NOAA Technical Memorandum NMFS F/NWC-205

Spatial and Temporal Patterns in the Catch of Pacific Whiting in the U.S. Management Zone During 1978-88

by
Martin W. Dorn

July 1991

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

SPATIAL AND TEMPORAL PATTERNS IN THE CATCH OF PACIFIC WHITING IN THE U.S. MANAGEMENT ZONE DURING 1978-88

by

Martin W. Dorn

National Marine Fisheries Service
Alaska Fisheries Science Center
National Oceanic and Atmospheric Administration
7600 Sand Point Way NE., BIN Cl5700
Seattle, WA 98115-0070

July 1991

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

This report describes the patterns of catch variability of Pacific whiting (Merluccius productus) in the U.S. management zone for the years 1978-88. This information is presented in two forms. Tables in an appendix give the catch at age and the length at age of Pacific whiting for geographic and temporal strata for each year. Variance estimates based on the two-stage sampling design used by the Alaska Fisheries Science Center (AFSC) observer program are also given in the appendix. The main body of the report contains a graphical analysis of the catch-at-age data reported in the appendix. Shifts in the timing and the alongshore distribution of fishing activity are identified. Evidence is given to support previous conjectures about the migratory behavior of Pacific whiting. Additional features of the annual migration are identified, including 1) a delayed northward migration of juvenile whiting and 2) the stability of the migratory behavior of Pacific whiting above age 6. Evidence for sex-specific migration between U.S. and Canadian waters during the fishing season is evaluated. A comparison of the catch by region with the geographic distribution of the population shows that Pacific whiting off the Oregon coast experience much higher exploitation rates than do the Pacific whiting located elsewhere in the U.S. management zone

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS

INTRODUCTION

The idea of "unit stock" has proven to be an extremely powerful concept in fisheries biology. The unit stock is an idealized population that is homogeneous, is reproductively isolated, and is lacking in spatial structure. This concept has made possible the development of sophisticated techniques for estimating population abundance and for modeling the effect of fisheries on exploited populations. Yet the unit-stock concept is not without limitations. It completely disregards the spatial characteristics of both the exploited population and the fishery that impinges on that population. Furthermore, gradual changes in the population or the fishery over time are not easy to study using models based on the unit-stock concept. While simple theoretical models provide a necessary foundation, it can be dangerous to leave unexamined the discrepancy between these models and the observed spatial and temporal variability of the population and the fishery. A management recommendation based on an inappropriate model may not achieve its intended objective.

This report describes an investigation. into the patterns of catch variability of Pacific whiting (Merluccius productus) over the period 1978-88. During this period the fishery for Pacific whiting evolved from a fishery dominated by foreign vessels to a joint venture fishery employing U.S. fishing boats and processing vessels from the Soviet Union and Poland. The domestic catch of Pacific whiting increased over this same period, but it has remained small relative to the catch of the offshore fleet (less than 5% by weight) and was processed at land-based facilities. The domestic catch has not been intensively sampled and is not investigated in this report.

The fishery for Pacific whiting is managed by setting an annual quota. Because of the low demand for Pacific whiting the actual catch is often below the quota. The rules for allocating the quota between the different fleets give priority to the domestic fleet, then to the joint venture fleet, and lastly to the foreign fleet. There are several geographic and temporal restrictions on the foreign and joint venture fisheries. Foreign fishing vessels are required to fish between lat. 39°00'N, and lat. 47°30'N. and outside a 12 mile limit along the U.S. west coast. The foreign fishery is.

limited to the period from 1 June to 31 October. Gear is restricted to pelagic trawls with a 100 mm minimum mesh size. There is a ban on foreign processing south of lat. 39°OO'N, a restriction which has the effect of limiting the development of a joint venture fishery farther south.

This study utilizes the data base obtained by comprehensive observer coverage --as high as 95% (observer days relative to vessel days)--for this fishery in recent years (Berger and Weikart 1989). This sampling program has made available a wealth of information on catch composition on a finer scale than had been possible earlier. This research had several objectives: 1) to examine the spatial and temporal variability of the catch for evidence of annual changes in exploitation rates and geographic shifts in the fishery; 2) to use the catch statistics by region to study the annual migratory pattern of Pacific whiting; 3) to provide estimates of catch at age and length at age for strata defined by geographic region and time period for eventual use in modeling studies; and 4) to estimate the sampling error of catch at age and length at age.

METHODS

The spatial distribution of the Pacific whiting catch in the U.S. Exclusive Economic Zone was examined to identify geographic strata based on the actual distribution of the stock. Figure 1 shows the alongshore distribution of the Pacific whiting catch for 1981-88. Three persistent areas of high abundance were detected. Three spatial strata were defined on that basis: 1) the area south of lat. 43°00'N containing the Eureka and Monterey International North Pacific Fishery Commission (INPFC) regions (EUE), 2) the area from lat. 43°OO'N north to Cape Falcon (lat. 45°45'N) consisting of the southern part of the Columbia INPFC region (SCOL), and 3) the area north of Cape Falcon to the U.S.-Canada border including the northern part of the Columbia INPFC region and the U.S. portion of the Vancouver INPFC region (VNC)(Fig. 2). In addition, the fishing season was divided into three roughly

equal time periods: early (April-June), middle (July-August), and late (September-November).

The Alaska Fisheries Science Center's Observer Program uses a two-stage sampling design to sample the catch of Pacific whiting (French et al. 1981). The first stage consists of obtaining a large initial sample of fish and recording the length and sex. For the second stage of sampling, a subsample of fixed size is selected for each combination of length category and sex. Otoliths are collected from each of these individuals, and the age is determined for each fish. The numbers of aged and measured fish from 1978 to 1988 are given in Table 1.

Estimates of catch at age and variance estimates of catch at age by strata from 1978 to 1988 were compiled using the procedure developed by Kimura (1989). With this method, the yield for a given substratum is distributed by age by applying the length frequency information from that substratum to age-length and weight-length keys compiled for the stratum of which it is an element. For this analysis the spatial and temporal strata defined above were used, and the catch was assigned to substrata according to fishery type (i.e., foreign or joint venture). Thus, for each sex, nine area-time strata were possible for a year, and within each stratum, two substrata were possible: foreign or joint venture.

For. most years approximately 3,000 Pacific whiting otoliths were read. Compiling as many as nine age-length keys for each sex with an age sample of this size could result in keys with large gaps; that is, length categories without any corresponding aged fish. To prevent this from occurring, background age-length keys for each sex were calculated using all the aged fish for a year. These keys would assign ages to fish that fell into the gaps in the age-length keys used for each stratum.

Stratified length-at-age estimates were also compiled for each stratum. Equations for these procedures and a delta-method variance estimator for the sampling variance are described in Dorn (1990). Because the catch characteristics (age composition and mean length at age) for the foreign and

joint venture fleets were very similar within a stratum, the catch statistics from the foreign fishery and the joint venture fishery were always combined to obtain the catch statistics of a stratum, which formed the smallest unit in the analysis.

