/90	7&12	1.1	42	M	CDFO	025234
COHO	B.C.	87	05/89	LWFR		SALMON R/VAN	SALMON R/VAN	28/04/90	SWIF	1.1	39	M	CDFO	026322
COHO	B.C.	87	05/89	LWFR	INCH CR.	INCH CR.	INCH CR.	01/05/90	FING	1.1	42	M	CDFO	025141
COHO	WASH	87	04/89	WA04	GREEN R. HATCH	BIG SOOS CR.	BIG SOOS CR.	24/04/90	SWIF	1.1	38		WDF	630152R2
COHO	WASH	87	04/89	WA04	PUYALLUP TRIBAL	VOIGHT CR.	VOIGHT CR.	27/04/90	7&12	1.1	45	F	WDF	630156R2
COHO	WASH	87	04/89	WA04	PUYALLUP TRIBAL	VOIGHT CR.	VOIGHT CR.	03/05/90	GULL	1.1	43	F	WDF	630156R3
COHO	WASH	87	04/89	WA05	GEORGE ADAMS HATCH	GEO. ADAMS (PURDY)	PURDY CR.	24/04/90	SWIF	1.1	43	F	WDF	630159R2
COHO	WASH	87	05/89	WA02	SWINOMISH CHAN PD	CLARK CR.	SWINOMISH CHAN PD	03/05/90	7&12	1.1	44	M	SSC	212521R4
COHO	WASH	87	05/89	WA03	SKYKOMISH HATCH	UNKNOWN	WALLACE R.	03/05/90	GULL	1.1	45		WDF	630155R1
COHO	WASH	87	05/89	WA03	SKYKOMISH HATCH	UNKNOWN	WALLACE R.	28/04/90	SWIF	1.1	44	F	WDF	630155R1
COHO	WASH	87	05/89	WA03	SKYKOMISH HATCH	UNKNOWN	WALLACE R.	03/05/90	7&12	1.1	41	F	WDF	630155R2
COHO	WASH	87	05/89	WA03	WHIDBEY ISL NET P	CLARK CR.	WHIDBEY ISL NET P	03/05/90	7&12	1.1	40	M	WDF	635519R1
COHO	WASH	87	05/89	WA03	WHIDBEY ISL NET P	CLARK CR.	WHIDBEY ISL NET P	04/05/90	GULL	1.1	43	M	WDF	635519R3
COHO	WASH	87	05/89	WA04		DESCHUTES R.	DESCHUTES R.	28/04/90	SWIF	1.1	45	M	WDF	635528R1
COHO	WASH	87	05/89	WA04	ELLIOTT BAY SEAPEN	CLARK CR.	ELLIOTT BAY SEAPEN	02/05/90	EDDY	1.1	43	F	WDF	630150R1
COHO	WASH	87	05/89	WA04	ELLIOTT BAY SEAPEN	CLARK CR.	ELLIOTT BAY SEAPEN	24/04/90	SWIF	1.1	47	F	WDF	630150R3
COHO	WASH	87	05/89	WA05	PORT GAMBLE PENS	DUNGENESS R.	PORT GAMBLE BAY PEN	29/04/90	EDDY	1.1	48	M	WDF	634761R3
COHO	WASH	87	05/89	WA05	QUILCENE NF HATCH	BIG QUILCENE R.	BIG QUILCENE R.	28/04/90	SWIF	1.1	43	M	FWS	052107R3
COHO	WASH	87	06/89	LOCO	TOUTLE HATCH	TOUTLE (TYPE-E)	TOUTLE (GREEN R.)	28/04/90	EDDY	1.1	40		WDF	635507R6
COHO	WASH	87	06/89	UPWA		HOKO R.	HOKO R.	27/04/90	7&12	1.1	44	M	PNPT	213238R4
COHO	WASH	87	06/89	WA02		SKAGIT R.	SKAGIT R. TRIBS	29/04/90	EDDY	1.1	40	M	SSC	213244R3
COHO	WASH	87	06/89	WA02	SKAGIT HAT (CLARK)	CLARK CR.	CLARK CR.	28/04/90	SWIF	1.1	41	F	WDF	630149R3
COHO	WASH	87	06/89	WA03	TULALIP HATCH	SNOHOMISH R.	TULALIP CR.	29/04/90	EDDY	1.1	45	M	TULA	212531R3
COHO	WASH	87	06/89	WA04	AGATE PASS SEAPEN	UNKNOWN	AGATE PASS SEAPENS	01/05/90	GULL	1.1	47	F	SUQ	212522R1
COHO	WASH	87	06/89	WA04	AGATE PASS SEAPEN	UNKNOWN	AGATE PASS SEAPENS	03/05/90	7&12	1.1	42	M	SUQ	212522R1
COHO	WASH	87	06/89	WA04	AGATE PASS SEAPEN	UNKNOWN	AGATE PASS SEAPENS	01/05/90	GULL	1.1	45	F	SUQ	212522R3
COHO	WASH	87	06/89	WA04	AGATE PASS SEAPEN	UNKNOWN	AGATE PASS SEAPENS	28/04/90	SWIF	1.1	48	M	SUQ	212522R4
COHO	WASH	87	06/89	WA04	SQUAXIN ISLAND PEN	UNKNOWN	PEALE PASSAGE	29/04/90	EDDY	1.1	38	M	WDF	630116R2

SPRING 1990 TOTALS:

	B.C.	WASH.	ORE.	CAL.	ALL	% OF TOTAL CATCH
COHO	9	25	0	0	34	2.2

TABLE 9 (cont'd)

(f) AGENCY KEY:

CDFG - CALIFORNIA DEPT. OF FISH AND GAME
CDFO - CANADIAN DEPT. OF FISHERIES AND OCEANS
CDFR - CANADIAN DEPT. OF FISHERIES AND OCEANS, RESEARCH
COOP - WASHINGTON DEPT. OF FISHERIES COOPERATIVE
FWS - FISH AND WILDLIFE SERVICE, U.S.A.
LUMM - LUMMI INDIAN TRIBE
NMFS - NATIONAL MARINE FISHERIES SERVICE
OAF - OREGON AQUA-FOODS, INC.
ODFW - OREGON DEPT. OF FISHERIES AND WILDLIFE
PNPT - POINT NO POINT TREATY COUNCIL
QDNR - QUINAULT DEPT. OF NATURAL RESOURCES
SKAG - SKAGIT SYSTEM COOPERATIVE
SKOK - SKOKOMISH INDIAN TRIBE
SSC - SKAGIT SYSTEM COOPERATIVE
SUQ - SUQUAMISH INDIAN TRIBE
TULA - TULALIP INDIAN TRIBE
UW - UNIVERSITY OF WASHINGTON, COLLEGE OF FISHERIES
WDF - WASHINGTON DEPT. OF FISHERIES

(g) PRODUCTION AREA KEY:

BRGT - BRIGHTS (COLUMBIA)
GSML - GEORGIA STRAIT MAINLAND - STATS 15, 16, 28, 29
GSVI - GEORGIA STRAIT VANCOUVER ISLAND - STATS 14, 17, 18, 19
HDCO - HEAD COLUMBIA RIVER
HEAD - HEAD WATERS (COLUMBIA)
LOCO - LOWER COLUMBIA RIVER
LWFR - LOWER FRASER RIVER - FRASER RIVER & TRIBS BELOW HOPE
LWOR - SOUTHERN OREGON COAST
LWWA - LOWER WASHINGTON
SACR - SACRAMENTO
SNAK - SNAKE RIVER
THOM - THOMPSON RIVER & TRIBS
UNKN - UNKNOWN
UPOR - NORTHERN OREGON COAST
UPWA - NORTHERN WASHINGTON COAST
WA00 - PUGET SOUND, HOOD CANAL
WA01 - WASHINGTON, MANAGEMENT AREA 1
WA02 - WASHINGTON, MANAGEMENT AREA 2
WA03 - WASHINGTON, MANAGEMENT AREA 3
WA04 - WASHINGTON, MANAGEMENT AREA 4
WA05 - WASHINGTON, MANAGEMENT AREA 5
WILL - WILLIAMETTE

TABLE 10. Percent frequency of occurrence of prey items for 1989 and 1990 chinook and coho (N = Empty stomachs + stomachs with contents; percent frequency of occurrence is calculated using only stomachs with contents; ALL = all fish; HERR = herring; SANDL = sandlance; ROCKF = rockfish; EUPHAUS = euphausiids; CRAB LV = crab larvae; PTERO = pteropods).

YEAR	SPECIES	N	EMPTY	% EMPTY	PERCENT FREQUENCY OF OCCURRENCE								
					FISH								
					ALL	HERR	SANDL	ROCKF	EUPHAUS	CRAB LV	PTERO	SQUID	SHRIMP
1989	CHINOOK	648	129	19.9	54.3	20.0	10.6	0.6	51.5	26.6	0.8	0.2	1.2
1990		366	116	34.5	68.4	17.6	12.4	6.5	38.8	0.0	0.8	1.2	0.0
1989	COHO	196	57	29.1	48.2	2.2	30.2	2.2	58.3	56.1	36.7	0.7	0.0
1990		255	100	39.2	49.7	6.5	29.7	6.5	51.0	0.7	43.9	0.0	0.0

TABLE 11. Percent frequency of occurrence of stomach contents for 1989 and 1990 chinook by size class (N = Empty stomachs + stomachs with contents; percent frequency of occurrence is calculated using only stomachs with contents; ALL = all fish; HERR = herring; SANDL = sandlance; ROCKF = rockfish; EUPHAUS = euphausiids; CRAB LV = crab larvae; PTERO = pteropods).

YEAR	FORK LENGTH (cm)	N	EMPTY	% EMPTY	PERCENT FREQUENCY OF OCCURRENCE								
					FISH								
					ALL	HERR	SANDL	ROCKF	EUPHAUS	CRAB LV	PTERO	SQUID	SHRIMP
1989	21 - 30	5	3	60.0	100.0	0.0	100.0	0.0	100.0	0.0	0.0	0.0	0.0
	31 - 40	39	14	35.9	20.0	0.0	12.0	4.0	60.0	36.0	0.0	0.0	0.0
	41 - 50	62	14	22.6	29.2	0.0	18.8	0.0	79.2	16.7	2.1	0.0	0.0
	51 - 60	50	10	20.0	30.0	2.5	10.0	2.5	77.5	27.5	0.0	2.5	0.0
	61 - 66	50	2	4.0	47.9	16.7	8.3	0.0	54.2	31.3	2.1	0.0	2.1
	>= 67	441	86	19.5	63.7	26.8	9.3	0.3	43.4	26.8	0.6	0.0	1.4
1990	21 - 30	15	12	80.0	33.3	0.0	33.3	0.0	100.0	0.0	0.0	0.0	0.0
	31 - 40	56	27	48.2	44.8	3.5	6.9	3.5	51.7	0.0	0.0	3.5	0.0
	41 - 50	42	12	28.6	50.0	3.3	10.0	3.3	60.0	0.0	0.0	0.0	0.0
	51 - 60	49	23	46.9	38.5	0.0	11.5	0.0	53.9	0.0	3.9	3.9	0.0
	61 - 66	31	7	22.6	91.7	29.2	4.2	0.0	12.5	0.0	0.0	4.2	0.0
	>= 67	173	35	20.2	79.7	25.4	15.2	0.0	31.9	0.0	0.7	0.0	0.0

TABLE 12. Percent frequency of occurrence of stomach contents of 1989 and 1990 chinook by area and by size class (N = Empty stomachs + stomachs with contents; percent frequency of occurrence is calculated using only stomachs with contents; ALL = all fish; HERR = herring; SANDL = sandlance; ROCKF = rockfish; EUPHAUS = euphausiids; CRAB LV = crab larvae; PTERO = pteropods).

YEAR	SAMPLING AREA	N	EMPTY	% EMPTY	PERCENT FREQUENCY OF OCCURRENCE: FISH								
					ALL	HERR	SANDL	ROCKF	EUPHAUS	CRAB LV	PTERO	SQUID	SHRIMP
	ALL SIZE CLASSES												
1989	BARKLEY SOUND	10	5	50.0	40.0	0.0	20.0	0.0	80.0	20.0	0.0	0.0	0.0
	SOUTH BANK	12	4	33.3	62.5	25.0	0.0	12.5	87.5	37.5	0.0	0.0	0.0
	SOUTHWEST CORNER	6	4	66.7	100.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
	7 & 12 MILE BANK	**313**	**59**	**18.9**	**48.0**	**17.3**	**1.6**	**0.0**	**49.2**	**28.4**	**0.8**	**0.0**	**0.8**
	THE GULLIES	**101**	**11**	**10.9**	**90.0**	**42.2**	**30.0**	**1.1**	**12.2**	**40.0**	**0.0**	**0.0**	**4.4**
	FINGER BANK	5	2	40.0	33.3	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
	PACHENA	21	6	28.6	40.0	0.0	20.0	0.0	66.7	26.7	0.0	0.0	0.0
	SWIFTSURE BANK	**89**	**20**	**22.5**	**49.3**	**15.9**	**4.4**	**0.0**	**63.8**	**7.3**	**0.0**	**1.5**	**0.0**
	THE EDDY	**50**	**14**	**28.0**	**19.4**	**2.8**	**5.6**	**0.0**	**88.9**	**8.3**	**2.8**	**0.0**	**0.0**
	NORTH BANK	20	0	0.0	60.0	30.0	35.0	5.0	75.0	40.0	0.0	0.0	0.0
	AMPHITRITE BANK	21	5	19.1	58.8	5.9	47.1	0.0	88.2	35.3	5.9	0.0	0.0
	>=67 CM												
1989	BARKLEY SOUND	2	2	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SOUTH BANK	10	3	30.0	57.1	28.6	0.0	0.0	85.7	42.9	0.0	0.0	0.0
	SOUTHWEST CORNER	6	4	66.7	100.0	50.0	0.0	0.0	50.0	0.0	0.0	0.0	0.0
	7 & 12 MILE BANK	**255**	**56**	**22.0**	**53.8**	**20.6**	**0.0**	**0.0**	**47.2**	**25.1**	**0.5**	**0.0**	**1.0**
	THE GULLIES	**89**	**9**	**10.1**	**93.8**	**43.8**	**30.0**	**1.3**	**13.8**	**40.0**	**0.0**	**0.0**	**3.8**
	FINGER BANK	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PACHENA	3	1	33.3	0.0	0.0	0.0	0.0	100.0	50.0	0.0	0.0	0.0
	SWIFTSURE BANK	**45**	**9**	**20.0**	**61.1**	**25.0**	**0.0**	**0.0**	**41.7**	**2.8**	**0.0**	**0.0**	**0.0**
	THE EDDY	**4**	**0**	**0.0**	**25.0**	**25.0**	**0.0**	**0.0**	**75.0**	**0.0**	**0.0**	**0.0**	**0.0**
	NORTH BANK	10	0	0.0	70.0	60.0	20.0	0.0	70.0	20.0	0.0	0.0	0.0
	AMPHITRITE BANK	17	2	11.8	53.3	0.0	46.7	0.0	100.0	40.0	6.7	0.0	0.0
	ALL SIZE CLASSES												
1990	SOUTH BANK	8	3	37.5	100.0	0.0	60.0	0.0	20.0	0.0	0.0	0.0	0.0
	7 & 12 MILE BANK	**128**	**28**	**21.9**	**46.0**	**15.0**	**3.0**	**0.0**	**69.0**	**0.0**	**2.0**	**2.0**	**0.0**
	THE GULLIES	**101**	**31**	**29.7**	**93.0**	**26.8**	**31.0**	**1.4**	**8.5**	**0.0**	**0.0**	**1.4**	**0.0**
	FINGER BANK	29	11	37.9	94.4	5.6	0.0	0.0	5.6	0.0	0.0	0.0	0.0
	PACHENA	4	3	75.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SWIFTSURE BANK	**36**	**14**	**38.9**	**63.6**	**22.7**	**4.6**	**0.0**	**31.8**	**0.0**	**0.0**	**0.0**	**0.0**
	THE EDDY	**59**	**27**	**45.8**	**65.6**	**12.5**	**6.3**	**0.0**	**37.5**	**0.0**	**0.0**	**0.0**	**0.0**
	>=67 CM												
1990	SOUTH BANK	5	2	40.0	100.0	0.0	100.0	0.0	33.3	0.0	0.0	0.0	0.0
	7 & 12 MILE BANK	**62**	**7**	**11.3**	**54.6**	**20.0**	**0.0**	**0.0**	**63.6**	**0.0**	**1.8**	**0.0**	**0.0**
	THE GULLIES	**58**	**9**	**15.5**	**100.0**	**34.7**	**36.7**	**0.0**	**6.1**	**0.0**	**0.0**	**0.0**	**0.0**
	FINGER BANK	15	5	33.3	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PACHENA	1	0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	SWIFTSURE BANK	**13**	**3**	**23.1**	**80.0**	**40.0**	**0.0**	**0.0**	**20.0**	**0.0**	**0.0**	**0.0**	**0.0**
	THE EDDY	**19**	**9**	**47.4**	**90.0**	**30.0**	**0.0**	**0.0**	**30.0**	**0.0**	**0.0**	**0.0**	**0.0**

TABLE 13. Percent frequency of occurrence of stomach contents of 1989 and 1990 coho by area (N = Empty stomachs + stomachs with contents; percent frequency of occurrence is calculated using only stomachs with contents; **ALL** = all fish; HERR = herring; SANDL = sandlance; ROCKF = rockfish; EUPHAUS = euphausiids; CRAB LV = crab larvae; PTERO = pteropods).

YEAR	SAMPLING AREA	N	EMPTY	% EMPTY	PERCENT FREQUENCY OF OCCURRENCE								
					FISH								
					ALL	HERR	SANDL	ROCKF	EUPHAUS	CRAB LV	PTERO	SQUID	SHRIMP
1989	BARKLEY SOUND	5	1	20.0	75.0	0.0	75.0	0.0	25.0	75.0	50.0	0.0	0.0
	SOUTH BANK	3	0	0.0	66.7	0.0	66.7	0.0	66.7	100.0	33.3	0.0	0.0
	7 & 12 MILE BANK	**61**	**19**	**31.2**	**52.4**	**0.0**	**35.7**	**2.4**	**54.8**	**57.1**	**57.1**	**0.0**	**0.0**
	THE GULLIES	**25**	**7**	**28.0**	**44.4**	**0.0**	**27.8**	**0.0**	**44.4**	**77.8**	**5.6**	**0.0**	**0.0**
	PACHENA	8	1	12.5	28.6	0.0	14.3	0.0	42.9	42.9	71.4	0.0	0.0
	SWIFTSURE BANK	**42**	**8**	**19.1**	**47.1**	**5.9**	**23.5**	**5.9**	**64.7**	**50.0**	**32.4**	**2.9**	**0.0**
	THE EDDY	**44**	**19**	**43.2**	**48.0**	**4.0**	**24.0**	**0.0**	**80.0**	**36.0**	**28.0**	**0.0**	**0.0**
	NORTH BANK	4	0	0.0	25.0	0.0	25.0	0.0	25.0	100.0	0.0	0.0	0.0
	AMPHITRITE BANK	3	1	33.3	50.0	0.0	50.0	0.0	50.0	50.0	0.0	0.0	0.0
1990	SOUTH BANK	6	2	33.3	75.0	25.0	50.0	0.0	75.0	0.0	25.0	0.0	0.0
	7 & 12 MILE BANK	**62**	**17**	**27.4**	**31.1**	**2.2**	**15.6**	**2.2**	**71.1**	**0.0**	**40.0**	**0.0**	**0.0**
	THE GULLIES	**58**	**18**	**31.0**	**85.0**	**5.0**	**65.0**	**12.5**	**42.5**	**0.0**	**40.0**	**0.0**	**0.0**
	FINGER BANK	8	4	50.0	75.0	25.0	25.0	0.0	0.0	0.0	50.0	0.0	0.0
	PACHENA	9	6	66.7	33.3	0.0	0.0	33.3	33.3	33.3	0.0	0.0	0.0
	SWIFTSURE BANK	**54**	**26**	**48.2**	**25.0**	**14.3**	**3.6**	**0.0**	**57.1**	**0.0**	**42.9**	**0.0**	**0.0**
	THE EDDY	**58**	**27**	**46.6**	**48.4**	**3.2**	**29.0**	**9.7**	**32.3**	**0.0**	**61.3**	**0.0**	**0.0**

TABLE 14. Summary statistics of the stomach dry weight (g)/estimated fish wet weight (kg) ratio (SW/FW ratio) by area (N = sample size).