RESULTS AND DISCUSSION

Tables in the appendix give the estimated catch at age and length at age for the spatial and temporal strata described above. Annual summary tables are also given. The sampling error of catch at age (coefficient of variation) and length at age (standard deviation) are included in the tables. Data in this form have a factorial structure, such that each catch-at-age datum is described by a unique combination of the factors of age, sex, time period in the season, geographic region, and year. In the remaining sections, the catch-at-age data are summarized using the simple method of averaging across some factor levels, and then graphing the catch totals or proportions by the remaining factor levels.

Annual Changes in Catch Rates

The total annual catch from the U.S. fishery fluctuated around 150 million fish from 1978 to 1985 (Fig. 3). This pattern was broken in 1986 when the catch in numbers jumped to about 300 million fish. The total catch has continued at that level through 1988. The smallest catch occurred in 1980 and was due primarily to a ban on directed fishing imposed by the United States on the Soviet Union. The relative amount of the catch occurring in the early, middle, and late seasons has remained relatively constant to 1988. The largest fraction of the catch occurred in the middle part of the season (July-August), followed by the early period (April-June). The smallest share of the catch took place during the late period (September-November). Late fisheries occurred in 1980 and in 1985, while in 1983 the fishery was early.

The mean catch at age roughly follows the classic shape of a catch curve (Fig. 4). Age-4 fish are the most abundant in the catch. The ascending limb of the curve consists of ages 1 to 3. These are age groups that are

incompletely recruited to the fishery. From age 5 onwards the abundance of succeeding age groups generally declines. The irregularities in the curve can be accounted for by noting that the abundant and heavily exploited 1984 year class is represented at age 4 in 1988 catch, but not at age 5. The fraction of the catch at age occurring during the early, middle, and late periods is approximately the same from age 3 onwards (Fig. 4). Age 1 and age 2 Pacific whiting are not found in the catch during the early period, suggesting that the juvenile age groups migrate northward into the fishing area more slowly than the adults. Another possible explanation for this pattern is that the rapid spring and summer growth of the age 1 and 2 fish increases their selectivity to the mid-water trawl gear used by the fishery.

When the catch at age for each year is examined, the dominance of large 1977, 1980, and 1984 year classes in the catch is remarkable (Fig. 5). Prior to the entry into the fishery of the 1977 year class in 1981, the age structure in the catch was much more balanced, with three or more year classes making large contributions to the total catch. After 1982, the catch was completely dominated by one or two large year classes.

Geographic Shifts in the Fishery

A significant geographic change in the fishery occurred in 1982 when the fishery shifted north (Fig. 6). Before 1982, the fishery took place mostly in the EUR and SCOL regions. From 1982 onwards, the largest fraction of the catch still came from the SCOL region, but most of the remaining catch came from the VNC region. Part of the explanation for this change may be the strengthening of the joint venture fishery, which, unlike the foreign directed fishery, was permitted to fish in the Vancouver INPFC region.

The mean annual catch by geographic region and time in the season is given in Figure 7. The largest fraction of the catch occurs in the SCOL region during all three time periods. In the early part of the season, the catch is divided evenly, for the most part, between the three regions. As the season progresses, there is a tendency for the catch to concentrate in the central SCOL region and to drop off both to the north and south. During the

late period, September-October, very few Pacific whiting are taken in the EUR region.

Sex Ratio Changes

The sex ratio in the catch of a geographic or temporal stratum can be estimated without being biased by the amount of fishing activity that took place in that stratum--provided some fishing activity took place. Patterns of variability in the sex ratio can provide evidence of sex-specific differences in migratory behavior or natural mortality. However, when interpreting changes in the sex ratio it is necessary to keep in mind that the fishery not only samples the population, but can be the major source of mortality on the population. For example, if initially there were equal numbers of males and females in the population, a fishery that selectively removed more females than males would tend to decrease the fraction of females remaining in the population, and could eventually result in fishery samples containing less than 50% females.

Figure 8 shows the age-specific sex ratio, expressed as the fraction of females, by geographic region. For the youngest Pacific whiting the sex ratio is slightly above a 1:l ratio.' Between the ages 4 and 9, the fraction of females dips below 50%, reaching a minimum at age 7. Lastly, there is a steady increase in the fraction of females to approximately 70% by age 15. An additional pattern that emerges is that the fraction of females in the catch increases from south to north. For most age groups, the fraction of females is lowest in the EUR region and highest in the VNC region.

One explanation for this pattern involves size-selective recruitment, different migratory behavior between the sexes, and sex-specific mortality rates for the older age groups. The females of an age group are found further north and are of a larger average size than the males. Consequently, for the age-2 and age-3 fish that are-not yet fully recruited by the fishery, a larger fraction of females than males will be caught. However, as the females begin migrating into the Canadian management 'zone, their abundance relative to the males of the same. age declines in the U.S. zone. After age 9, as the fraction

of females begins to increase again, some new process must begin to affect the sex ratio in the catch. One interpretation of this pattern is that the natural mortality rate of the males is higher than the females. Other interpretations are possible. For example, the males may adopt benthic habits, making them less vulnerable to the mid;-water fishery.

For most years, the fraction of females in the catch declined as the season progressed (Fig. 9). There are no obvious trends by year in-the sex ratio. The fraction of females was highest in 1982 and 1983, and it was lowest in 1985. The information on the geographic and temporal variation in the sex ratio is summarized in Figure 10. During the early period, the fraction of females was approximately 50% for both the SCOL and the VNC regions. During the middle period, it dropped to 47% in the SCOL region, but stayed near 50% in the VNC region. By the late period, the fraction of females in the SCOL region dropped to 45%, the same level that occurred throughout the season in the EUR region. In the VNC region the fraction of females remained constant at 50%. A gradual reduction in the availability of the females or a migration out of the SCOL region could account for this pattern. An alternative explanation is that there is an influx of males. Beamish and MacFarlane (1985) observe that the Canadian catch of Pacific whiting ranges between 60 and 82% females and increases June onwards. This is consistent with the changes in the sex ratio in the U.S. zone, but does not resolve the question of whether the males are migrating south or the females north during the fishing season.

Age-Specific Migration Patterns

Study of the regional characteristics of the catch tended to support earlier conjectures about the annual migratory pattern of Pacific whiting (Alverson and Larkins 1969; Bailey et al. 1982). The hypothesis that Pacific whiting migrate farther north as they become older is confirmed by the data presented in Figure 11, which shows the proportion of the catch by geographic region for each age group. Virtually none of age-l Pacific whiting are caught north of the Columbia River in the VNC region. By age 4, approximately 25% of

the total catch comes from the VNC region. The fraction of the total catch in the VNC region increases gradually with age to approximately 35% at age 15.

Because the catch at age in a region depends on the amount of fishing that took place there, it is incorrect to interpret these catch proportions as estimates of the geographic distribution of the population. They can, however, tell us which age groups have similar migratory behavior. For the older age groups (age 6 and above) the fraction of the catch that occurs in each region is relatively constant. This indicates that the migration pattern tends to stabilize with increasing age.

A more direct way to examine how the annual migratory pattern changes with age is to look at the mean distribution of population as measured by the triennial groundfish surveys conducted in 1977, 1980, 1983 and 1986 (Dark et al. 1980; Weinberg et al. 1984; Nelson and Dark 1985; Coleman 1986 and 1988; and Neal Williamson, Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA, BIN C15700, 7600 Sand Point Way NE., Seattle, WA 98115. Pers. commun., May 1989) (Fig. 12). A similar pattern is discernible. Age-2 fish are most abundant in the Monterey INPFC region, and the center of abundance of fish from age 3 to age 5 progressively shifts further north. The older age groups remain moderately abundant in the south, suggesting that they have a wider geographic range than the younger age groups. As is seen in the data from the fishery, the annual migratory pattern of fish age 6 and above tends to be very similar, although the percent of the population in Canadian waters continues to increase up to age 12. Because age-6 fish are nearing their asymptotic size, these results support the hypothesis that the migratory pattern of Pacific whiting is primarily related to the size of the individual and only secondarily related to age. Additional support for this hypothesis is the observation by Francis (1983) that, even within an age group, the larger individuals are found further north.

It is possible to refine our ideas about the migratory behavior of Pacific whiting by introducing the concept of an annual migratory distance, This would be defined as the distance between the spawning grounds and the

northward limit of the annual migration of a particular fish. Table 2 contains rough approximations of the age-specific mean migration distance during the triennial survey years. These approximations were obtained by assuming that spawning takes place at lat. 33°00'N, and that the distance migrated by members of an age group in a geographic region can be measured by the degrees of latitude between the spawning grounds and the latitudinal midpoint of that geographic region. The following characteristics- of the annual migration pattern can be abstracted from the information in Table 2 and the preceding analyses:

1. The mean migration distance of an age group increases with age.

2. The difference in mean migration distance between the consecutive age groups declines with age. For example, the mean distance migrated by the age 15-fish is about the same as for age-14 fish.

3. The older age groups have a wider distribution than the younger- age groups. In other words, the variance of the migratory distance increases with age.

Comparison of Fishery Catch with Survey Results

The fishing mortality on the Pacific whiting population within a region or on an annual basis can be calculated by assuming that the triennial groundfish surveys (trawl and acoustic surveys combined) estimate mean population abundance. The fishing mortality rate can then be estimated using the relation $F_i = C_i / N_i$, where F_i is the age-specific fishing mortality rate, C_i is the catch at age, and N_i is the mean population abundance at age. The mean age-specific fishing mortality for each region is given in Figure 13. The Pacific whiting population in the SCOL region experiences much higher exploitation rates than do the Pacific whiting located elsewhere in the U.S. management zone. This conclusion is dependent on assuming that there is little migration taking place during the fishing season. The fishing

mortality rate on the age-2 and age-3 fish is low in all regions. In the SCOL and the VNC regions the fishing mortality rate from age 4 to age 15 shows fluctuations from one age group to the next, but it exhibits no trends. In the EUR region, the fishing mortality rate increases gradually from age 3 to age 6, then remains relatively stable to age 14. The extremely high fishing mortality on the age-15 fish in the EUR region is probably due to sampling error.

The size of the catch relative to the population at each age should provide information about whether the fishery actively targets on strong year classes. A comparison of age-structured population size during the survey years and fishing mortality on each age group showed no evidence that the fishery targets on dominant year classes (Fig. 14). In fact, exactly the opposite seems to be the case. In 1983 and in 1986, when there were strong year classes-at age 3 and age 2, respectively, the apparent fishing mortality rate was lower on these strong year classes than it was on the older year classes that were much weaker. This indicates that the relative abundance of fish at different ages does not strongly influence fishing strategy, and could suggest that the catch of a vessel is constrained by its processing capacity, and not by its ability to find and capture fish. This situation could change if the exploitation rate increased significantly over the levels observed during 1978-88.

ACKNOWLEDGMENTS

I thank Anne Hollowed, Mark Wilkins, and Rick Methot for their comments on a preliminary version of this paper.

CITATIONS

Alverson, D. L., and H. A. Larkins. 1969. Status of knowledge of the Pacific hake resource. Calif. Coop. Oceanic Fish. Invest. Rep. 13:24-31.

Bailey, K. M., R. C. Francis, and P. Stevens. 1982. The life history and fishery of Pacific hake, Merluccius productus. Calif. Coop. Oceanic Fish. Invest. Rep. 23:81-92.

Beamish, R. J., and G. A. MacFarlane. 1985. Pacific Whiting, Merluccius productus, stocks off the west coast of Vancouver Island, Canada. U.S. Natl. Mar. Fish. Serv., Mar. Fish. Rev. 47(2):75-81.

Berger, J., and H. Weikart. 1989. Summary of U.S. observer sampling of foreign and joint venture fisheries in the northeast Pacific Ocean and eastern Bering Sea, 1988. NOAA Tech. Memo. NMFS F/NWC-172, 118 p.

Coleman, B. A. 1986. The 1980 Pacific west coast bottom trawl survey of groundfish resources: Estimates of distribution, abundance, length and age composition. U.S. Dep. Commer., NOAA Tech. Memo. NMFS F/NWC-100, 181 p.

Coleman, B. A. 1988. The 1986 Pacific west coast bottom trawl survey of groundfish resources: Estimates of distribution, abundance, length and age composition. U.S. Dep. Commer., NOAA Tech. Memo. NMFS F/NWC-152, 145 p.

Dark, T. A,, M. 0. Nelson, J. J. Traynor, and E. P. Nunnalee. 1980. The distribution, abundance, and biological characteristics of Pacific hake, Merluccius productus, in the California-British Columbia region during July-September, 1977. U.S. Natl. Mar. Fish. Serv., Mar. Fish. Rev. 42(3-4):17-33.

Dorn, M. W. 1990. Detecting environmental covariates of Pacific hake growth using a growth increment regression model. Unpubl. manuscr., 36 p. Alaska Fish. Sci. Cent., Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way NE, BIN C15700, Seattle, WA 98115.

Francis, R. C. 1983. Population and trophic dynamics of Pacific hake (Merluccius oroductus). Can. J. Fish. Aquat. Sci. 40:1925-1943.

French, R., R. Nelson, Jr., and J. Wall. 1981. Results of U.S. observer sampling on Japanese, U.S.S.R., Korean, and Polish fishing vessels, 1979. Int. North Pac. Fish. Comm., Annu. Rep. 1980:96-122.

Kimura, D. K. 1989. Variability in estimating catch-in-numbers-at-age and its impact on cohort analysis. p. 57-66. In R. J. Beamish and G. A. McFarlane (editors), Effects of ocean variability on recruitment and an evaluation of parameters used in stock assessment models. Can. Spec. Publ. Fish. Aquat. Sci. 108.

Nelson, M. O., and T. A. Dark. 1985. Results of the coastal Pacific whiting, Merluccius oroductus, surveys in 1977 and 1980. U.S. Natl. Mar. Fish. Serv. Mar. Fish. Rev. 47(2):82-94.