	AREA	N	MEDIAN	MIN	MAX
1989 CHINOOK	**THE GULLIES**	**101**	**0.98**	**0.00**	**11.50**
	NORTH BANK	20	0.45	0.04	4.94
	AMPHITRITE	21	0.29	0.00	9.17
	SWIFTSURE	**89**	**0.24**	**0.00**	**6.10**
	7 & 12 MILE BANK	**313**	**0.13**	**0.00**	**13.57**
	FINGER BANK	5	0.13	0.00	1.20
	THE EDDY	**50**	**0.10**	**0.00**	**5.40**
	SOUTH BANK	12	0.07	0.00	5.35
	PACHENA	21	0.04	0.00	1.76
	SOUTHWEST CORNER	6	0.00	0.00	5.91
	BARKLEY SOUND	9	0.00	0.00	3.68
	(Kruskal-Wallis Test: X^2=56.55, df=10, P>X^2=0.0001)				
1990 CHINOOK	WEST BANK	1	0.35	0.35	0.35
	THE GULLIES	**101**	**0.30**	**0.00**	**17.66**
	7 & 12 MILE BANK	**128**	**0.29**	**0.00**	**12.16**
	SWIFTSURE BANK	**36**	**0.19**	**0.00**	**5.77**
	FINGER BANK	**27**	**0.13**	**0.00**	**9.44**
	SOUTH BANK	8	0.10	0.00	1.98
	THE EDDY	**57**	**0.04**	**0.00**	**5.09**
	PACHENA	4	0.00	0.00	1.02
	(Kruskal-Wallis Test: X^2=17.96, df=7, P>X^2=0.0121)				
1989 COHO	NORTH BANK	4	2.24	0.99	6.44
	BARKLEY SOUND	5	0.84	0.00	4.53
	AMPHITRITE	3	0.48	0.00	2.33
	SWIFTSURE	**42**	**0.38**	**0.00**	**7.52**
	PACHENA	8	0.31	0.00	0.65
	THE GULLIES	**25**	**0.31**	**0.00**	**4.18**
	SOUTH BANK	3	0.30	0.26	0.45
	7 & 12 MILE BANK	**61**	**0.18**	**0.00**	**5.80**
	THE EDDY	**44**	**0.05**	**0.00**	**5.21**
	FINGER BANK	1	0.00	0.00	0.00
	(Kruskal-Wallis Test: X^2=17.74, df=9, P>X^2=0.0383)				
1990 COHO	SOUTH BANK	6	0.23	0.00	6.22
	THE GULLIES	**58**	**0.18**	**0.00**	**9.70**
	7 & 12 MILE BANK	**62**	**0.13**	**0.00**	**5.63**
	FINGER BANK	8	0.07	0.00	3.05
	THE EDDY	**58**	**0.03**	**0.00**	**5.61**
	SWIFTSURE	**54**	**0.02**	**0.00**	**13.56**
	PACHENA	9	0.00	0.00	0.35
	(Kruskal-Wallis Test: X^2=19.31, df=6, P>X^2=0.0037)				

TABLE 15. Summary statistics of the stomach dry weight (g)/estimated fish wet weight (kg) ratio (SW/FW ratio) by time period (N = sample size).

	TIME PERIOD	N	MEDIAN	MIN	MAX
1989 CHINOOK	0600 - 0859	122	0.10	0.00	9.87
	0900 - 1159	204	0.24	0.00	9.17
	1200 - 1459	185	0.25	0.00	13.57
	1500 - 1759	125	0.15	0.00	11.20
	(Kruskal-Wallis Test: X^2=8.45, df=3, P>X^2=0.0376)				
1990 CHINOOK	0600 - 0859	68	0.18	0.00	12.23
	0900 - 1159	154	0.19	0.00	17.66
	1200 - 1459	82	0.11	0.00	10.77
	1500 - 1759	47	0.13	0.00	12.16
	(Kruskal-Wallis Test: X^2=0.79, df=3, P>X^2=0.8519)				
1989 COHO	0600 - 0859	39	0.38	0.00	6.74
	0900 - 1159	72	0.09	0.00	7.52
	1200 - 1459	53	0.21	0.00	6.44
	1500 - 1759	28	0.37	0.00	5.21
	(Kruskal-Wallis Test: X^2=4.80, df=3, P>X^2=0.1871)				
1990 COHO	0600 - 0859	25	0.09	0.00	6.27
	0900 - 1159	96	0.09	0.00	5.63
	1200 - 1459	72	0.14	0.00	9.70
	1500 - 1759	52	0.06	0.00	13.56
	(Kruskal-Wallis Test: X^2=1.38, df=3, P>X^2=0.7093)				

FIG. 1. The study area, the banks off southwest Vancouver Island.

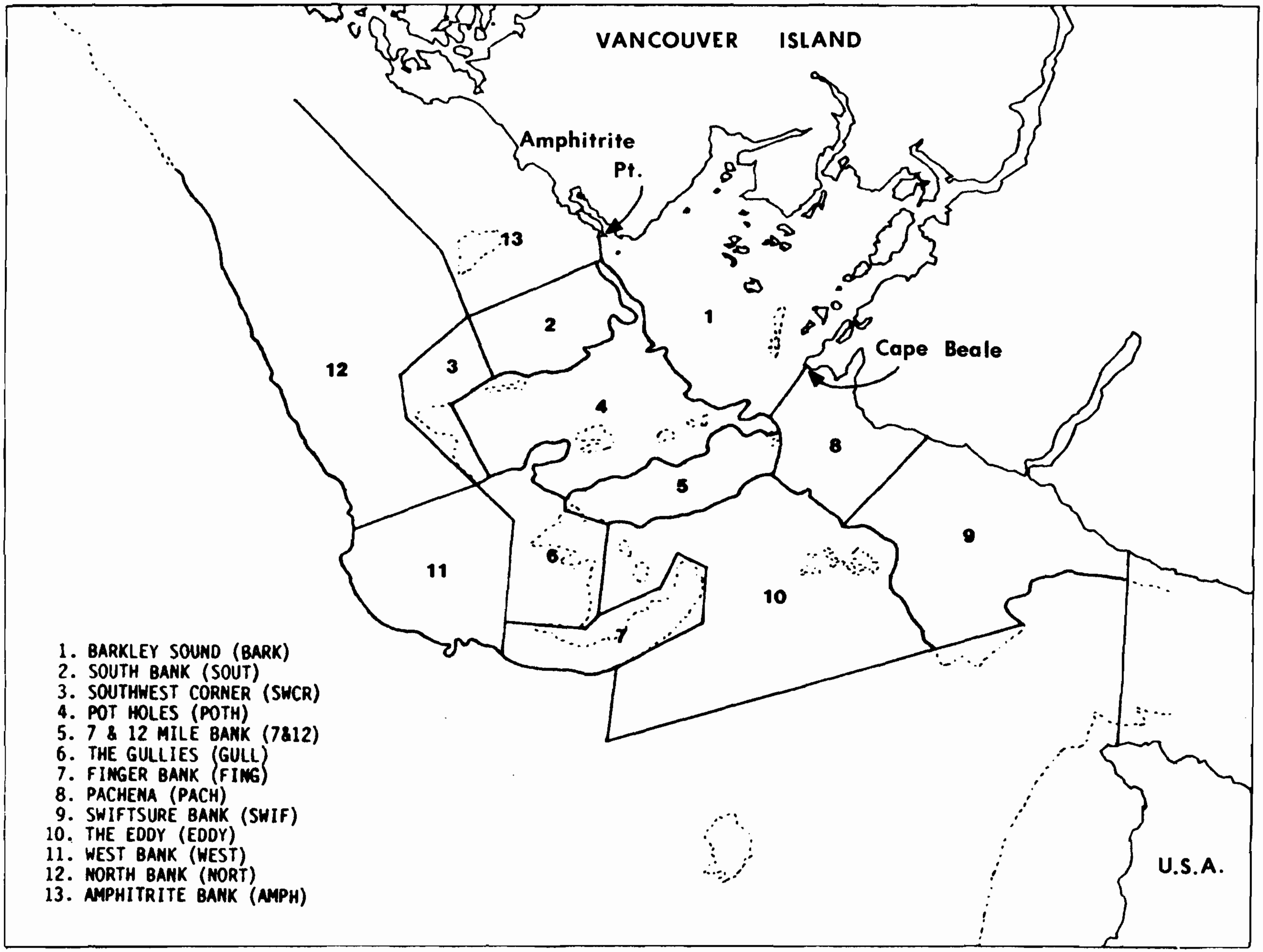

VANCOUVER ISLAND
Amphitrite Pt.
Cape Beale
U.S.A.
1
2
3
4
5
6
7
8
9
10
11
12
13
1. BARKLEY SOUND (BARK)
2. SOUTH BANK (SOUT)
3. SOUTHWEST CORNER (SWCR)
4. POT HOLES (POTH)
5. 7 & 12 MILE BANK (7&12)
6. THE GULLIES (GULL)
7. FINGER BANK (FING)
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)

FIG. 2a. The 1989 fishing tacks.

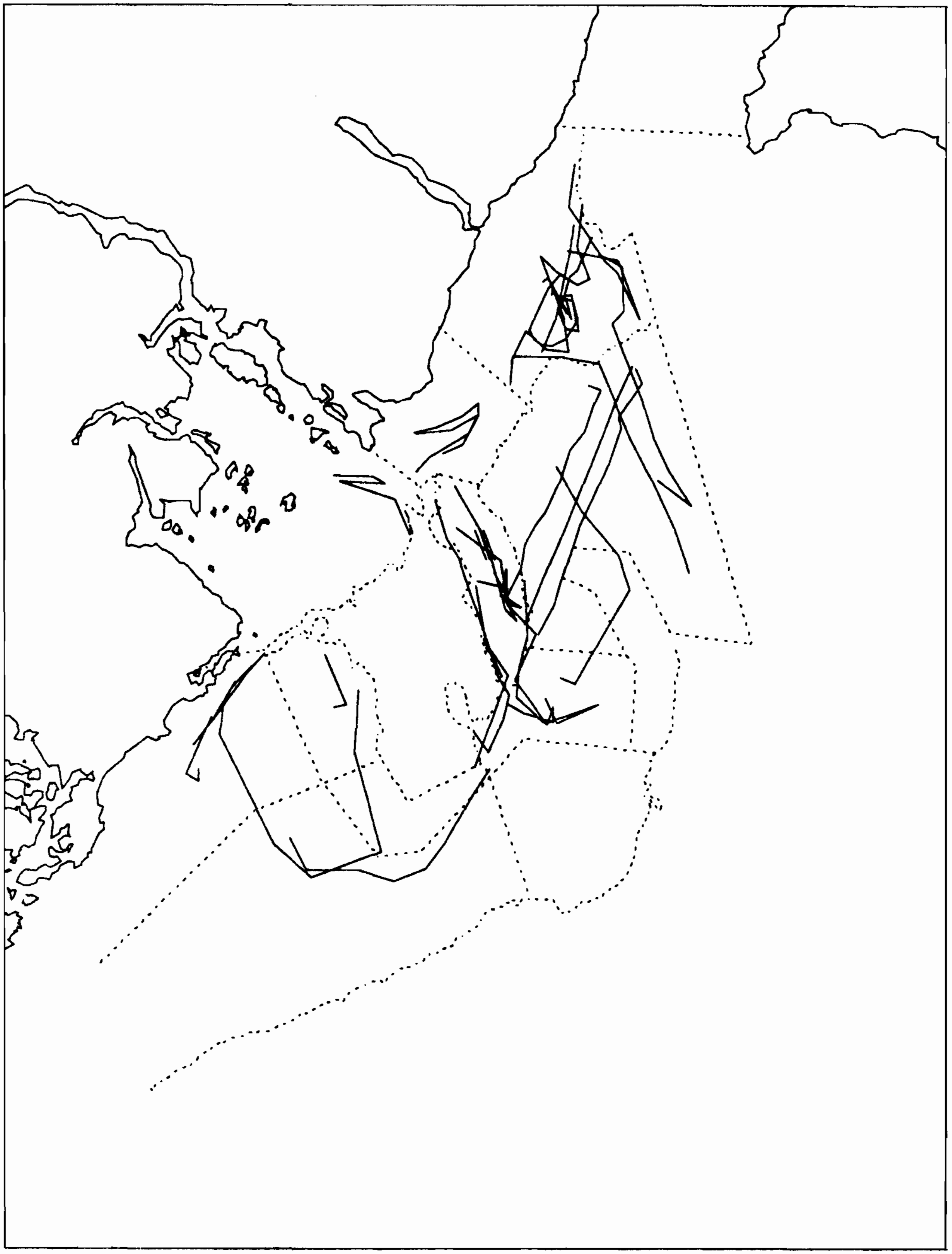


FIG. 2b. The 1990 fishing tacks.

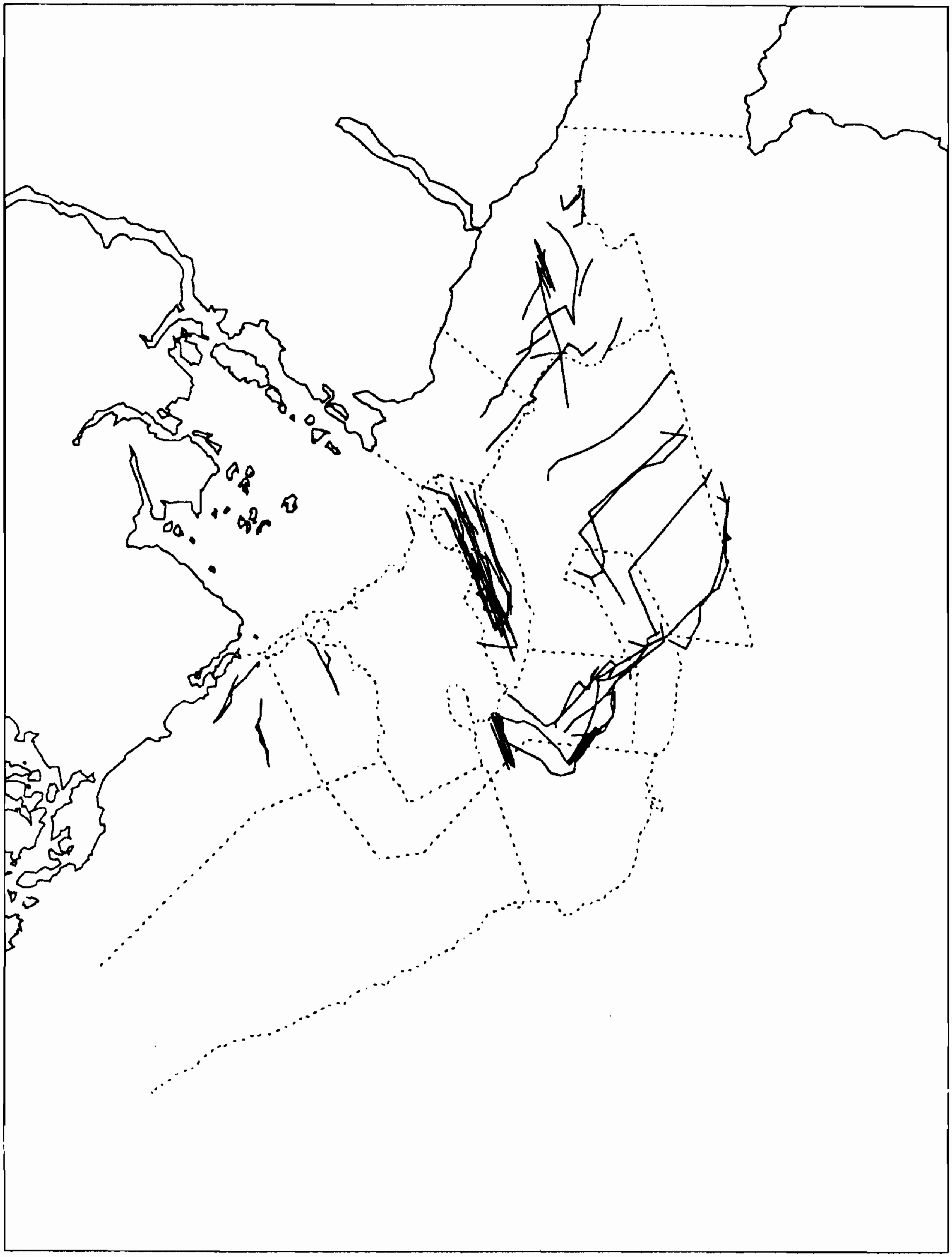


FIG. 3a. Geometric mean CPUE (catch/hr) of legal size (>=67 cm) chinook by area.

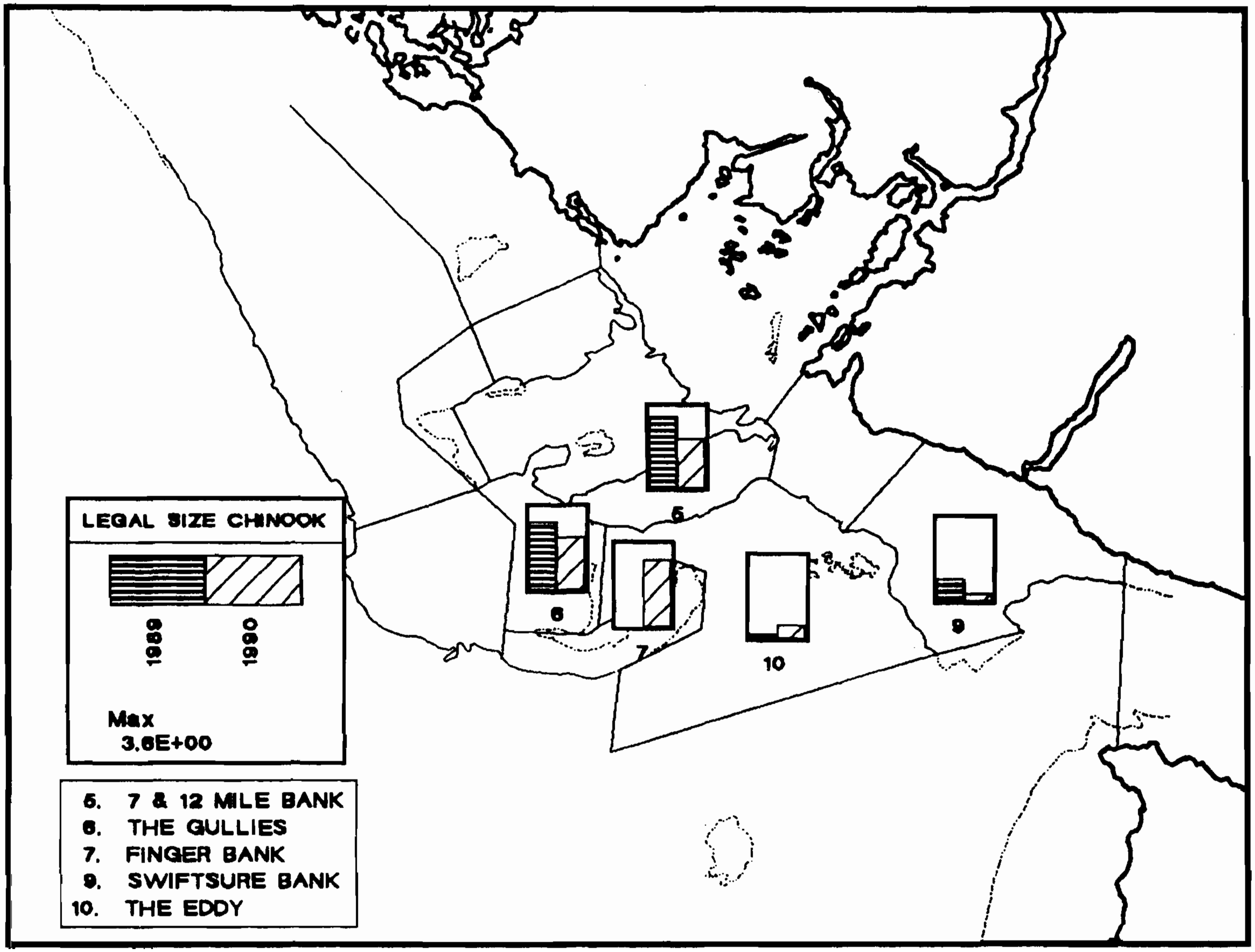

LEGAL SIZE CHINOOK
1989
1990
Max
3.6E+00
5
6
7
9
10
5. 7 & 12 MILE BANK
6. THE GULLIES
7. FINGER BANK
9. SWIFTSURE BANK
10. THE EDDY

FIG. 3b. Geometric mean CPUE (catch/hr) of 61-66 cm chinook by area.