Weinberg, K. L., M. E. Wilkins, and T. A. Dark. 1984. The 1983 Pacific west coast bottom trawl survey of groundfish resources: estimates of distribution, abundance, age and length composition. U.S. Dep. Commer., NOAA Tech. Memo. NMFS F/NWC-70, 376 p.

Table l.- -Number of Pacific whiting from fishery samples aged and measured by NMFS personnel during the years 1978-88.

	Early period		Middle period		Late Period		Annual total	
Year	Aged	Measured	Aged	Measured	Aged	Measured	Aged	Measured
1978	2,060	31,819	2,801	66,153	978	26,799	5,839	124,771
1979	1,072	37,678	1,552	83,584	500	52,094	3,124	173,356
1980	844	15,674	2,927	43,038	1,565	43,536	5,336	102,248
1981	1,287	26,961	1,928	55,174	1,053	53,605	4,268	135,740
1982	1,913	77,529	1,463	66,683	882	27,604	4,258	171,816
1983	1,480	82,186	1,277	70,499	475	14,173	3,232	166,858
1984	1,344	70,888	1,304	108,272	662	64,524	3,310	243,684
1985	200	23,329	1,690	142,592	550	101,089	2,440	267,010
1986	1,203	125,542	1,393	238,779	474	109,786	3,070	474,107
1987	1,021	102,191	1,414	188,361	740	140,902	3,175	431,454
1988	1,192	125,714	1,349	194,246	502	100,184	3,043	420,144
Total	13,616	719,511	19,098	1,257,381	8,381	734,296	41,095	2,711,188

Table 2.- -Mean migration distance (MD) (km) and the standard deviation of migration distance (SD(MD)), as estimated from information on the geographic distribution of Pacific whiting collected during the triennial surveys in 1977, 1980, 1983, and 1986. Sources: Dark et al. 1980; Weinberg et al. 1984; Nelson and Dark 1985; Coleman 1986 and 1988; and Neal Williamson, Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA, BIN C15700, 7600 Sand Point Way NE., Seattle, WA 98115. Pers. commun., May 1989.

	1977		1980		1983		1986	
Age	MD	SD(MD)	MD	SD(m)	MD	SD(m)	MD	SD(m)
2	857	215	593	148	991	261	712	299
3	881	257	633	174	1213	295	789	347
4	1006	281	762	240	1399	317	1058	448
5	1070	304	1017	454	1544	264	946	426
6	1198	351	998	453	1572	288	1276	418
7	1257	339	1308	406	1499	360	1352	397
8	1375	335	1164	440	1528	341	1132	448
9	1436	316	1387	389	1475	385	1262	437
10	1410	345	1448	349	1504	368	1163	448
11	1401	363	1494	339	1486	381	1173	452
12	1444	355	1465	368	1523	326	943	482
13	1492	348	1499	303	1510	331	1261	449
14	1559	223	1292	459	1563	279	1363	278
15	1446	286	1424	405	1226	430	770	388

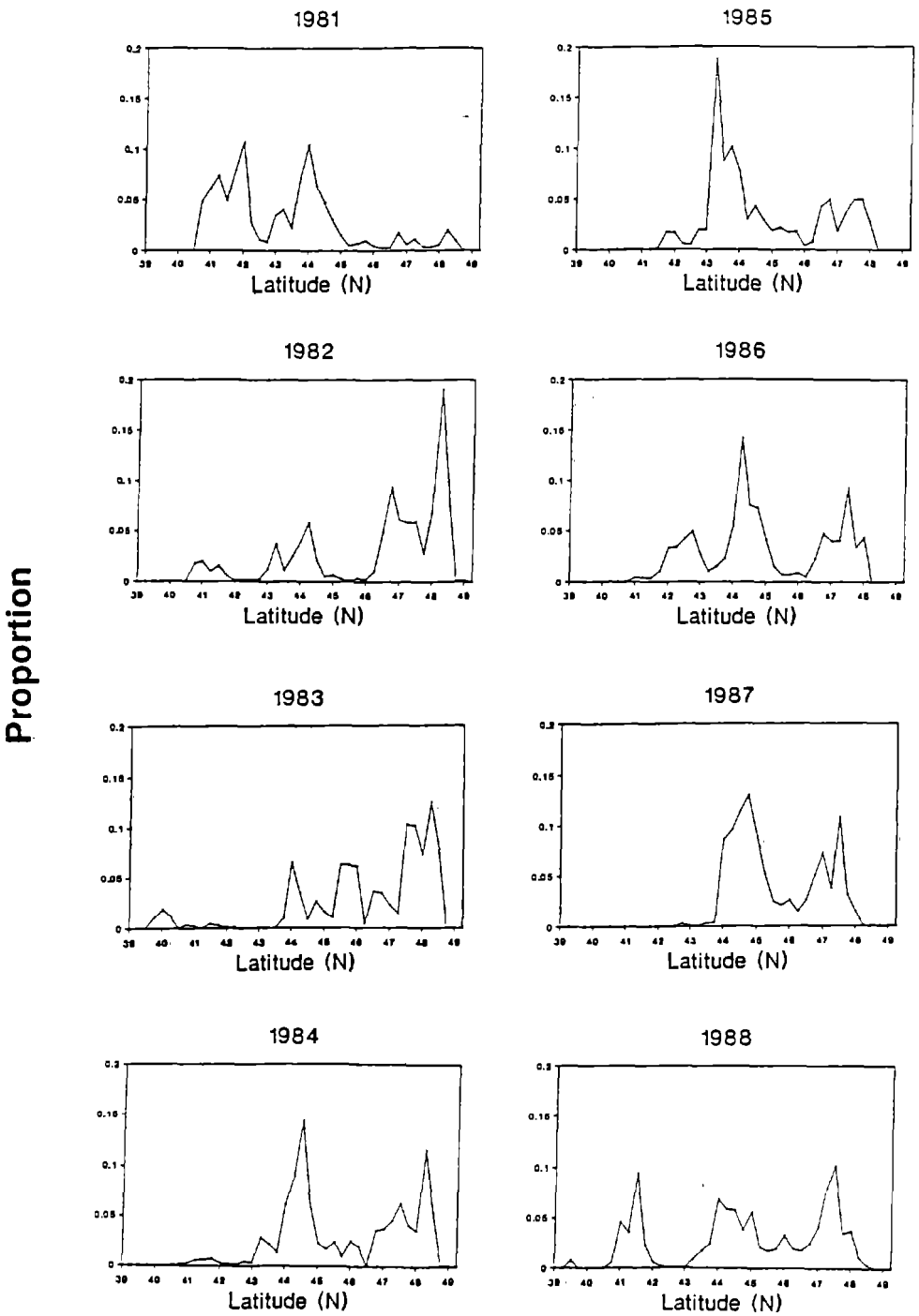


Figure 1. --The alongshore distribution of the Pacific whiting catch in the U.S. management zone, 1981-88. The persistence of three areas of high fishing productivity is evident in the plots. Source: Jerald Berger, U.S. Foreign Fishery Observer Program, Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA, BIN C15700, 7600 Sand Point Way NE., Seattle, WA 98115, Pers. commun., February 1989.

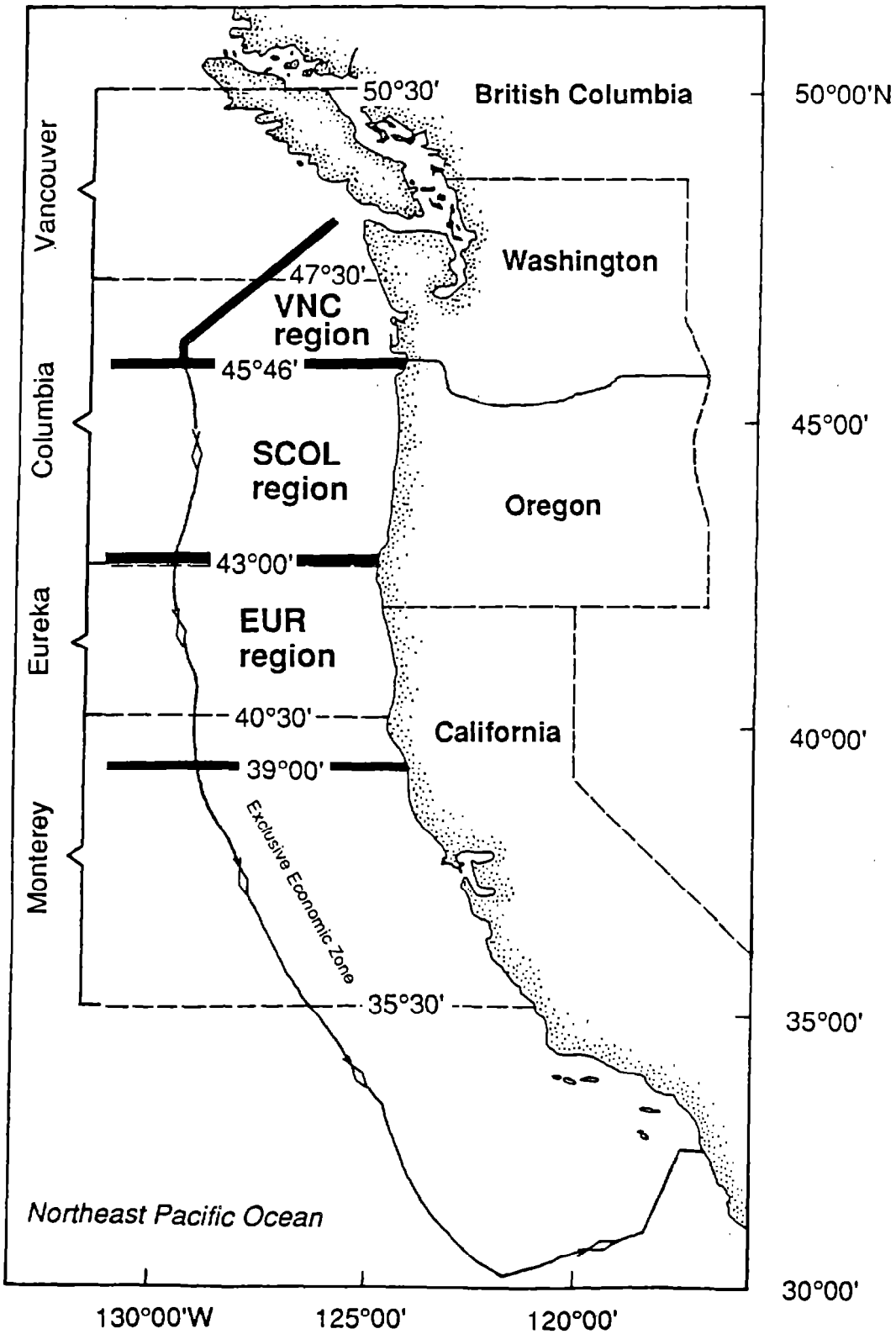


Figure 2.--Geographic regions along the northwest coast of the United States defined as strata to estimate catch at age and length at age.

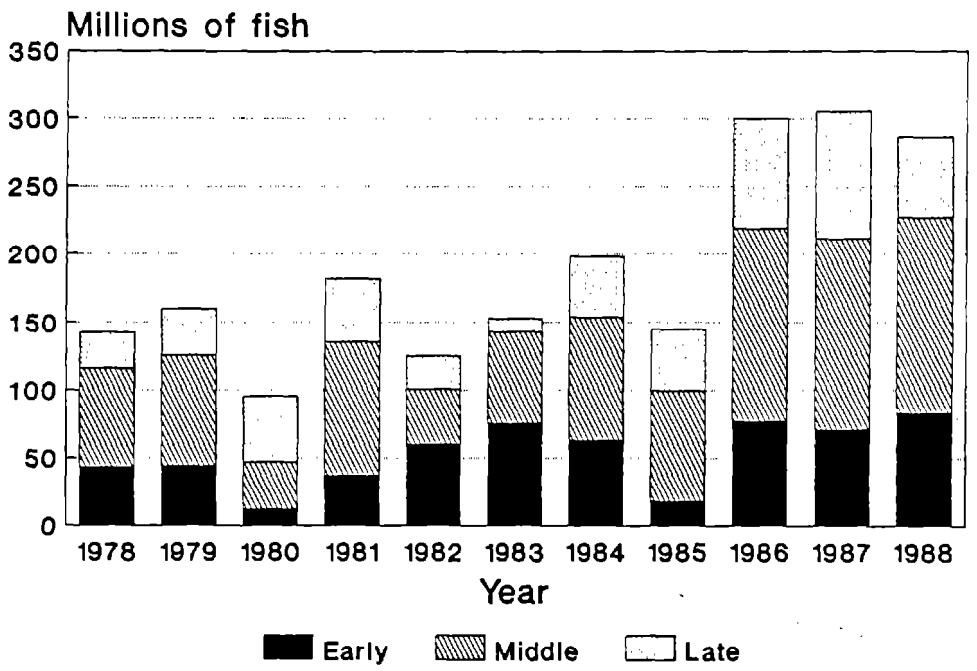


Figure 3. --Annual Pacific whiting catch in millions of fish by time period during the fishing season by foreign and joint venture vessels in the U.S. management zone. Early (April-June), middle (July-August), late (September-October),