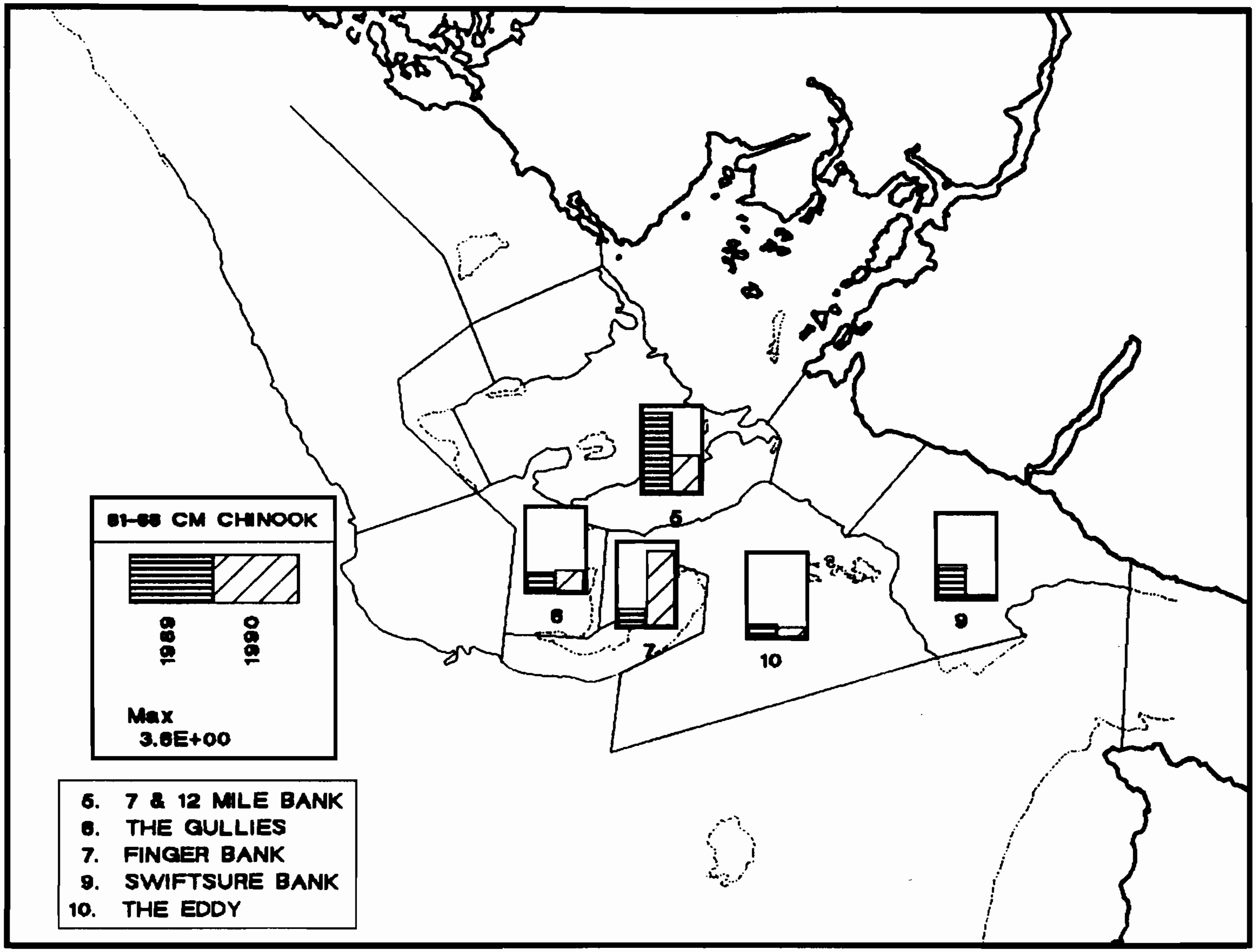

61-65 CM CHINOOK
1989
1990
Max
3.6E+00
5. 7 & 12 MILE BANK
6. THE GULLIES
7. FINGER BANK
9. SWIFTSURE BANK
10. THE EDDY
5
6
7
10
9

FIG. 3c. Geometric mean CPUE (catch/hr) of 51-60 cm chinook by area.

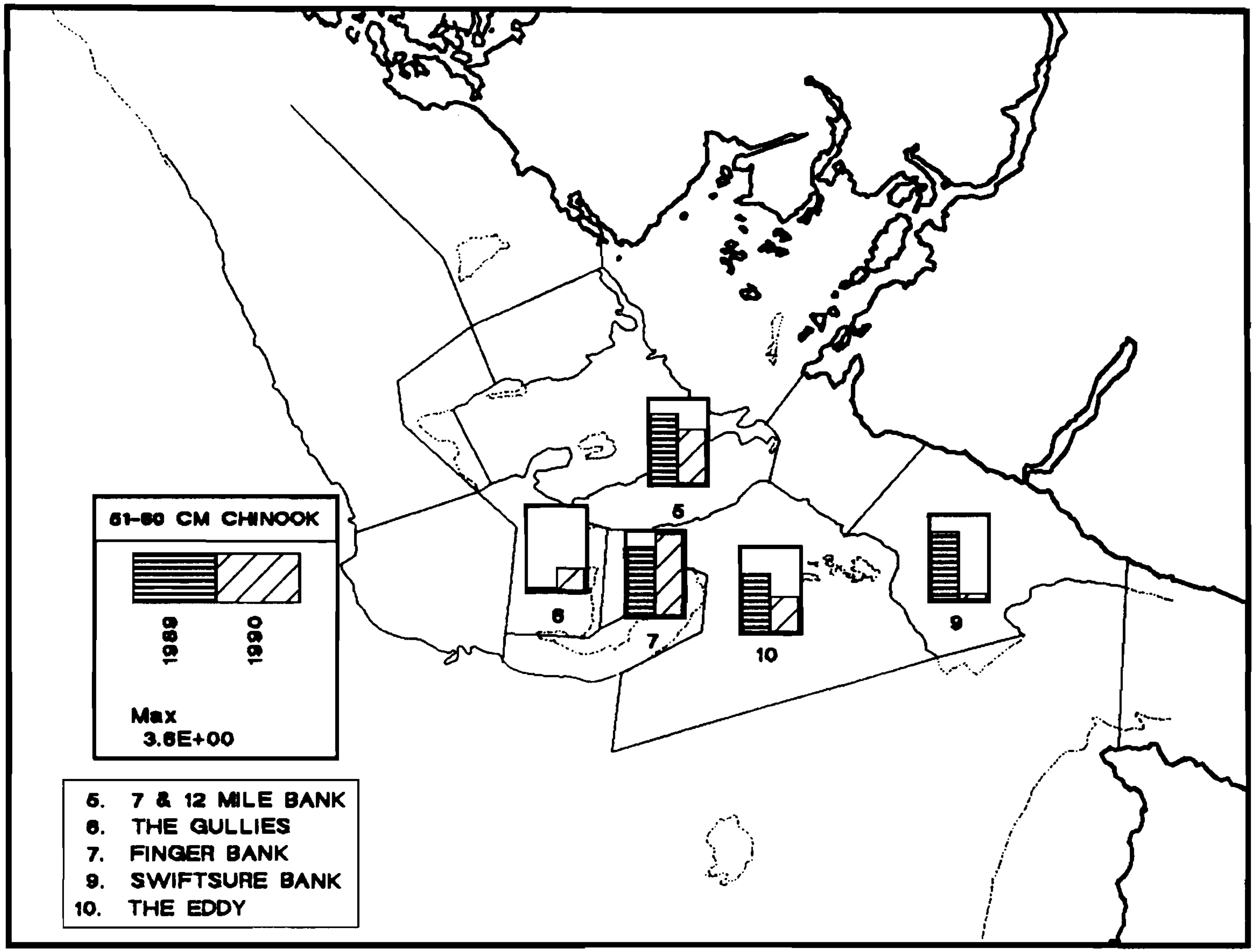

51-60 CM CHINOOK
1989
1990
Max
3.6E+00
5
6
7
10
9
5. 7 & 12 MILE BANK
6. THE GULLIES
7. FINGER BANK
9. SWIFTSURE BANK
10. THE EDDY

FIG. 3d. Geometric mean CPUE (catch/hr) of 41-50 cm chinook by area.

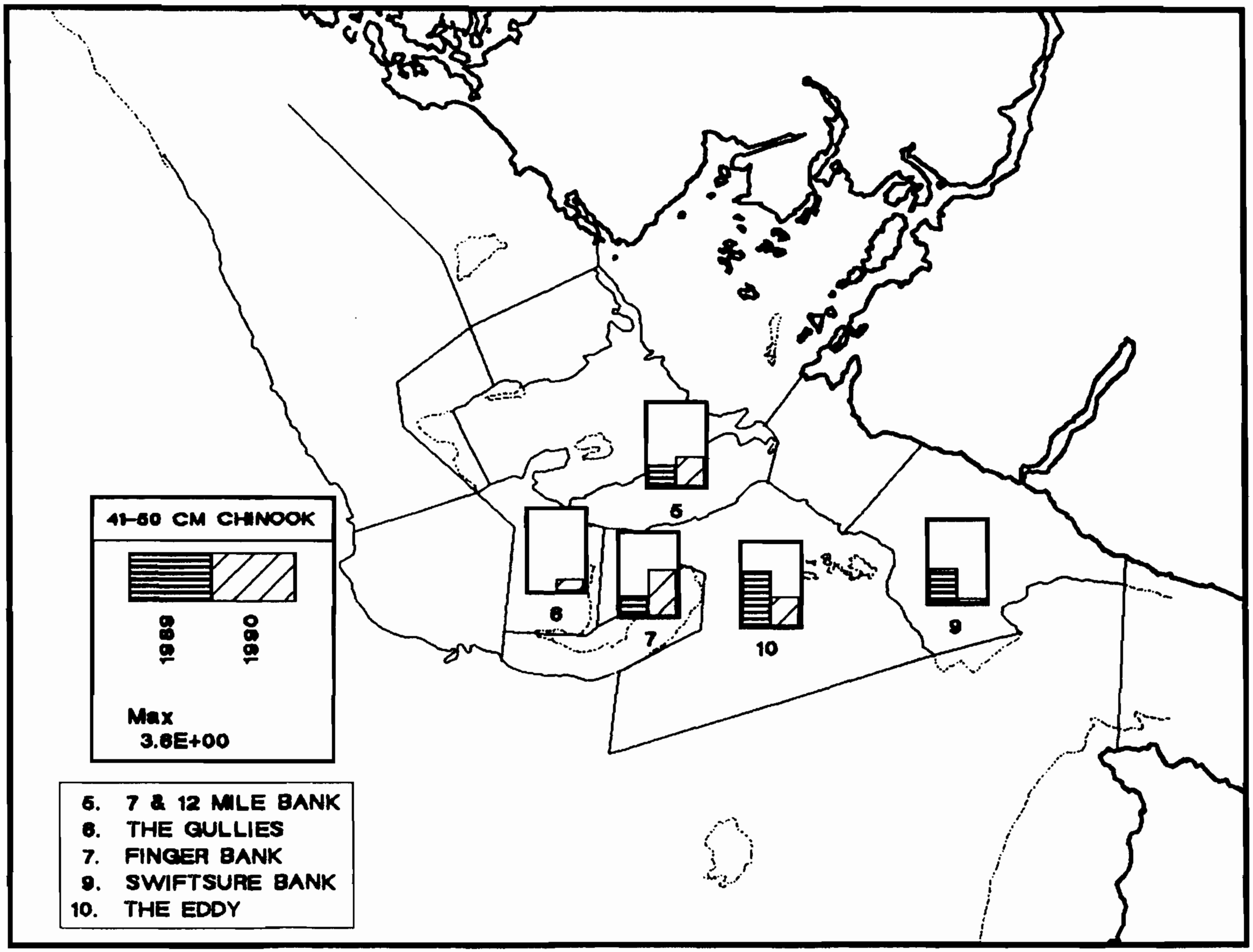

41-50 CM CHINOOK
1989
1990
Max
3.6E+00
5. 7 & 12 MILE BANK
6. THE GULLIES
7. FINGER BANK
9. SWIFTSURE BANK
10. THE EDDY
5
6
7
10
9

FIG. 3e. Geometric mean CPUE (catch/hr) of 31-40 cm chinook by area.

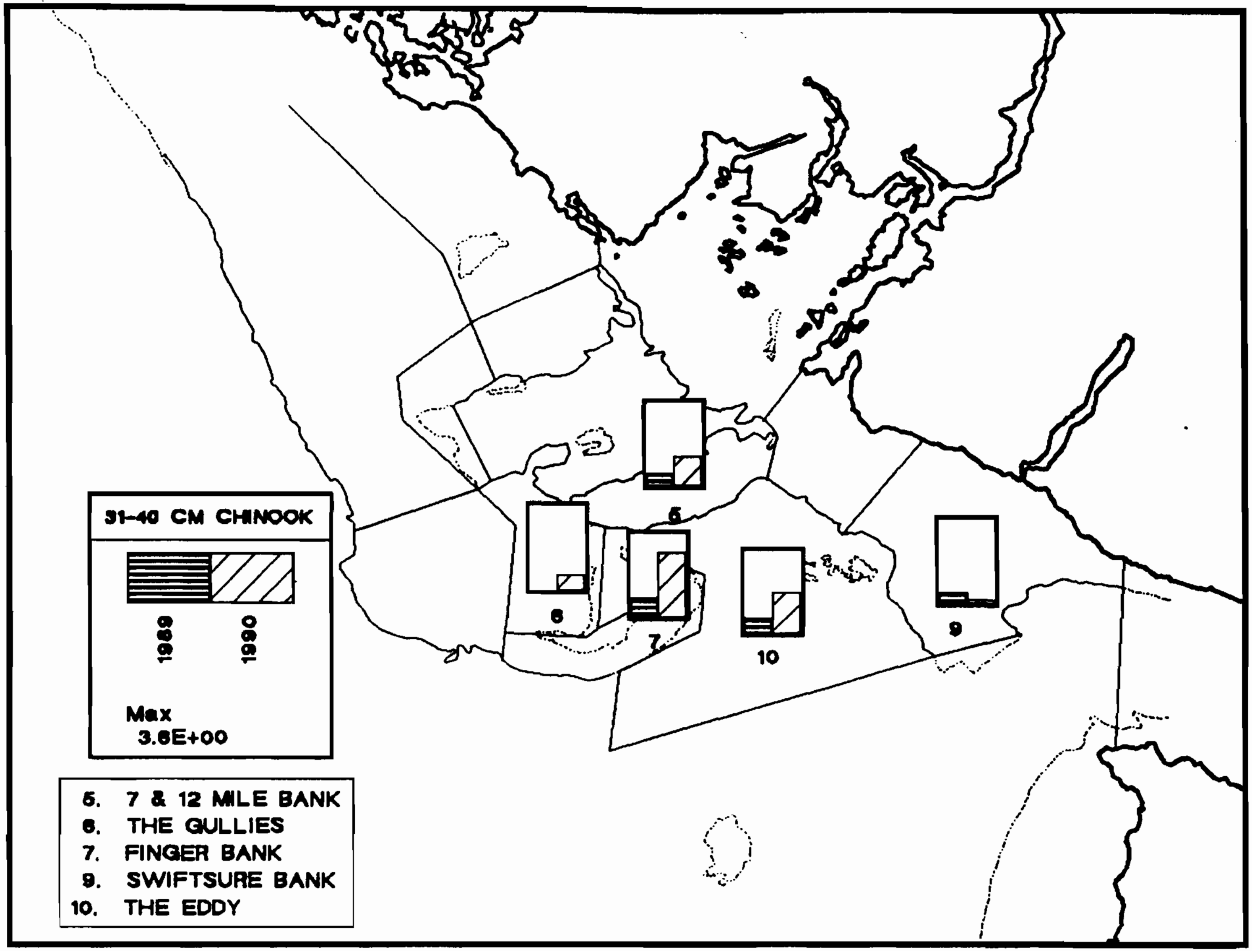
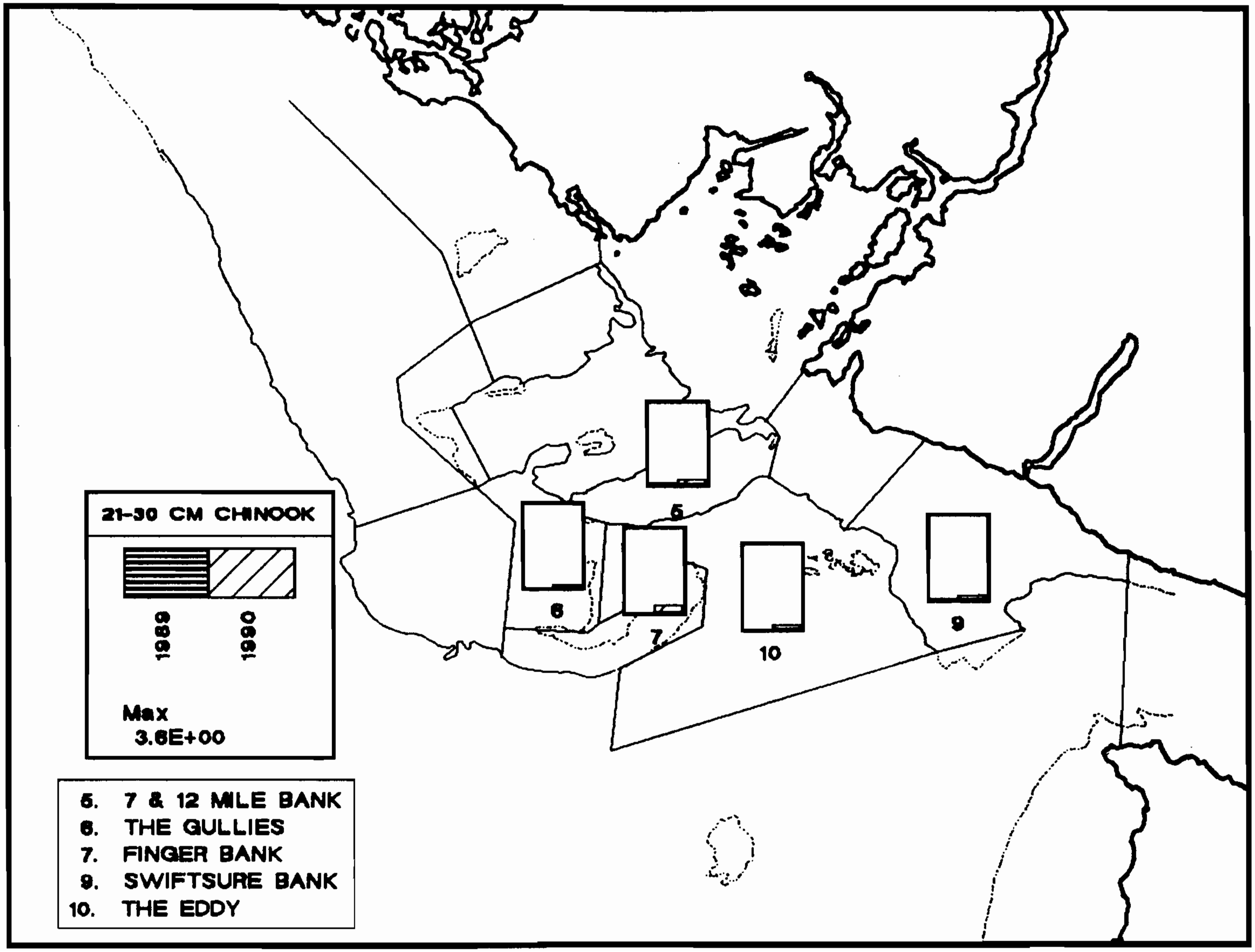

31-40 CM CHINOOK
1989
1990
Max
3.6E+00
5
6
7
10
9
5. 7 & 12 MILE BANK
6. THE GULLIES
7. FINGER BANK
9. SWIFTSURE BANK
10. THE EDDY

FIG. 3f. Geometric mean CPUE (catch/hr) of 21-30 cm chinook by area.



21-30 CM CHINOOK
1989
1990
Max
3.6E+00
5
6
7
9
10
5. 7 & 12 MILE BANK
6. THE GULLIES
7. FINGER BANK
9. SWIFTSURE BANK
10. THE EDDY

FIG. 3g. Geometric mean CPUE (catch/hr) of coho by area.