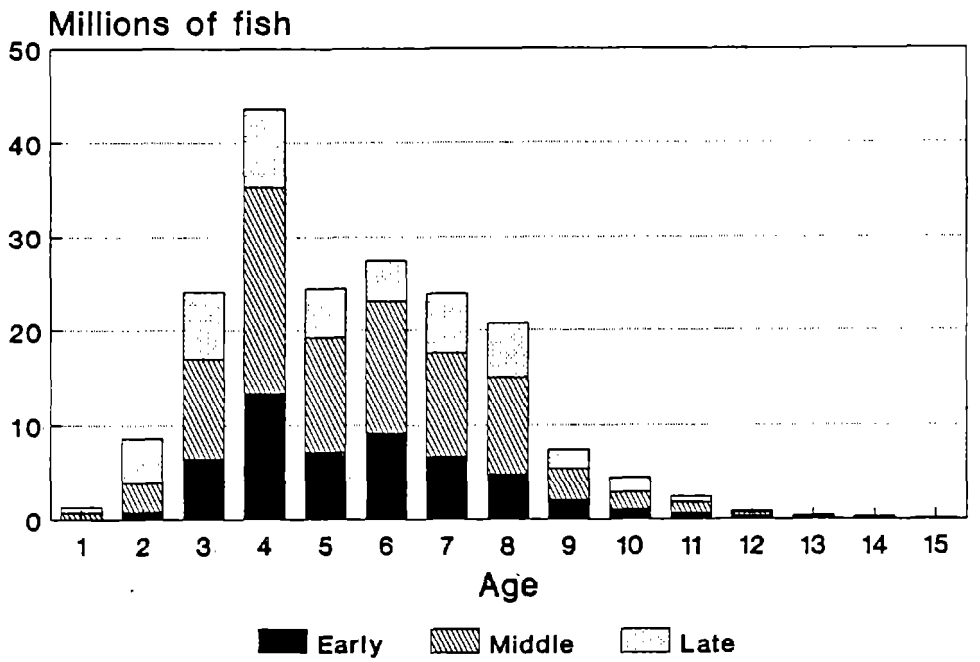


Figure 4. --Mean 1978-88 catch at age of Pacific whiting by time period in millions of fish. Early (April-June), middle (July-August), late (September-October).

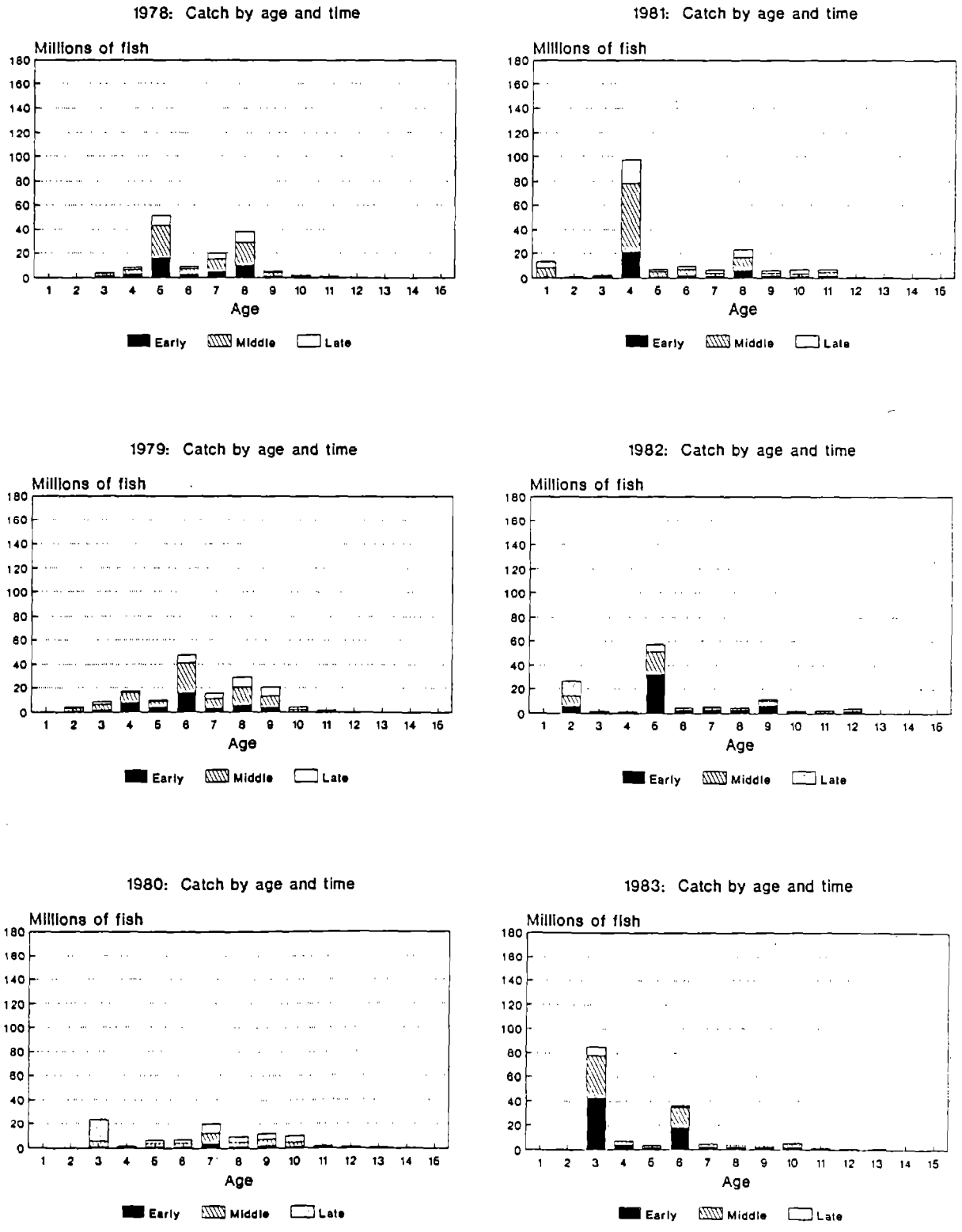
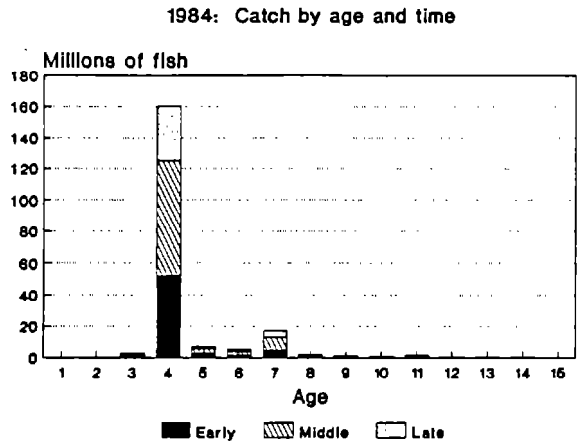
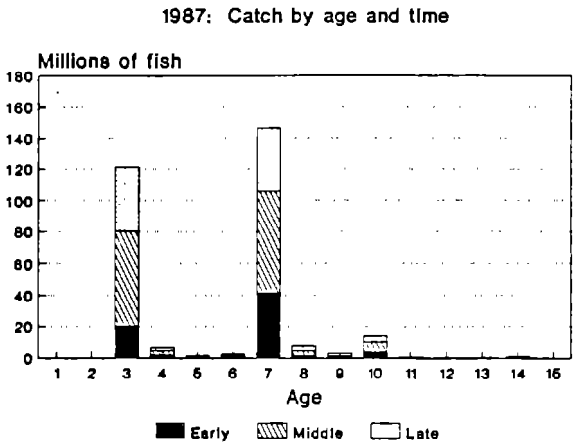
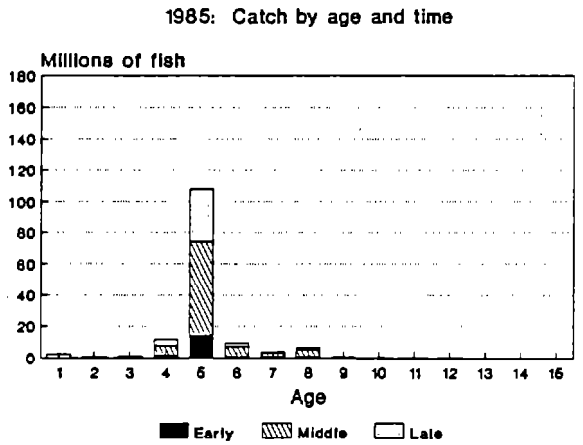
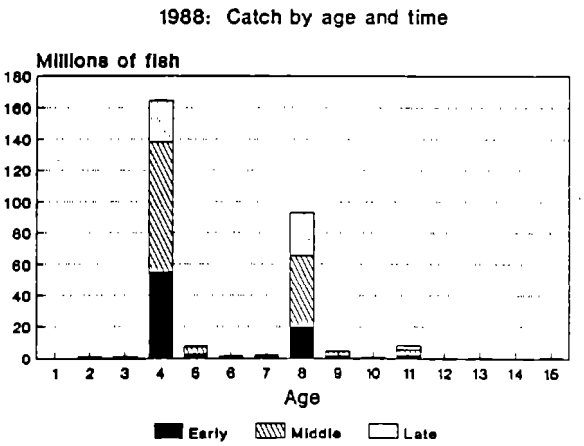


Figure 5. --Catch at age, 1978-88, by time period. Early (April-June), middle (July-August), late (September-October).









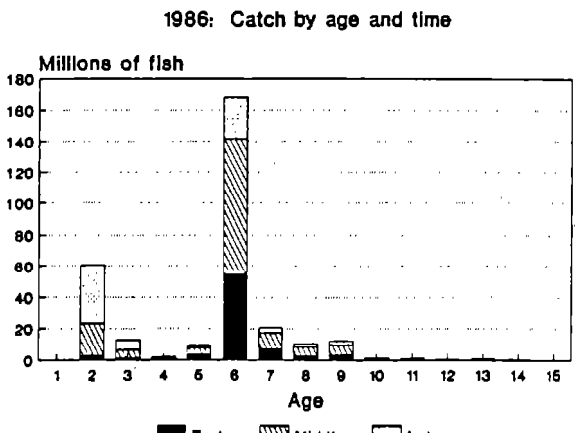


Figure 5. --Continued,

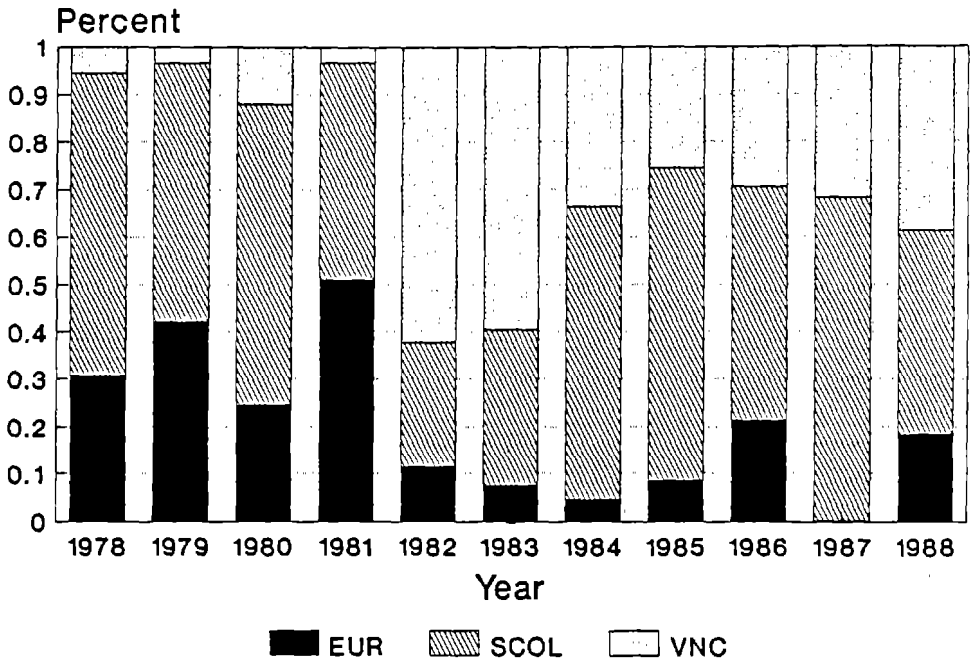


Figure 6. --Annual catch proportion in numbers occurring in each of three geographic regions. See Figure 2 for a chart showing where the regions EUR, SCOL, and VNC are located.

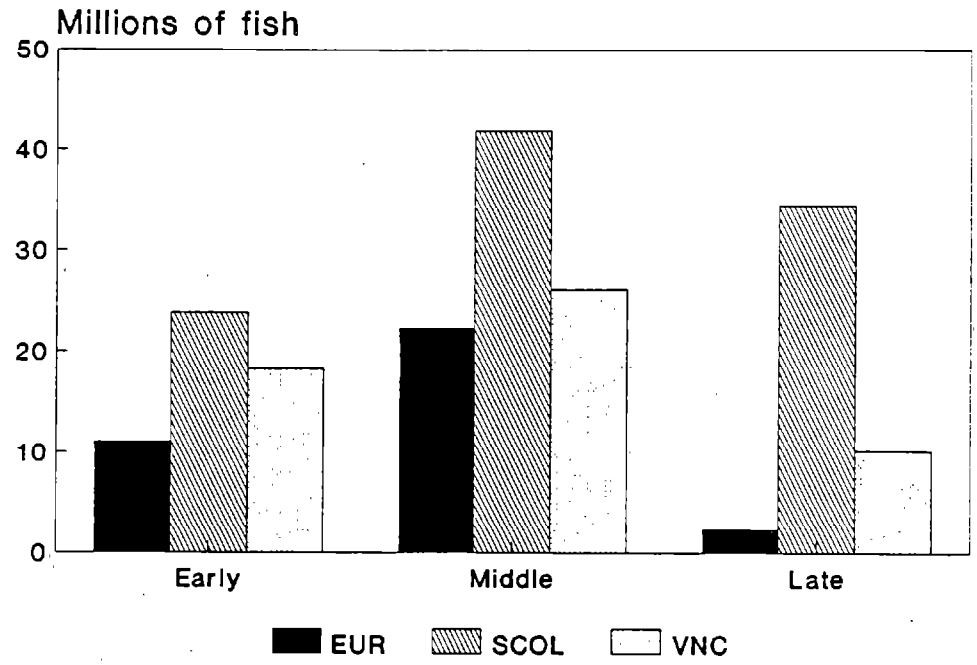


Figure 7. --Mean annual catch (1978-88) by geographic region and time in the season. See Figure 2 for a chart showing where the regions EUR. SCOL, and VNC are located. Early (April-June), middle (July-August), late (September-October).