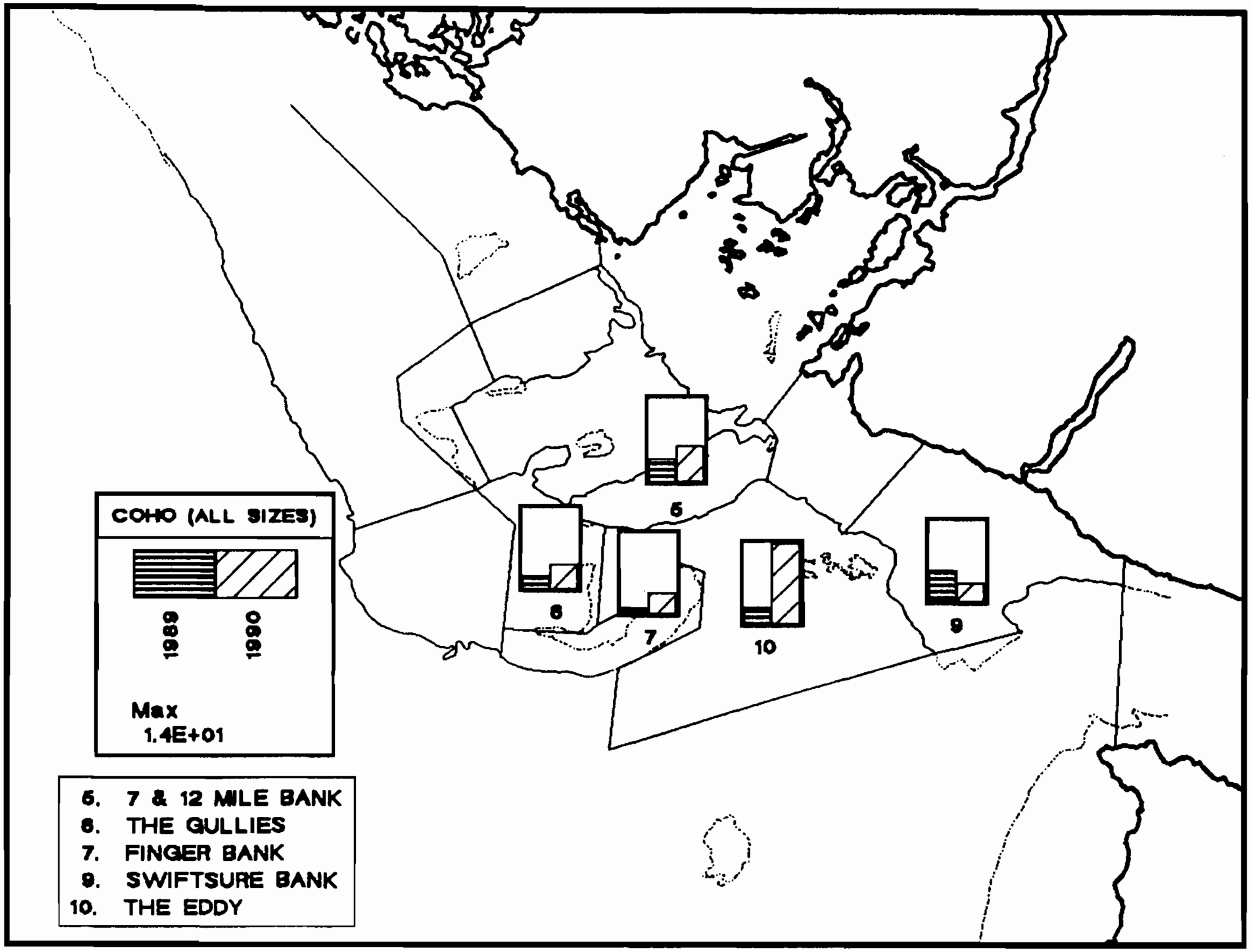
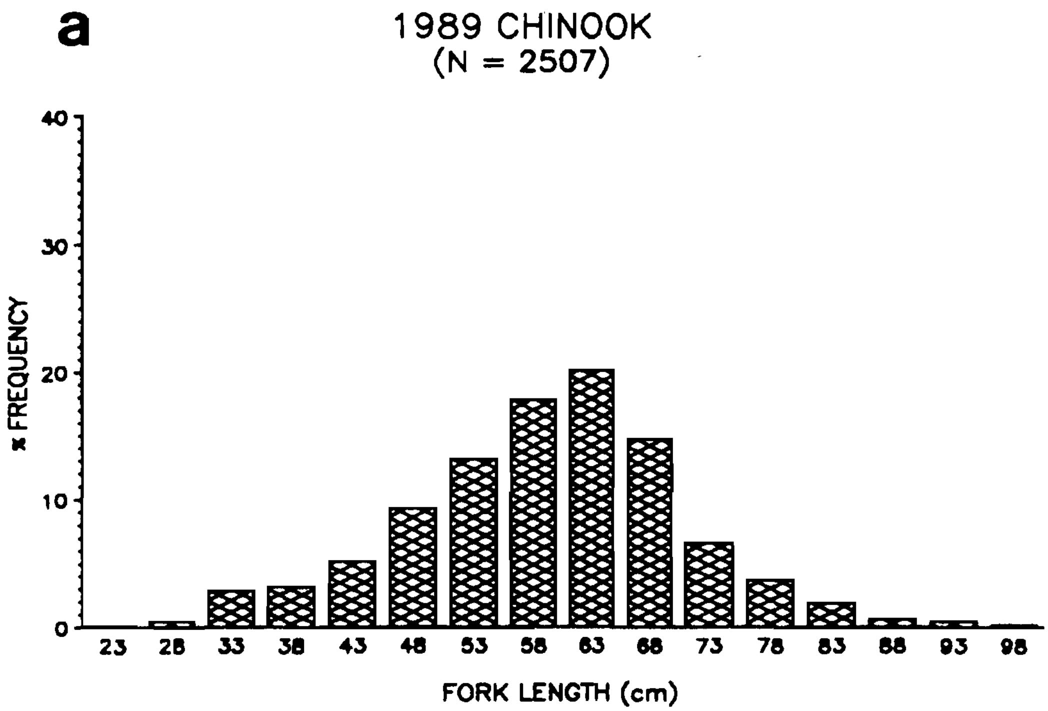

COHO (ALL SIZES)
1989
1990
Max
1.4E+01
5
6
7
10
9
5. 7 & 12 MILE BANK
6. THE GULLIES
7. FINGER BANK
9. SWIFTSURE BANK
10. THE EDDY

FIG. 4. Chinook length frequency distribution: (a) 1989; (b) 1990.

a


1989 CHINOOK
(N = 2507)
40
30
20
10
0
% FREQUENCY
23
28
33
38
43
48
53
58
63
68
73
78
83
88
93
98
FORK LENGTH (cm)

b

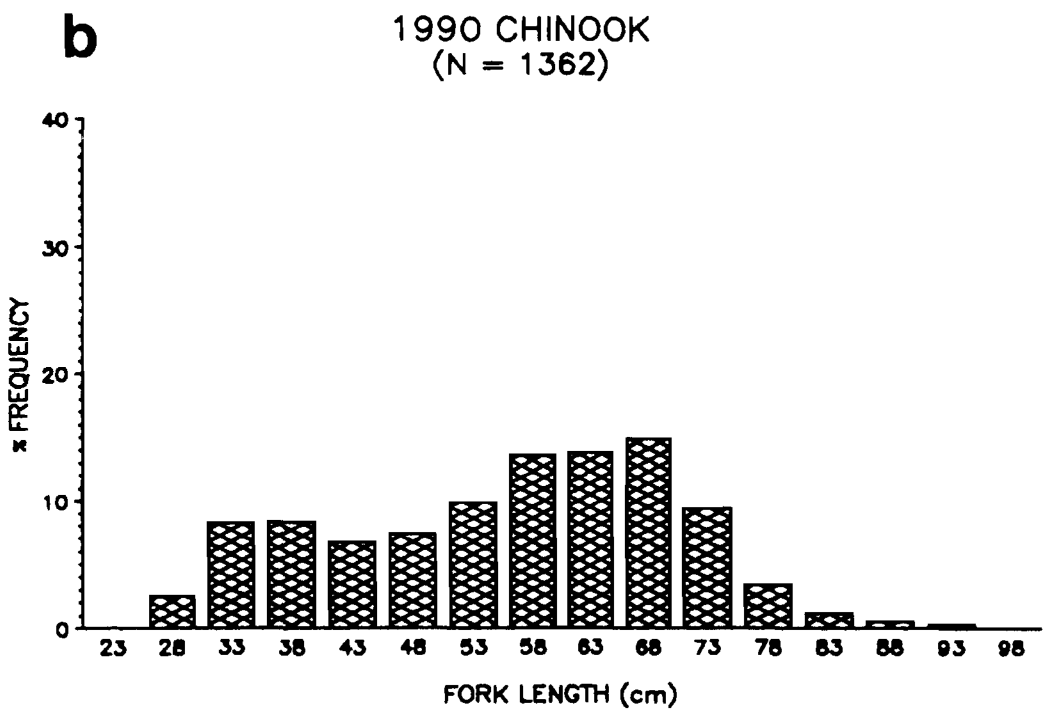
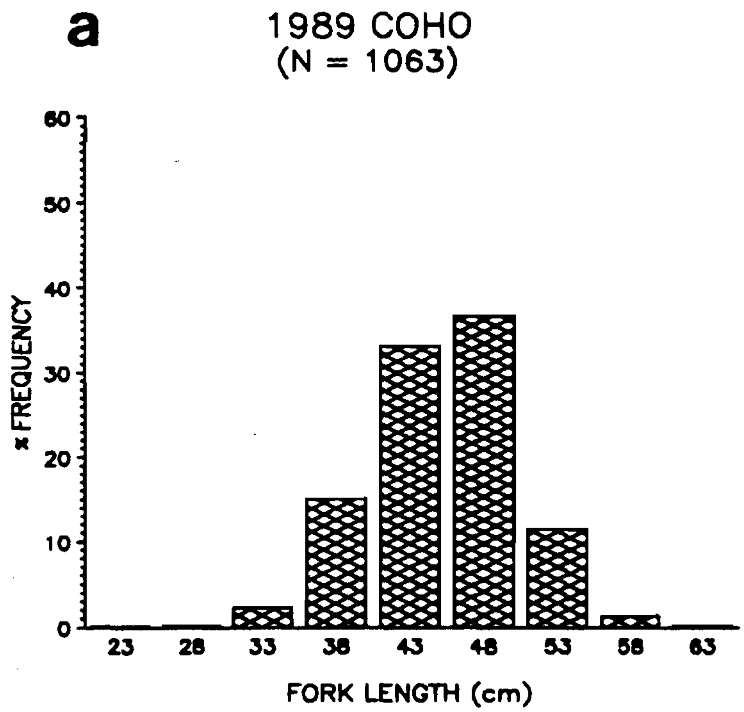

1990 CHINOOK
(N = 1362)
40
30
20
10
0
% FREQUENCY
23
28
33
38
43
48
53
58
63
68
73
78
83
88
93
98
FORK LENGTH (cm)

FIG. 5. Coho length frequency distribution: (a) 1989; (b) 1990.


a
1989 COHO
(N = 1063)
% FREQUENCY
60
50
40
30
20
10
0
23
28
33
38
43
48
53
58
63
FORK LENGTH (cm)

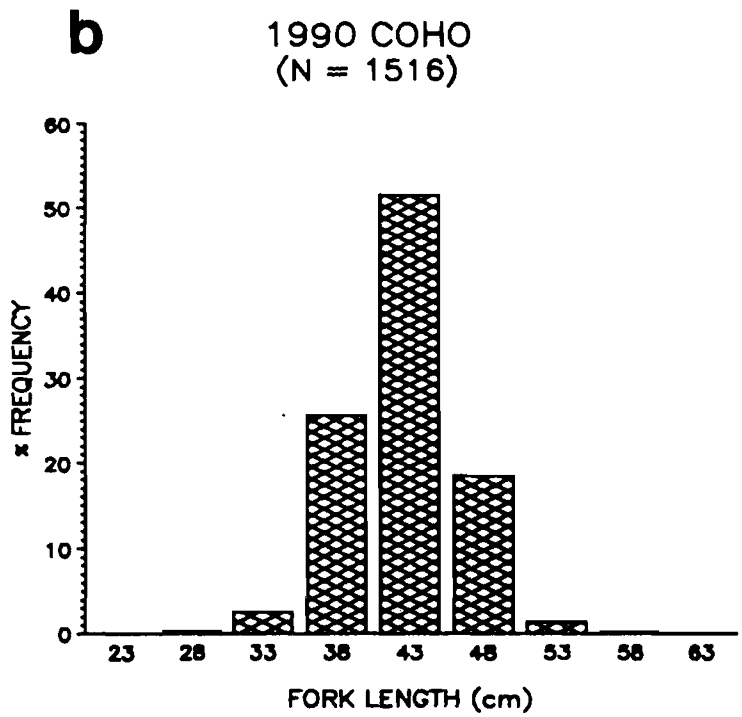
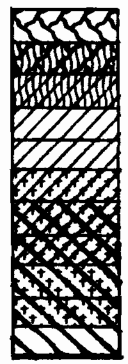
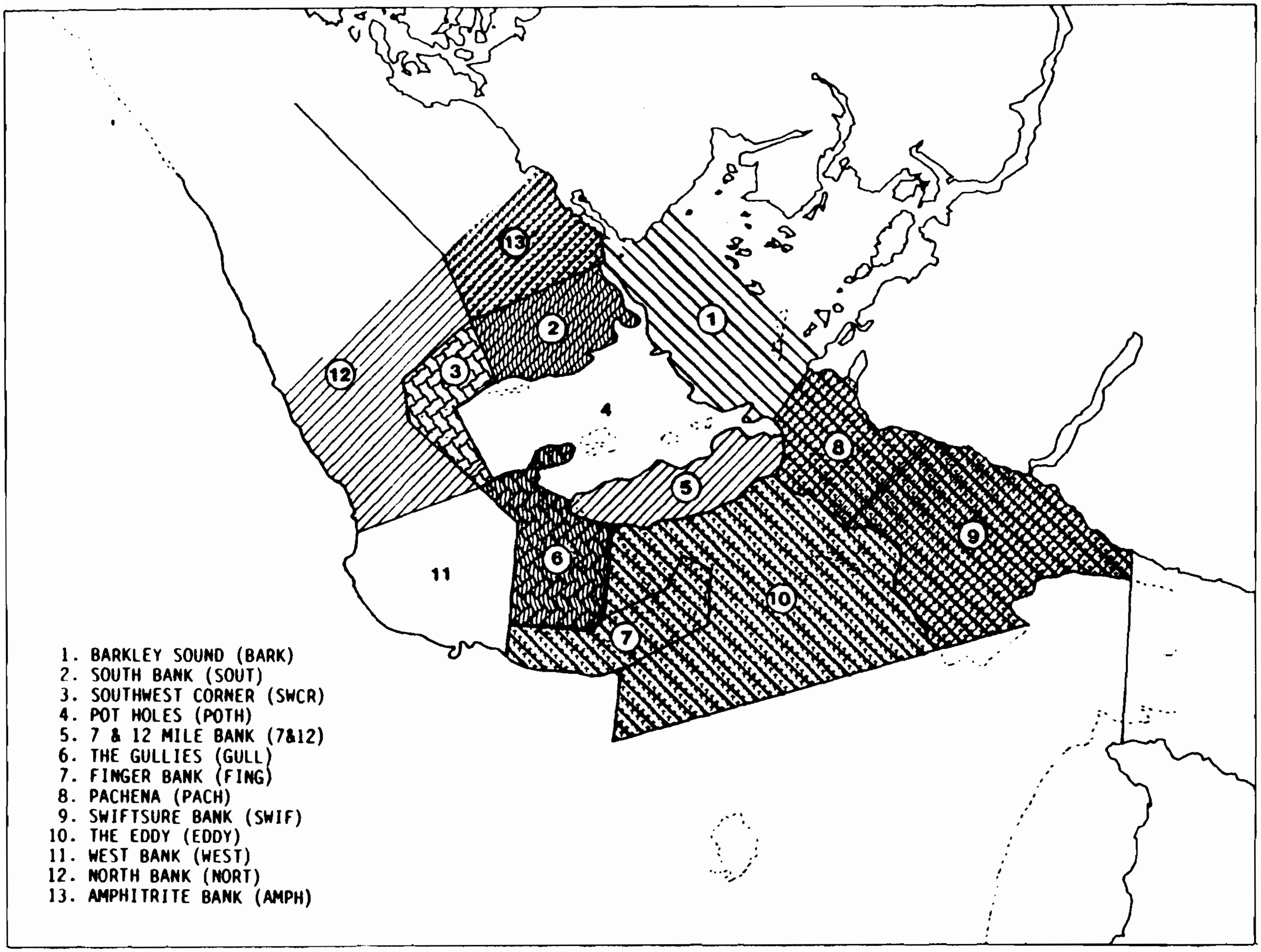

b
1990 COHO
(N = 1516)
% FREQUENCY
60
50
40
30
20
10
0
23
28
33
38
43
48
53
58
63
FORK LENGTH (cm)

FIG. 6a. Tests for significant differences in 1989 chinook mean fork lengths between sampling areas (F = 52.81; PR>F = 0.0).

AREA	N	MEAN FORK LENGTH (cm)	GROUPING					KEY
SWCR	6	74.67	A					
GULL	118	71.64	A	B				
SOUT	18	64.28		B	C			
7&12	1414	61.33			C			
NORT	40	61.20			C			
AMPH	54	58.17			C	D		
PACH	67	55.84			C	D	E	
SWIF	438	55.81			C	D	E	
FING	20	52.40				D	E	
EDDY	287	51.05				D	E	
BARK	45	49.47					E	




1. BARKLEY SOUND (BARK)
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3. SOUTHWEST CORNER (SWCR)
4. POT HOLES (POTH)
5. 7 & 12 MILE BANK (7&12)
6. THE GULLIES (GULL)
7. FINGER BANK (FING)
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)
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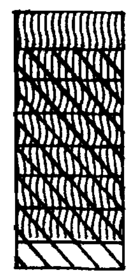
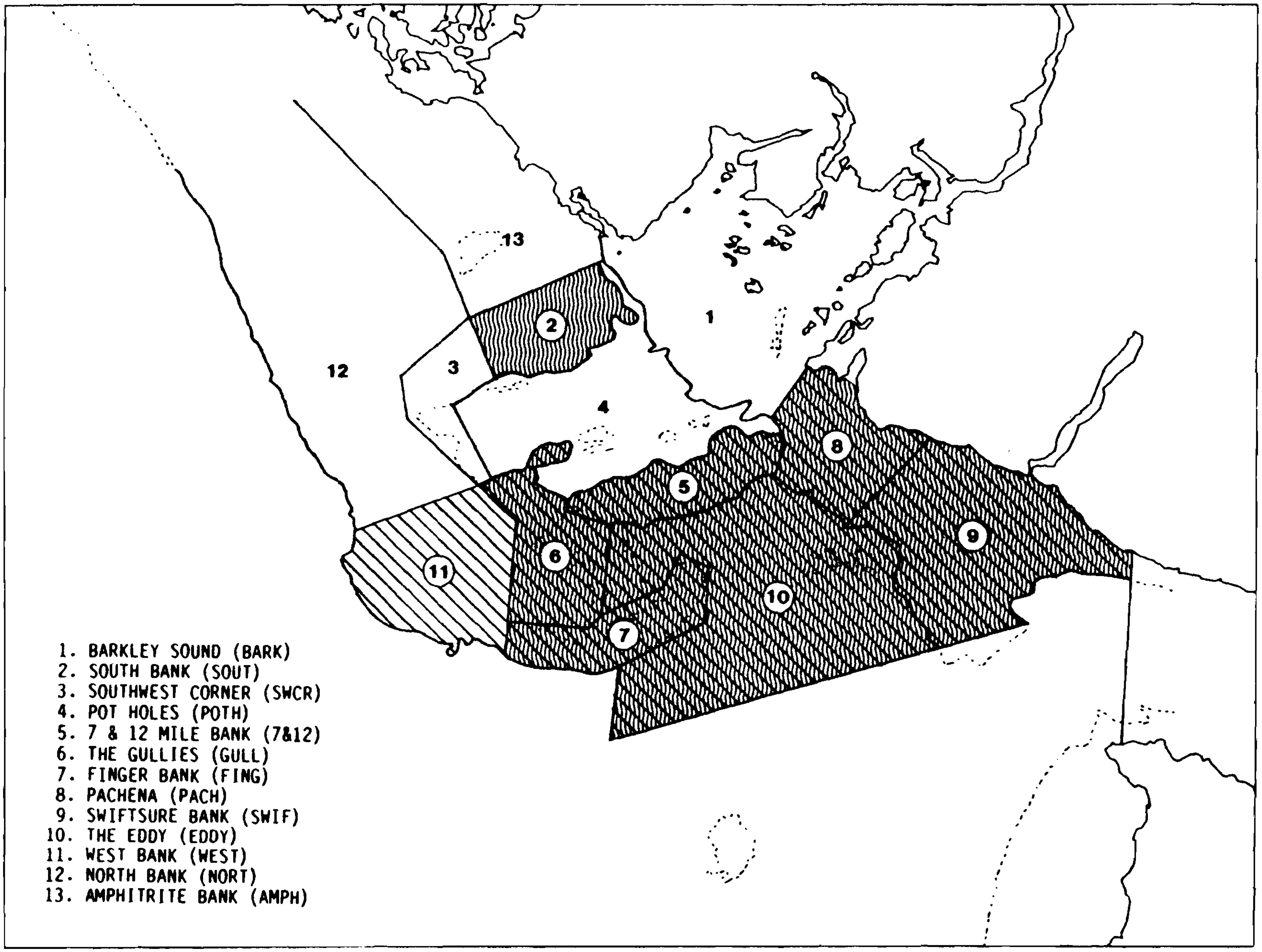
FIG. 6b. Tests for significant differences in 1990 chinook mean fork lengths between sampling areas (F = 13.61; PR>F = 0.0001).

AREA	N	MEAN FORK LENGTH (cm)	GROUPING		KEY
SOUT	15	60.47	A		
GULL	405	59.55	A	B	
FING	137	57.79	A	B	
7&12	533	56.29	A	B	
SWIF	49	54.74	A	B	
PACH	12	49.08	A	B	
EDDY	206	48.83	A	B	
WEST	5	47.20		B	




1. BARKLEY SOUND (BARK)
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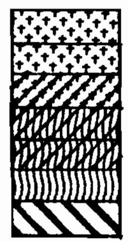
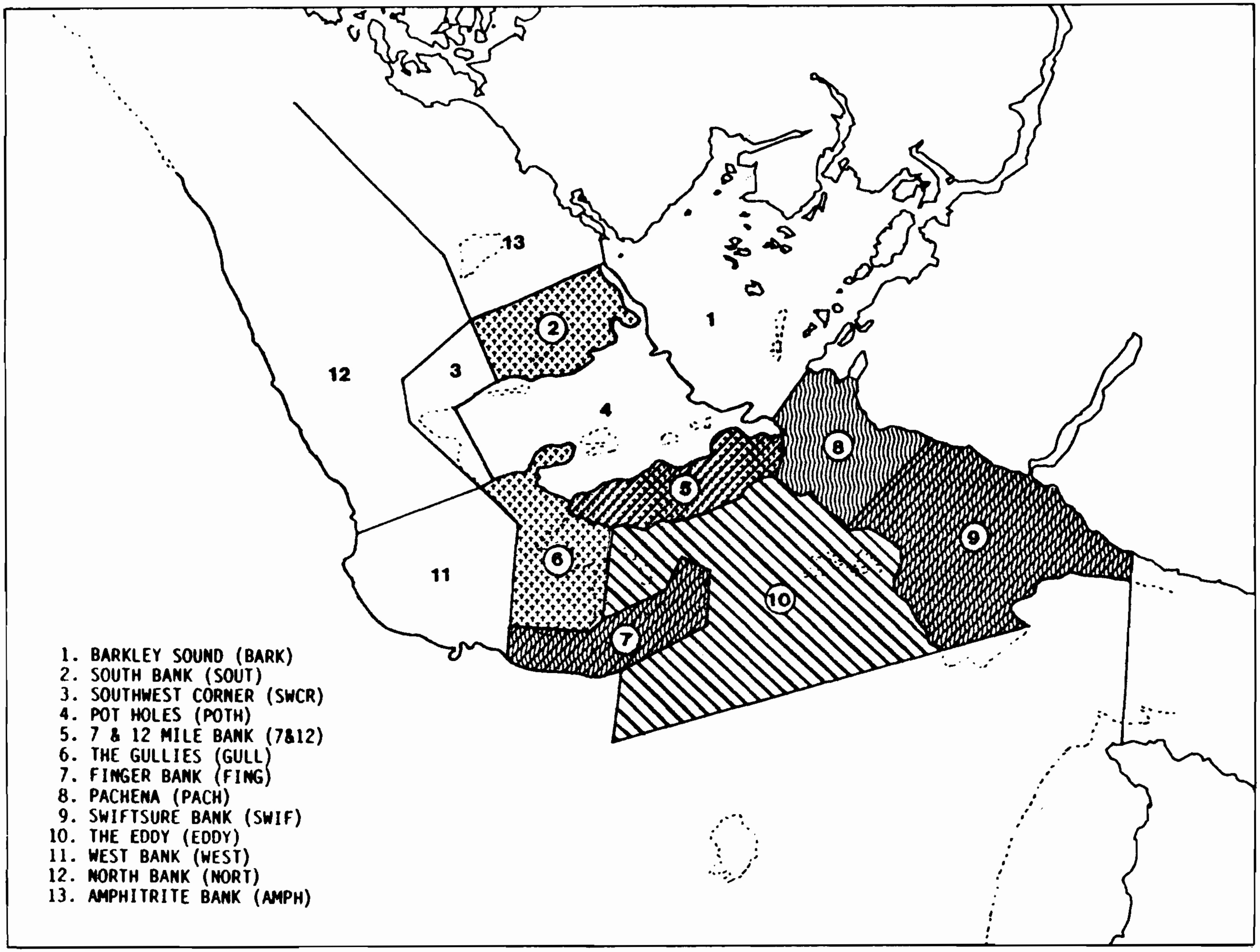
5. 7 & 12 MILE BANK (7&12)
6. THE GULLIES (GULL)
7. FINGER BANK (FING)
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)

FIG. 6c. Tests for significant differences in 1989 and 1990 chinook (combined data) mean fork lengths between sampling areas (F = 71.80; PR>F = 0.0).

AREA	N	MEAN FORK LENGTH (cm)	GROUPING				KEY
SOUT	33	62.55	A				
GULL	523	62.28	A				
7&12	1947	59.95	A	B			
FING	157	57.10		B	C		
SWIF	487	55.70		B	C		
PACH	79	54.81			C		
EDDY	493	50.12				D	

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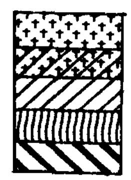
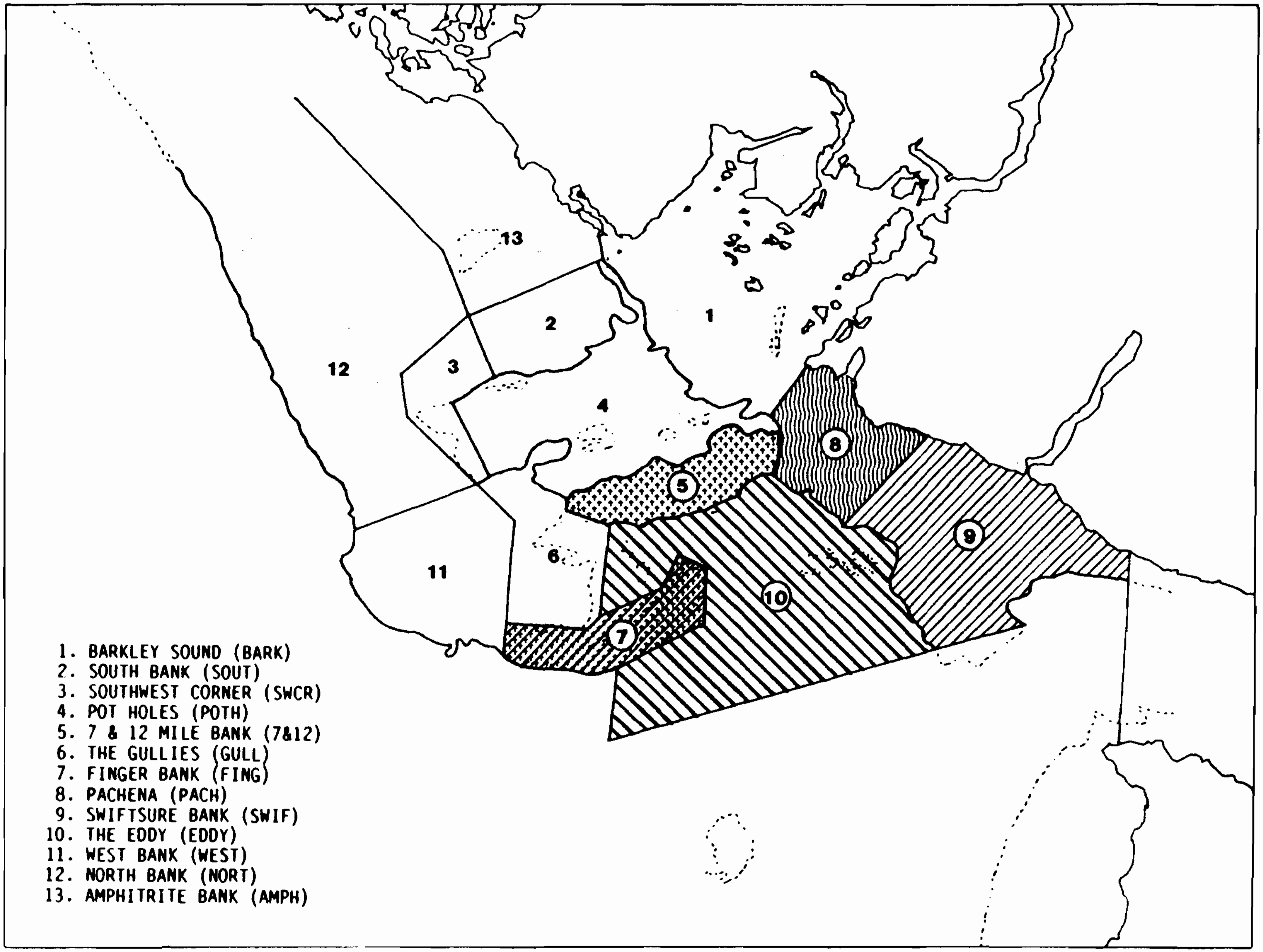
6. THE GULLIES (GULL)
7. FINGER BANK (FING)
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)

FIG. 6d. Tests for significant differences in 1988, 1989 and 1990 chinook (combined data) mean fork lengths between sampling areas (F = 70.13; PR>F = 0.0).

AREA	N	MEAN FORK LENGTH (cm)	GROUPING				KEY
7&12	2375	60.22	A				
FING	219	57.80	A	B			
SWIF	1003	56.90		B			
PACH	132	54.38			C		
EDDY	505	50.01				D	

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4. POT HOLES (POTH)
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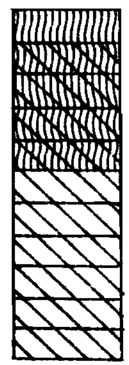
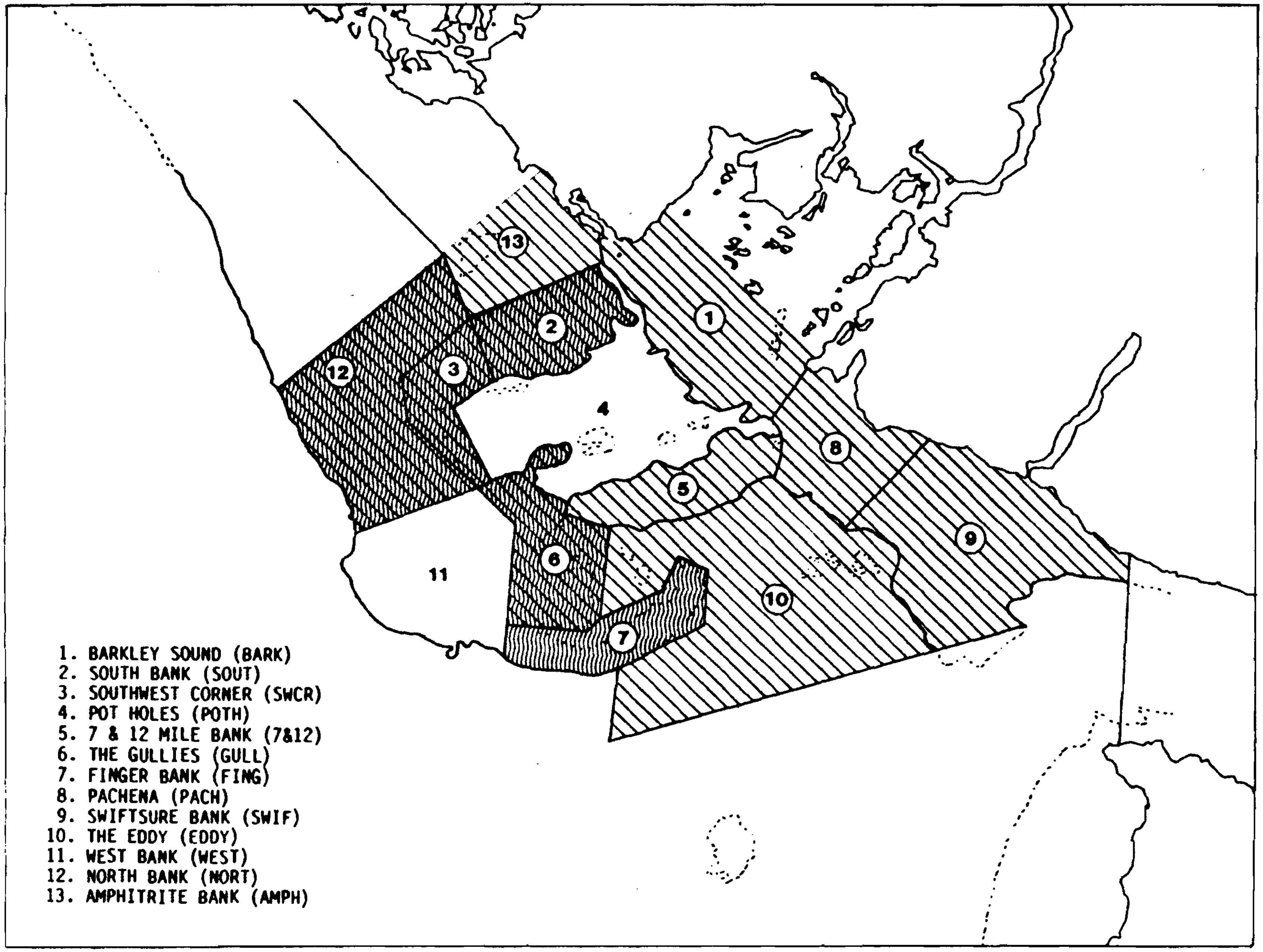
7. FINGER BANK (FING)
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)

FIG. 7a. Tests for significant differences in 1989 coho fork mean lengths between sampling areas (F = 13.11; PR>F = 0.0001).

AREA	N	MEAN FORK LENGTH (cm)	GROUPING		KEY
FING	3	54.33	A		
SWCR	2	50.00	A	B	
SOUT	22	48.82	A	B	
NORT	4	48.75	A	B	
GULL	86	47.48	A	B	
7&12	496	46.18		B	
EDDY	135	44.90		B	
AMPH	13	44.69		B	
BARK	8	43.75		B	
SWIF	285	43.09		B	
PACH	9	42.78		B	




1. BARKLEY SOUND (BARK)
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4. POT HOLES (POTH)
5. 7 & 12 MILE BANK (7&12)
6. THE GULLIES (GULL)
7. FINGER BANK (FING)
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)
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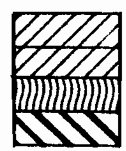
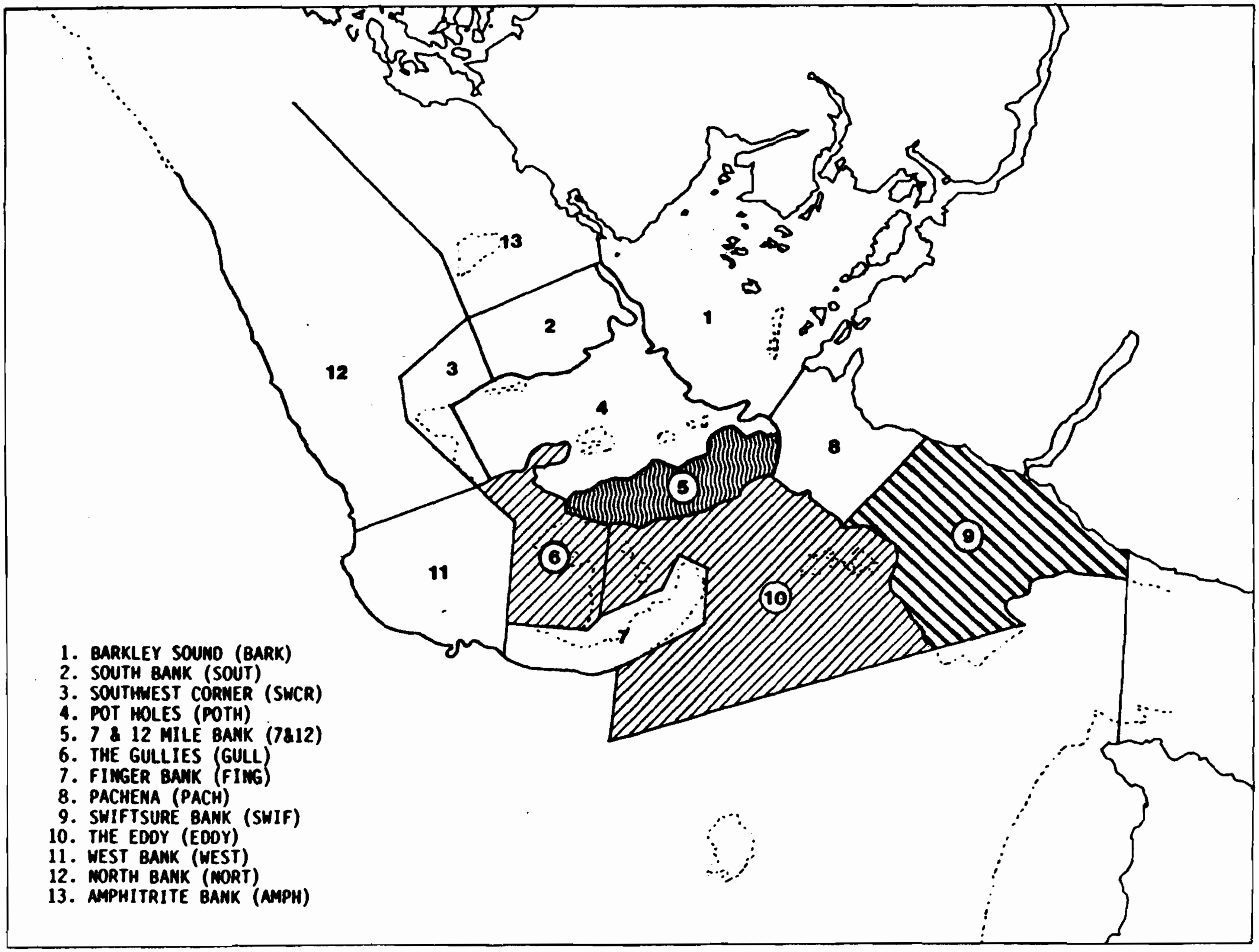
FIG. 7b. Tests for significant differences in 1990 coho mean fork lengths between sampling areas (F = 24.60; PR>F = 0.0001).

AREA	N	MEAN FORK LENGTH (cm)	GROUPING			KEY
GULL	222	43.73	A			
EDDY	482	43.30	A			
7&12	368	42.32		B		
SWIF	300	41.37			C	

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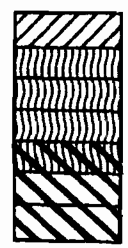
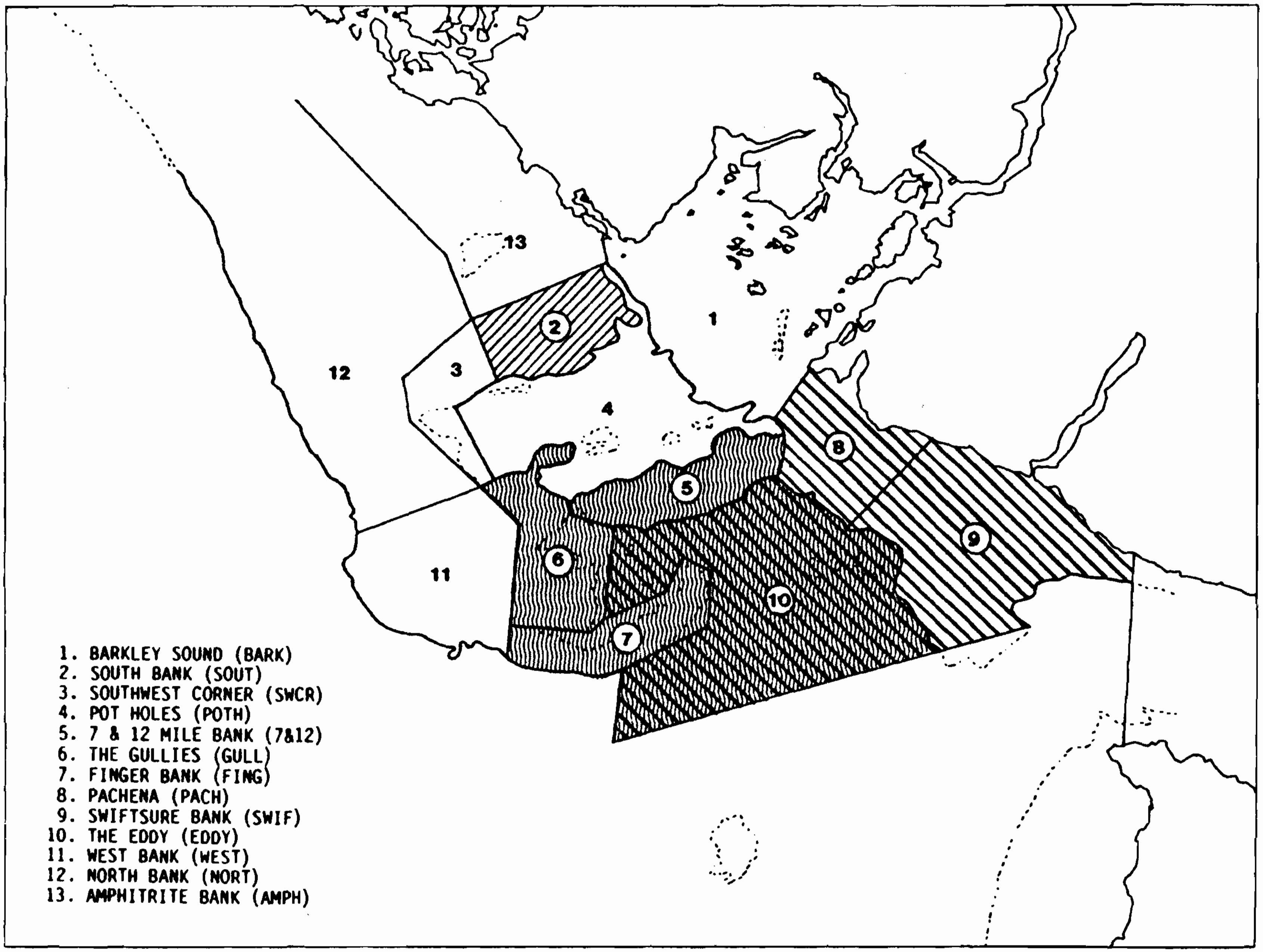
1. BARKLEY SOUND (BARK)
2. SOUTH BANK (SOUT)
3. SOUTHWEST CORNER (SWCR)
4. POT HOLES (POTH)
5. 7 & 12 MILE BANK (7&12)
6. THE GULLIES (GULL)
7. FINGER BANK (FING)
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)

FIG. 7c. Tests for significant differences in 1989 and 1990 coho (combined data) mean fork lengths between sampling areas (F = 60.59; PR>F = 0.0).

AREA	N	MEAN FORK LENGTH (cm)	GROUPING			KEY
SOUT	32	46.94	A			
GULL	308	44.78		B		
7&12	864	44.54		B		
FING	43	44.44		B		
EDDY	617	43.65		B	C	
SWIF	585	42.21			C	
PACH	96	41.93			C	




1. BARKLEY SOUND (BARK)
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4. POT HOLES (POTH)
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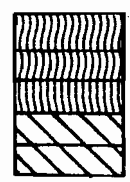
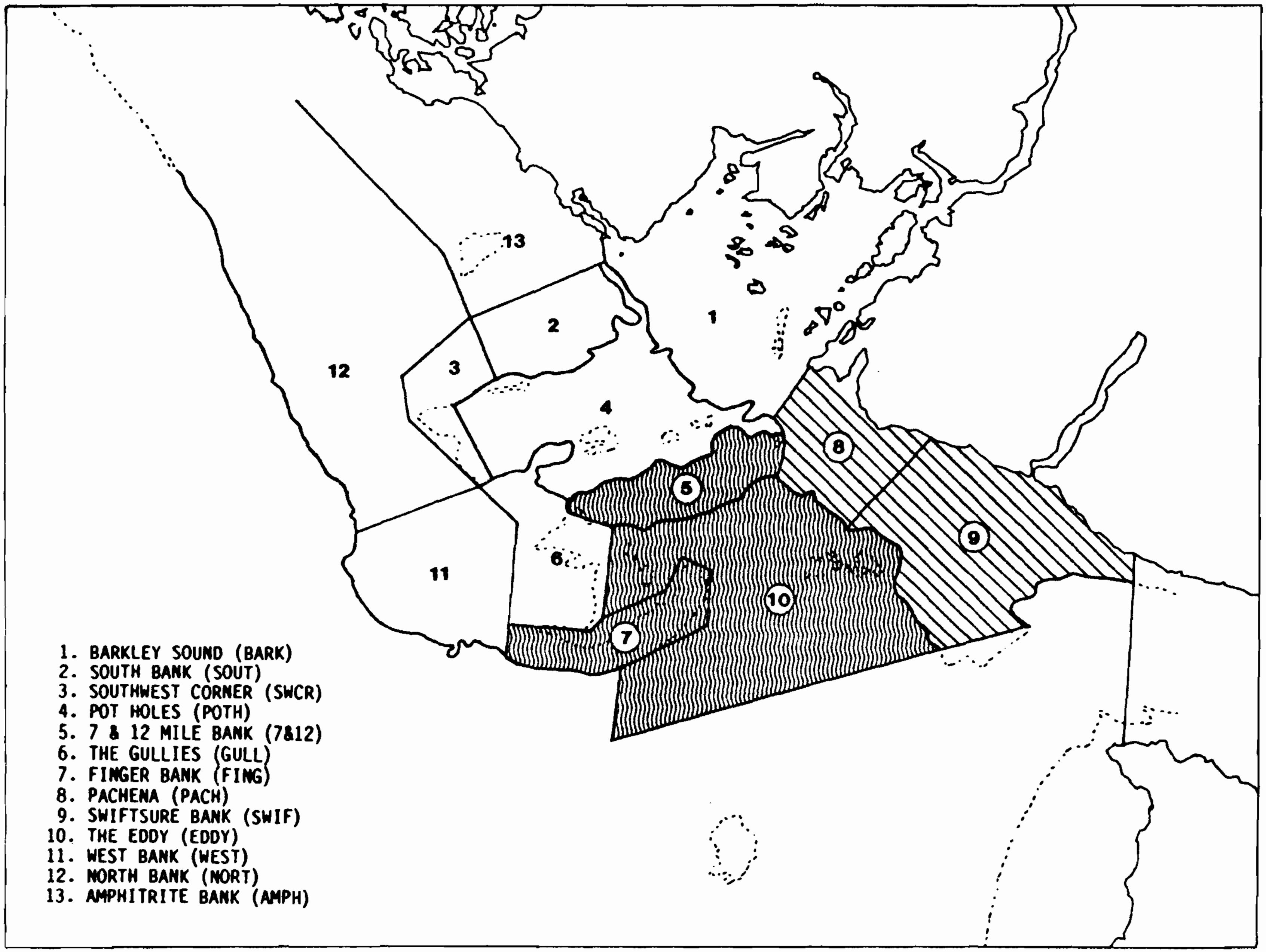
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)

FIG. 7d. Tests for significant differences in 1988, 1989 and 1990 coho (combined data) mean fork lengths between sampling areas (F = 55.38; PR>F = 0.0).

AREA	N	MEAN FORK LENGTH (cm)	GROUPING		KEY
7&12	894	44.51	A		
FING	63	44.38	A		
EDDY	627	43.67	A		
SWIF	655	42.19		B	
PACH	113	41.78		B	

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1. BARKLEY SOUND (BARK)
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3. SOUTHWEST CORNER (SWCR)
4. POT HOLES (POTH)
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7. FINGER BANK (FING)
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)

FIG. 8. Depth of capture of 1989 chinook by fork length interval:

(a) all fork lengths;
(b) keepers, > =67 cm;
(c) 61 to 66 cm;
(d) 51 to 60 cm;

1989 CHINOOK

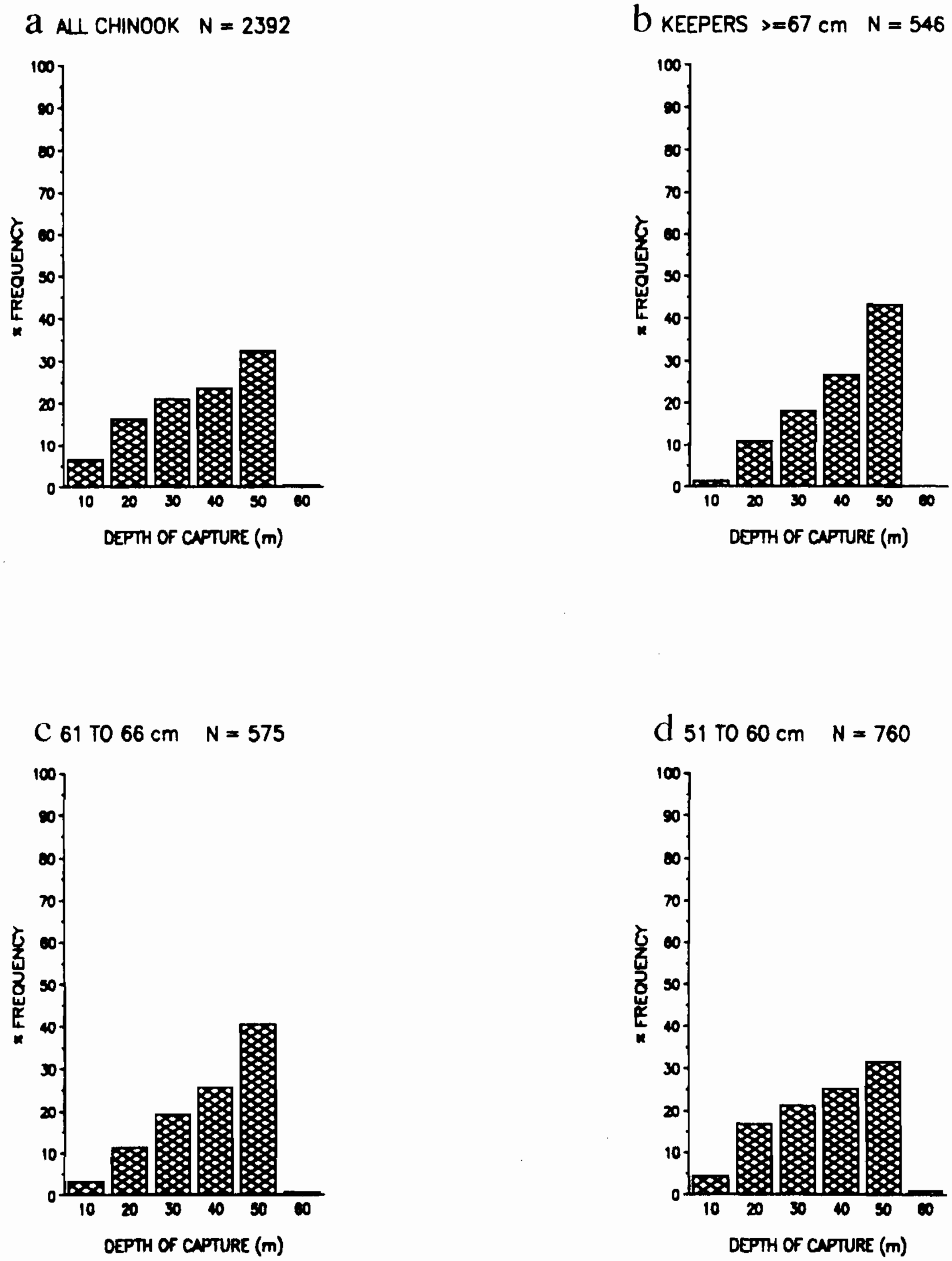
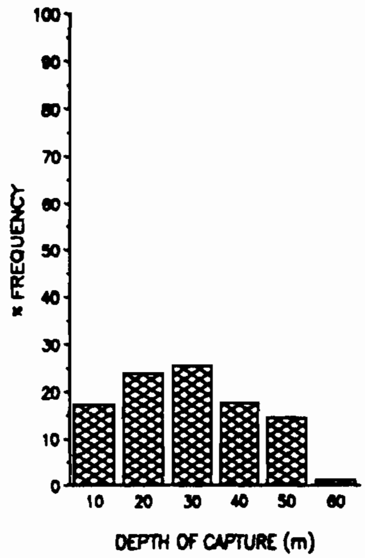


FIG. 8 cont'd. Depth of capture of 1989 chinook by fork length interval:

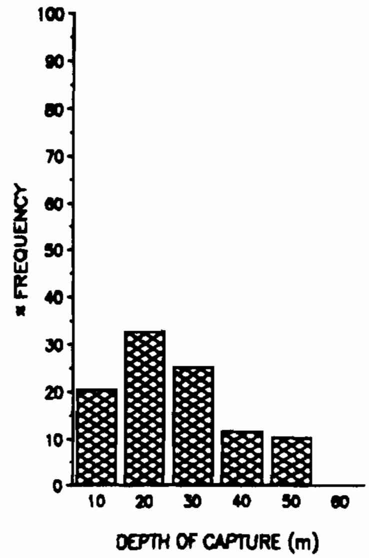
(e) 41 to 50 cm;
(f) 31 to 40 cm;
(g) 21 to 30 cm.

1989 CHINOOK

e 41 TO 50 cm   N = 351



f 31 TO 40 cm   N = 147



g 21 TO 30 cm   N = 13

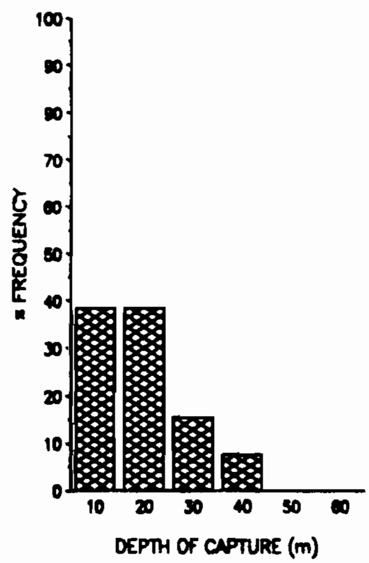


FIG. 9. Depth of capture of 1990 chinook by fork length interval:

(a) all fork lengths;
(b) keepers, >=67 cm;
(c) 61 to 66 cm;
(d) 51 to 60 cm;

1990 CHINOOK

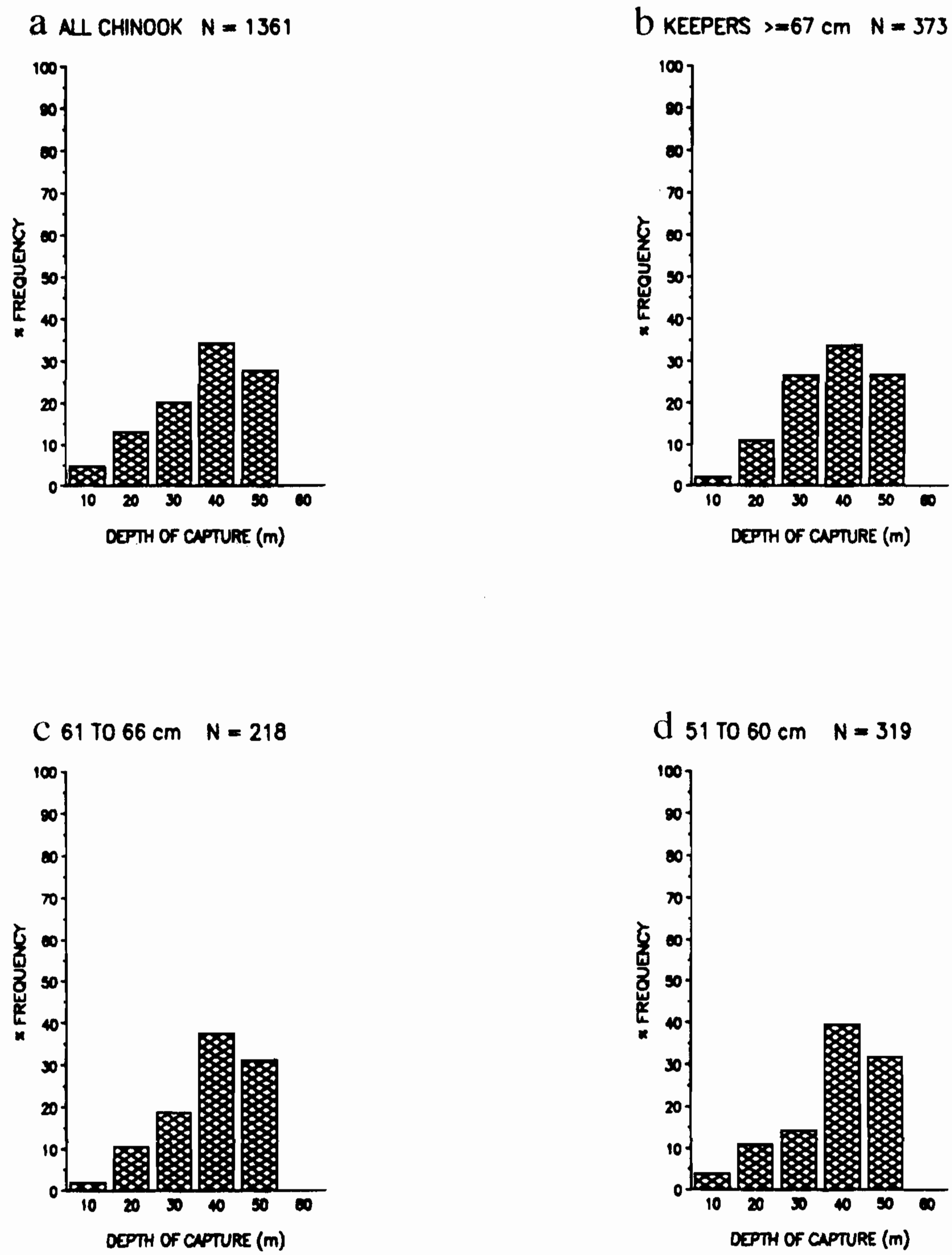
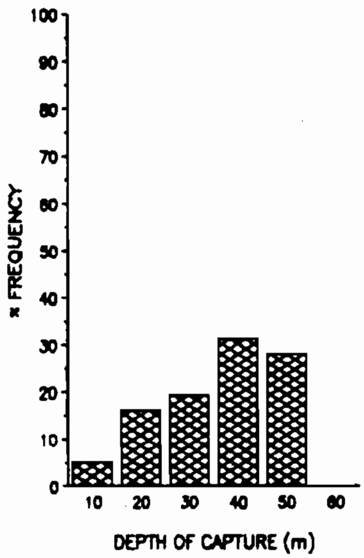


FIG. 9 cont'd. Depth of capture of 1990 chinook by fork length interval:

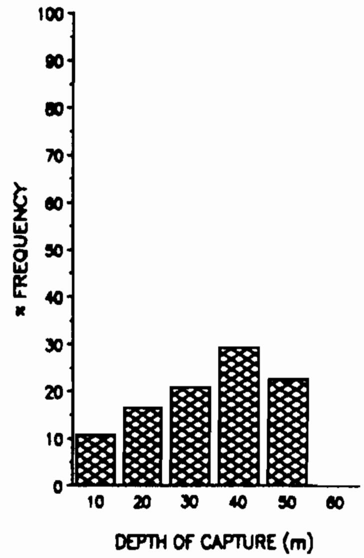
(e) 41 to 50 cm;
(f) 31 to 40 cm;
(g) 21 to 30 cm.

1990 CHINOOK

e 41 TO 50 cm N = 192



f 31 TO 40 cm N = 225



g 21 TO 30 cm N = 34

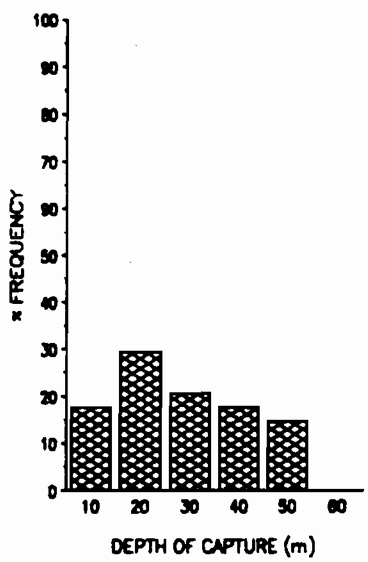
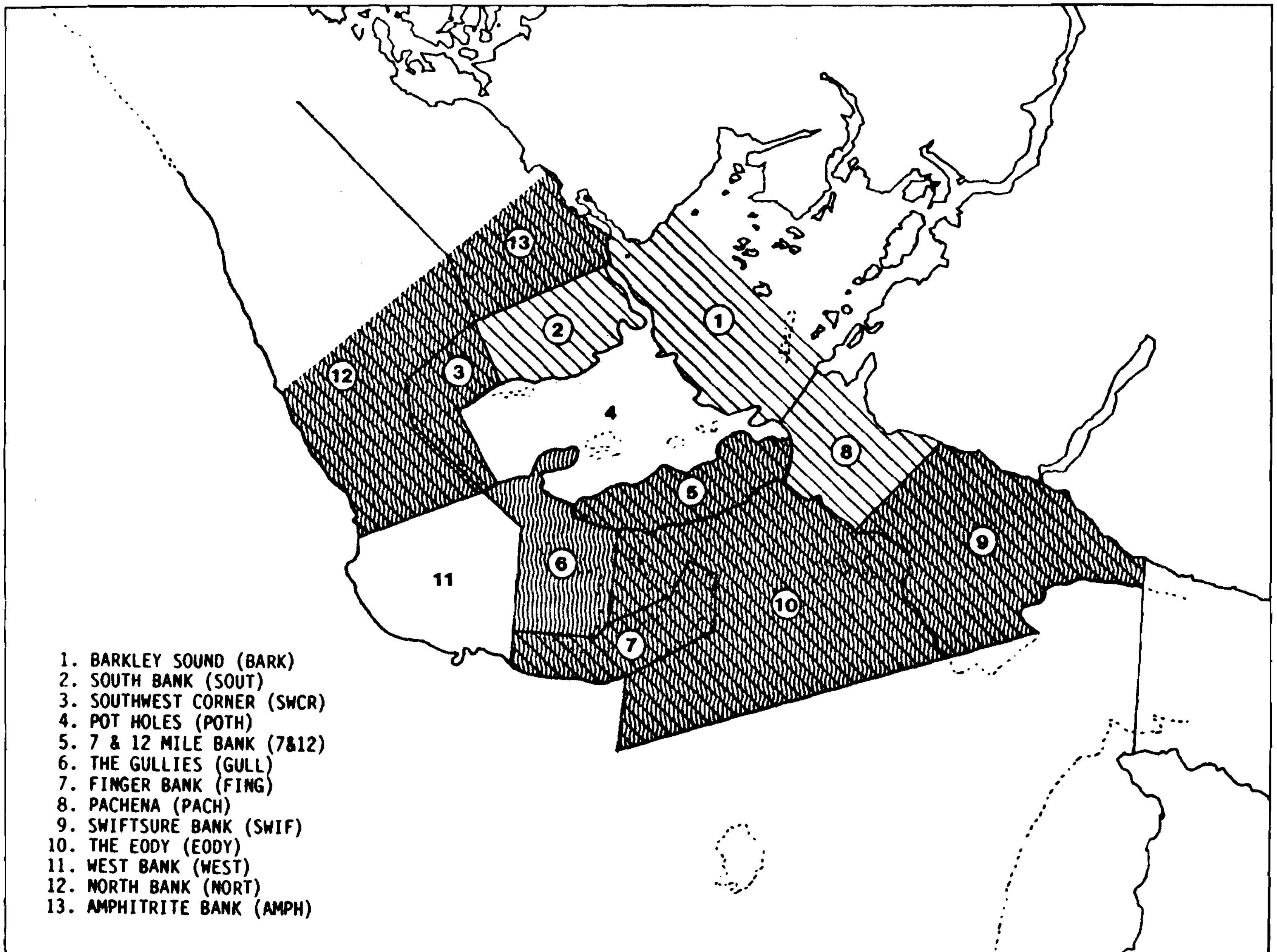


FIG. 10a. Tests for significant differences in the mean depth of capture of 1989 chinook between sampling areas (F = 14.39; PR>F = 0.0001).

AREA	N	MEAN DEPTH (m)	GROUPING		KEY
GULL	83	42.00	A		
7&12	1372	37.69	A	B	
SWCR	6	36.45	A	B	
NORT	40	35.82	A	B	
SWIF	443	33.24	A	B	
EDDY	286	32.23	A	B	
FING	18	32.05	A	B	
AMPH	54	32.00	A	B	
SOUT	20	30.43		B	
BARK	45	29.50		B	
PACH	66	28.79		B	


1. BARKLEY SOUND (BARK)
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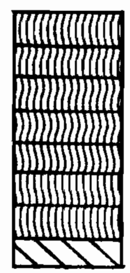
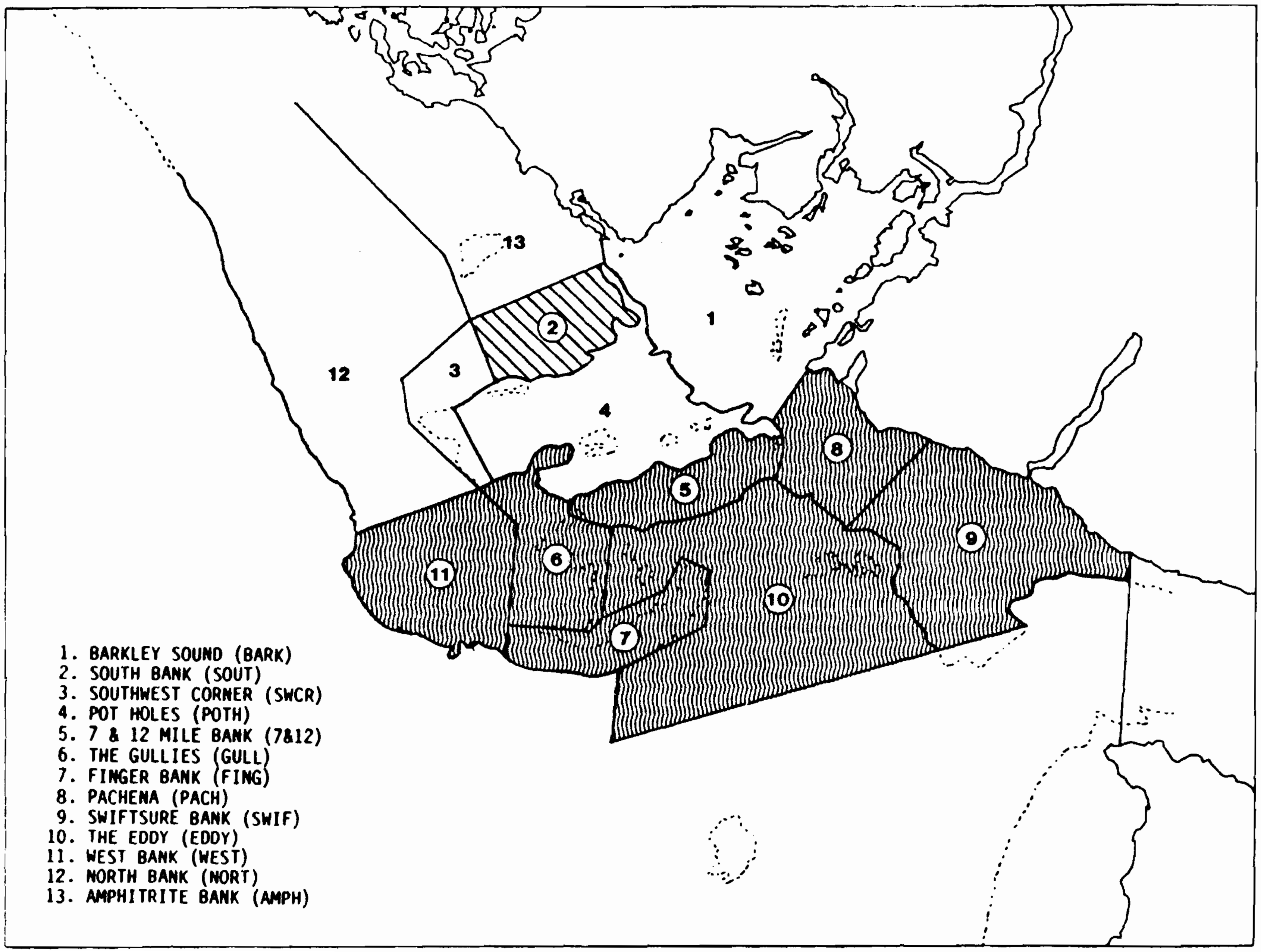
3. SOUTHWEST CORNER (SWCR)
4. POT HOLES (POTH)
5. 7 & 12 MILE BANK (7&12)
6. THE GULLIES (GULL)
7. FINGER BANK (FING)
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)

FIG. 10b. Tests for significant differences in the mean depth of capture of 1990 chinook between sampling areas (F = 8.48; PR>F = 0.0001).

AREA	N	MEAN DEPTH (m)	GROUPING		KEY
PACH	12	42.92	A		
WEST	5	39.94	A		
FING	142	39.75	A		
EDDY	212	37.76	A		
GULL	415	37.46	A		
SWIF	49	35.84	A		
7&12	547	35.02	A		
SOUT	15	22.35		B	

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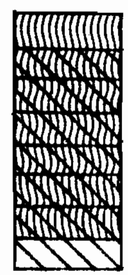
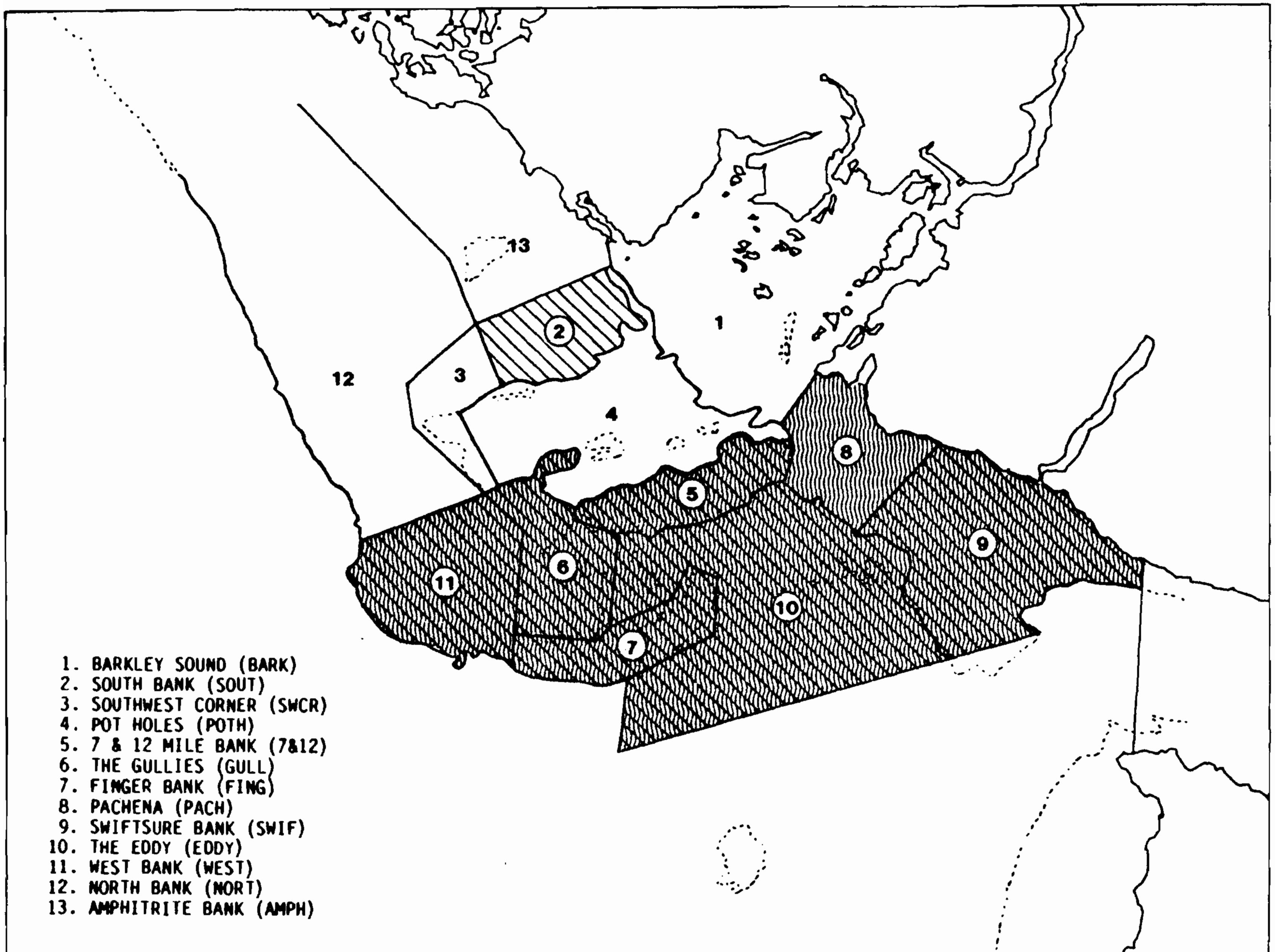
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)

FIG. 11. Tests for significant differences in the mean depth of capture of 1990 coho between sampling areas (F = 11.92; PR>F = 0.0001).

AREA	N	MEAN DEPTH (m)	GROUPING		KEY
PACH	87	18.00	A		
SWIF	309	15.75	A	B	
EDDY	499	15.30	A	B	
7&12	381	11.35	A	B	
GULL	234	9.00	A	B	
FING	43	8.81	A	B	
WEST	7	8.04	A	B	
SOUT	11	6.70		B	

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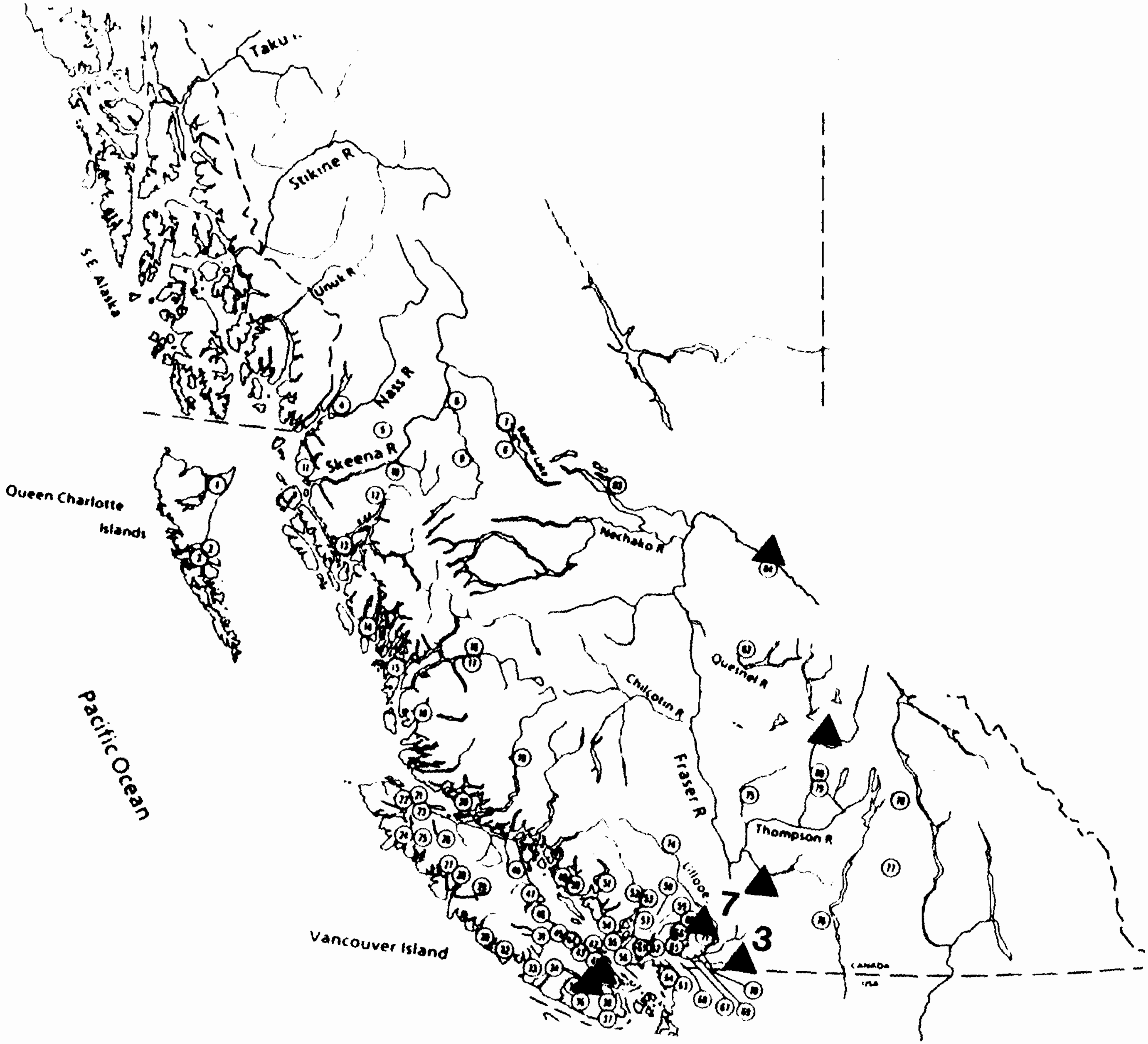
8. PACHENA (PACH)
9. SWIFTSURE BANK (SWIF)
10. THE EDDY (EDDY)
11. WEST BANK (WEST)
12. NORTH BANK (NORT)
13. AMPHITRITE BANK (AMPH)

FIG. 12a. Release site locations of chinook CWT's in B.C., captured in 1987 to 1990 in our study area. The small numbered circles represent hatcheries; the black triangles represent the release site of chinook recaptured in our study area. A number beside a black triangle indicates the number of chinook from this release site that were recaptured. If there is no number, then there was only one fish recaptured.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Nass R
Skeena R
Queen Charlotte
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Nechako R
Quesnel R
Chilcotin R
Fraser R
Thompson R
Pacific Ocean
Vancouver Island
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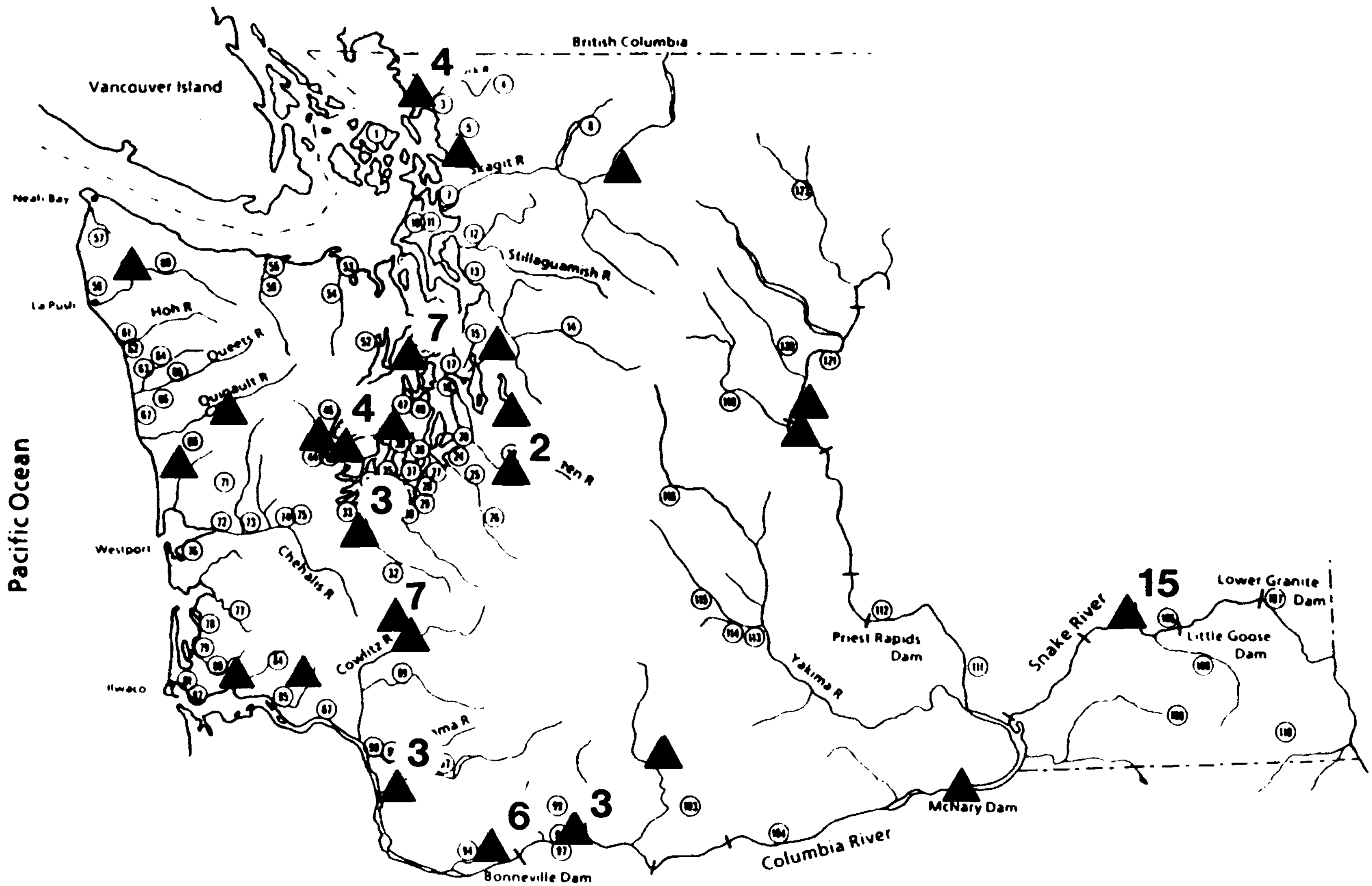
FIG. 12b. Release site locations of chinook CWT's in Washington state, captured in 1987 to 1990 in our study area. The small numbered circles represent hatcheries; the black triangles represent the release site of chinook recaptured in our study area. A number beside a black triangle indicates the number of chinook from this release site that were recaptured. If there is no number, then there was only one fish recaptured.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La Push
Hoh R
Queets R
Quinault R
Skagit R
Stillaguamish R
Westport
Chehalis R
Cowlitz R
Ilwaco
Pacific Ocean
Bonneville Dam
Columbia River
McNary Dam
Yakima R
Priest Rapids Dam
Snake River
Lower Granite Dam
Little Goose Dam
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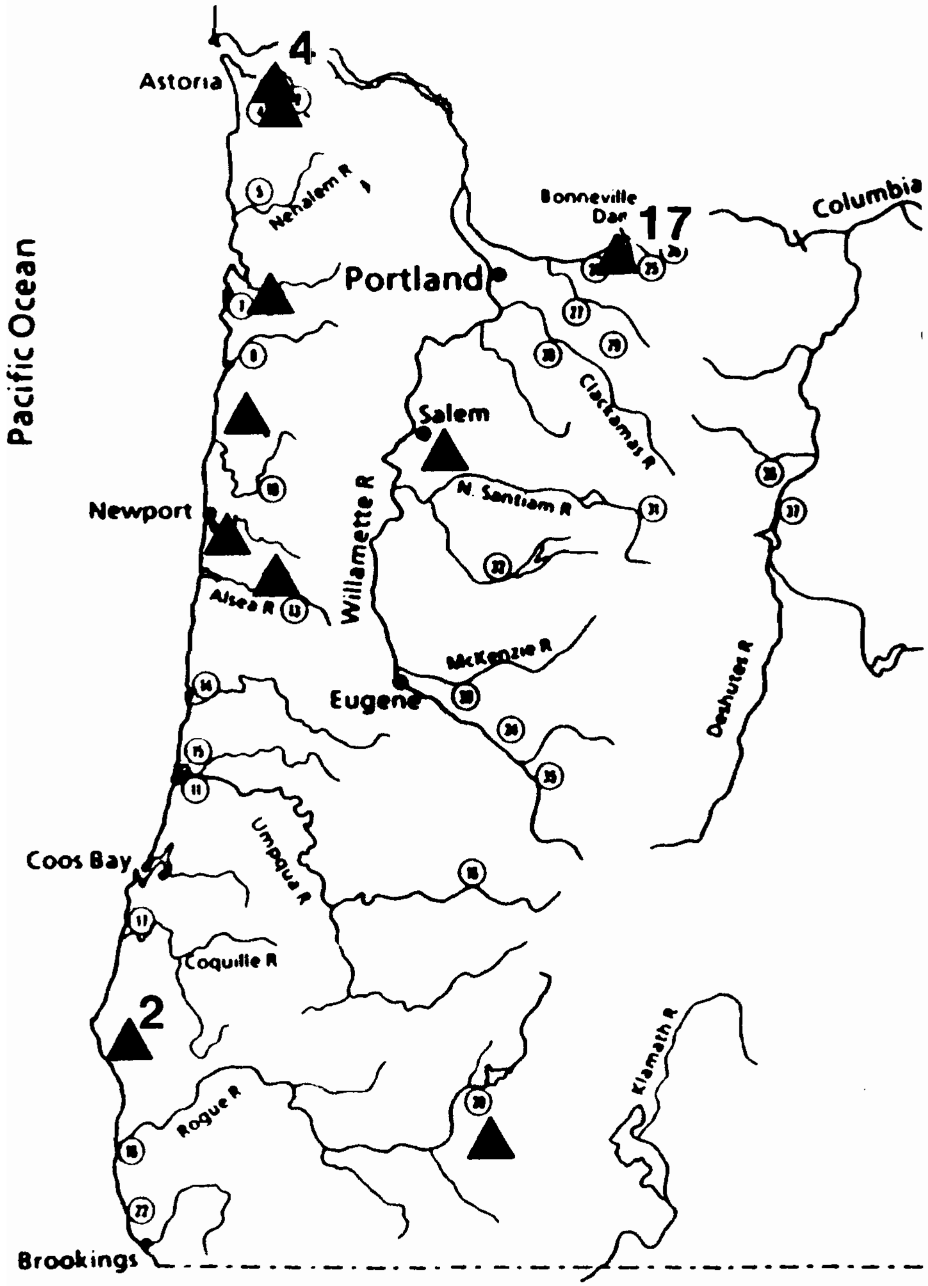
FIG. 12c. Release site locations of chinook CWT's in Oregon, captured in 1987 to 1990 in our study area. The small numbered circles represent hatcheries; the black triangles represent the release site of chinook recaptured in our study area. A number beside a black triangle indicates the number of chinook from this release site that were recaptured. If there is no number, then there was only one fish recaptured.



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Eugene
Deschutes R
Coos Bay
Umpqua R
Coquille R
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Klamath R
Rogue R
Brookings

FIG. 12d. Release site locations of chinook CWT's in California, captured in 1987 to 1990 in our study area. The small numbered circles represent hatcheries; the black triangles represent the release site of chinook recaptured in our study area. A number beside a black triangle indicates the number of chinook from this release site that were recaptured. If there is no number, then there was only one fish recaptured.

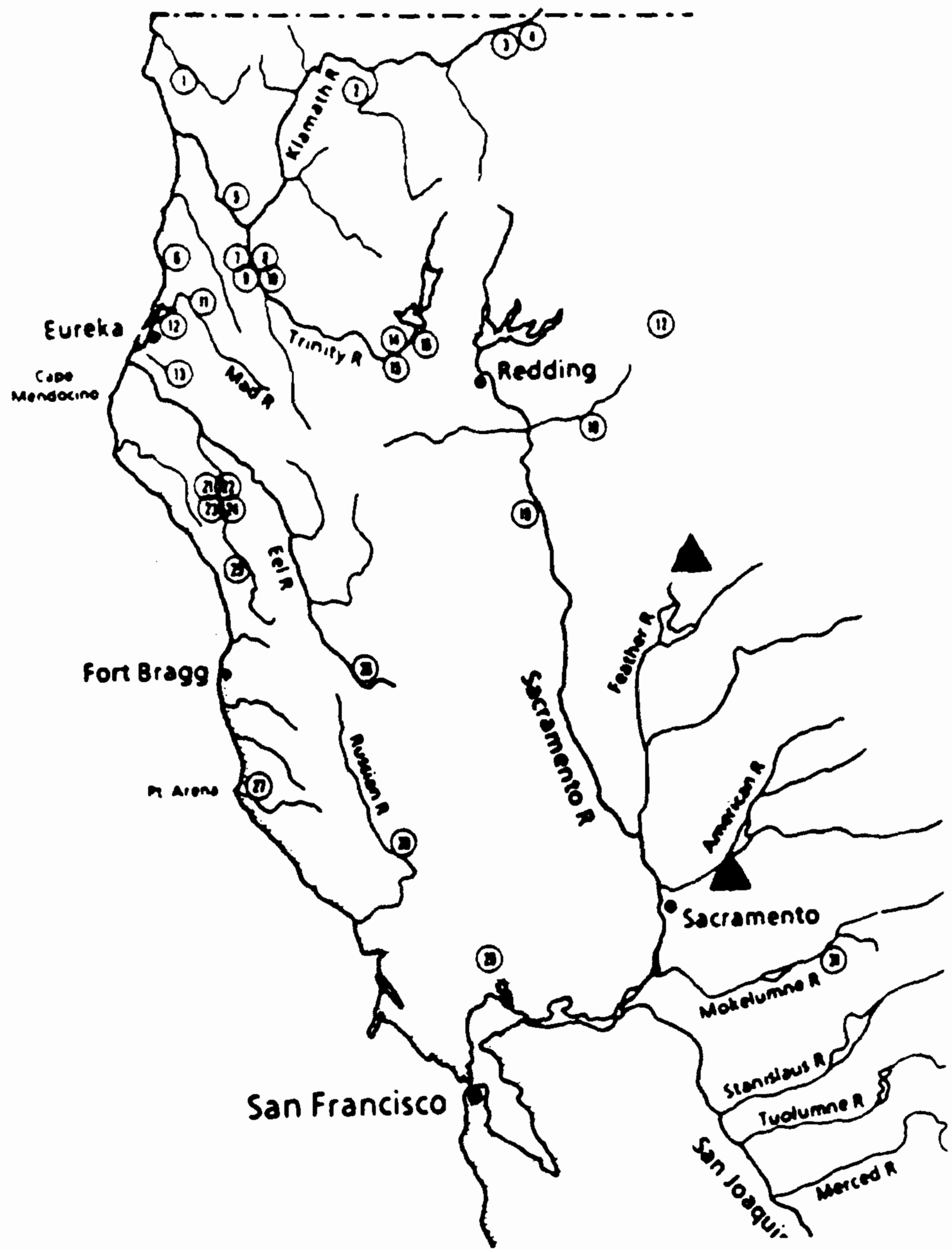

Klamath R
Eureka
Cape Mendocino
Trinity R
Mad R
Redding
Eel R
Fort Bragg
Pt. Arena
Russian R
Sacramento R
Feather R
American R
Sacramento
Mokelumne R
Stanislaus R
Tuolumne R
Merced R
San Francisco

Fig. 13a. Release site locations of coho CWT's in B.C., captured in 1987 to 1990 in our study area. The small numbered circles represent hatcheries; the black hexagons represent the release site of coho recaptured in our study area. A number beside a black hexagon indicates the number of coho from this release site that were recaptured. If there is no number, then there was only one fish recaptured.

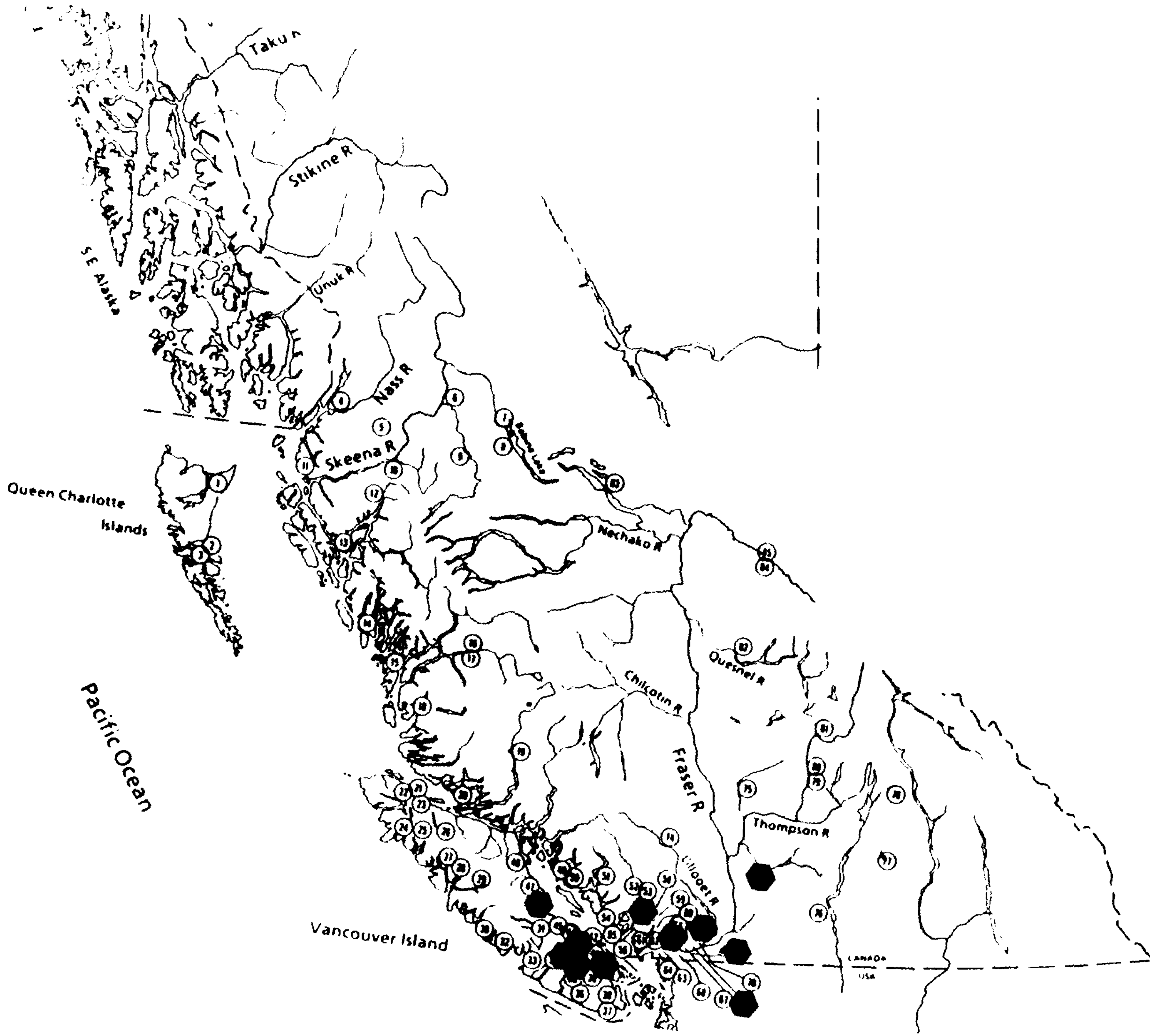

Taku R
Stikine R
Unuk R
S.E. Alaska
Nass R
Skeena R
Queen Charlotte
Islands
Nechako R
Quesnel R
Chilcotin R
Fraser R
Thompson R
Pacific Ocean
Vancouver Island
CANADA
USA

Fig. 13b. Release site locations of coho CWT's in Washington state, captured in 1987 to 1990 in our study area. The small numbered circles represent hatcheries; the black hexagons represent the release site of coho recaptured in our study area. A number beside the black hexagon indicates the number of coho from this release site that were recaptured. If there is no number, then there was only one fish recaptured.

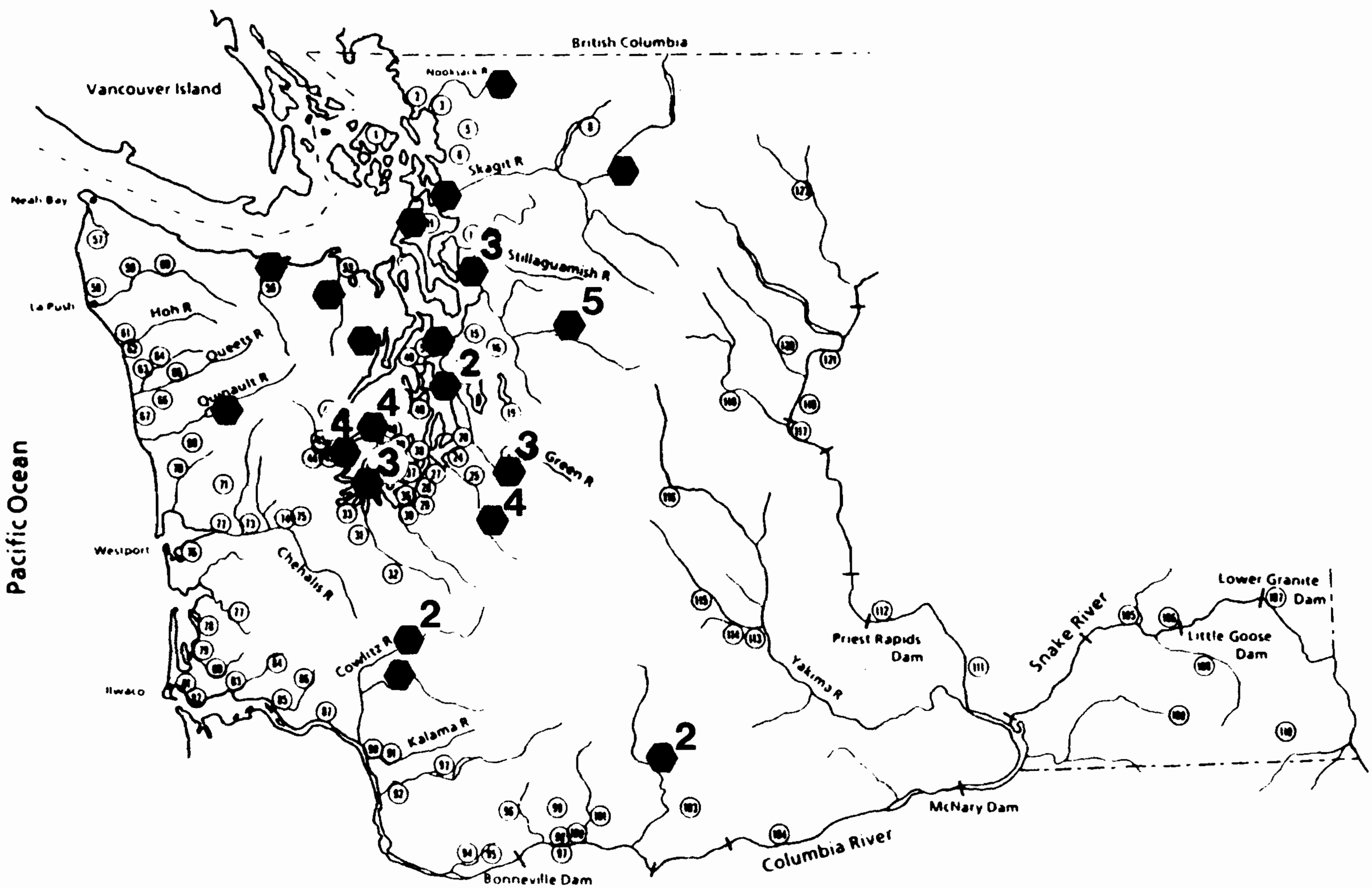
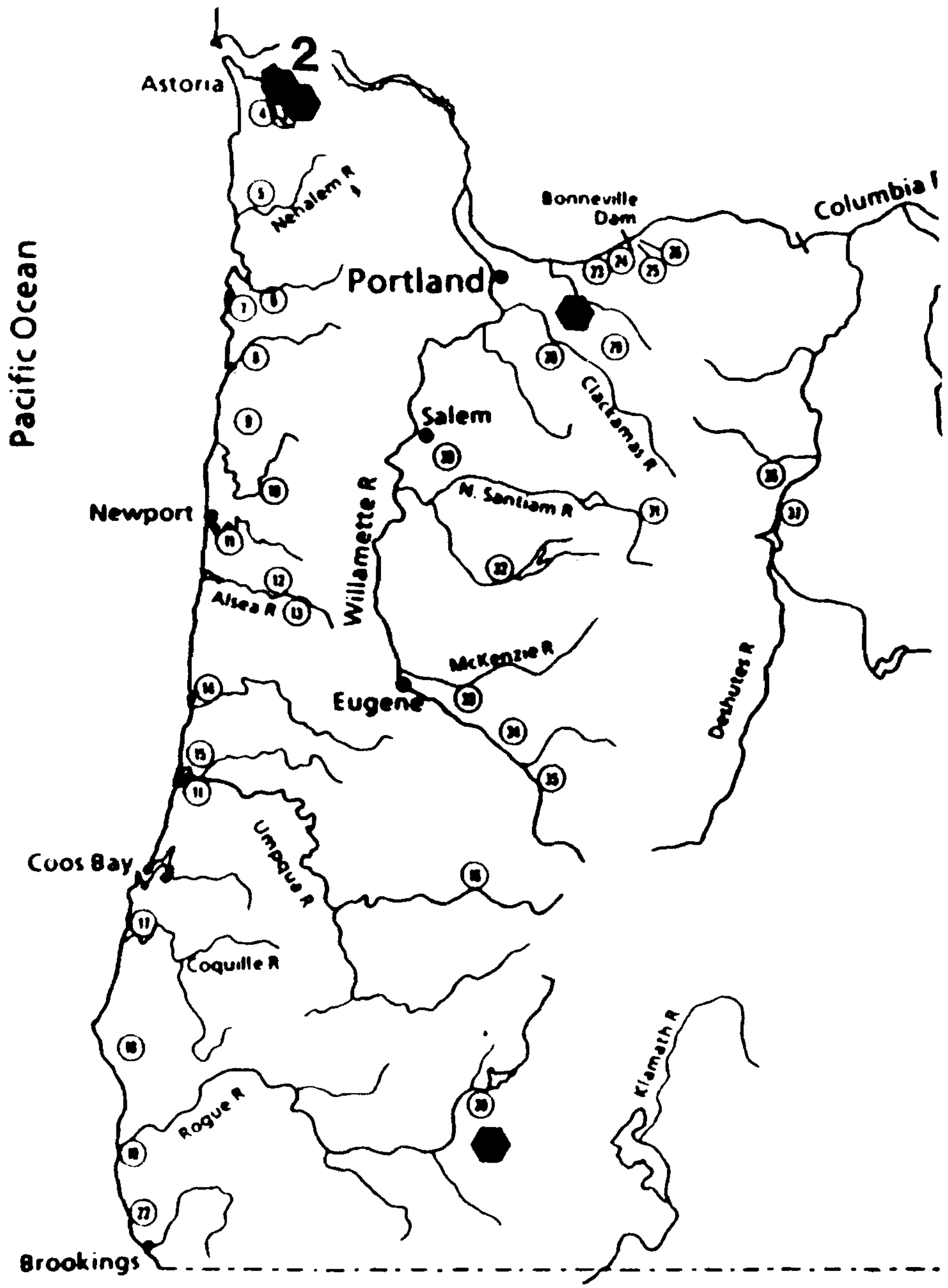

British Columbia
Vancouver Island
Nooksack R
Skagit R
Neah Bay
Stillaguamish R
La Push
Hoh R
Queets R
Quinault R
Green R
Pacific Ocean
Westport
Chehalis R
Cowlitz R
Ilwaco
Kalama R
Bonneville Dam
Columbia River
McNary Dam
Yakima R
Priest Rapids Dam
Snake River
Lower Granite Dam
Little Goose Dam
3
5
2
4
4
3
3
4
2
2

Fig. 13c. Release site locations of coho CWT's in Oregon, captured in 1987 to 1990 in our study area. The small numbered circles represent hatcheries; the black hexagons represent the release site of coho recaptured in our study area. A number beside the black hexagon indicates the number of coho from this release site that were recaptured. If there is no number, then there was only one fish recaptured.


Pacific Ocean
2
Astoria
Nehalem R
Bonneville Dam
Columbia R
Portland
Salem
Clackamas R
N. Santiam R
Willamette R
Newport
Alsea R
McKenzie R
Eugene
Deschutes R
Umpqua R
Coos Bay
Coquille R
Klamath R
Rogue R
Brookings