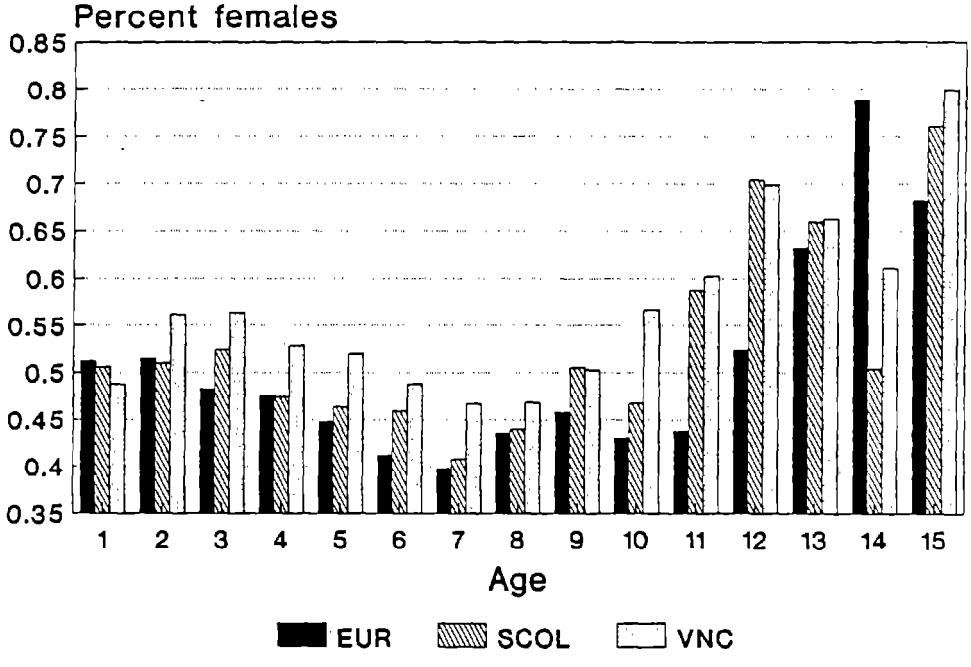


Figure 8. --Age-specific fraction of females in the catch of Pacific whiting (1978-88) by geographic region. The scatter in the sex ratio above age 12 is probably caused by the very small sample sizes for those age groups. See Figure 2 for a chart showing where the regions EUR, SCOL, and VNC are located.

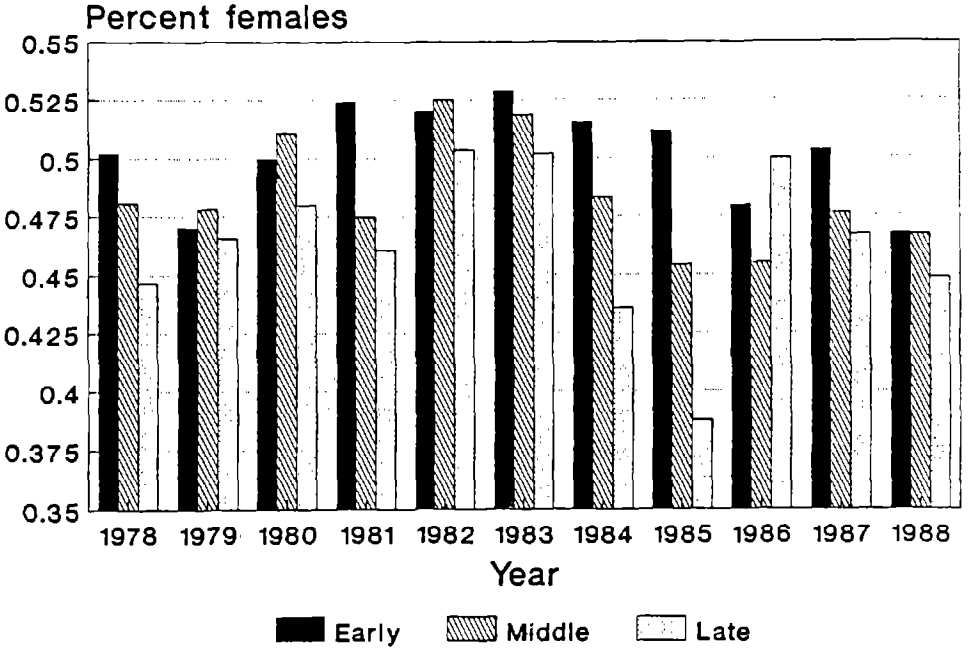


Figure 9.-- Fraction of females in the catch of Pacific whiting by time in the season for the years 1978-88. Early (April-June), middle (July-August), late (September-Octdber).

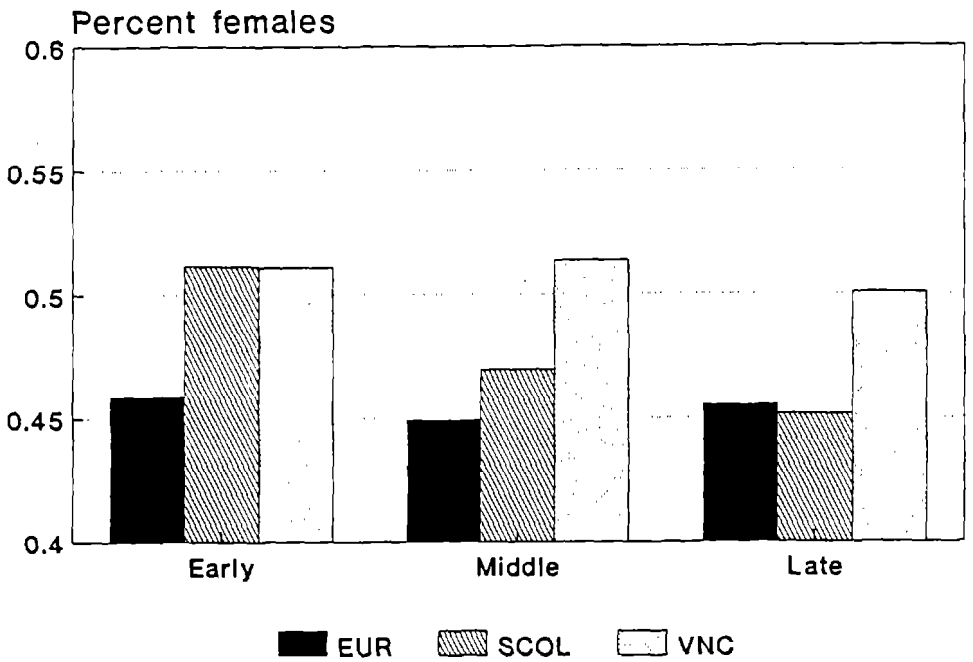


Figure 10. --Fraction of females in the catch by geographic region and time in the season averaged over 1978-88. See Figure 2 for a chart showing where the regions EUR, SCOL, and VNC are located. Early (April-June), middle (July-August), late (September-October).

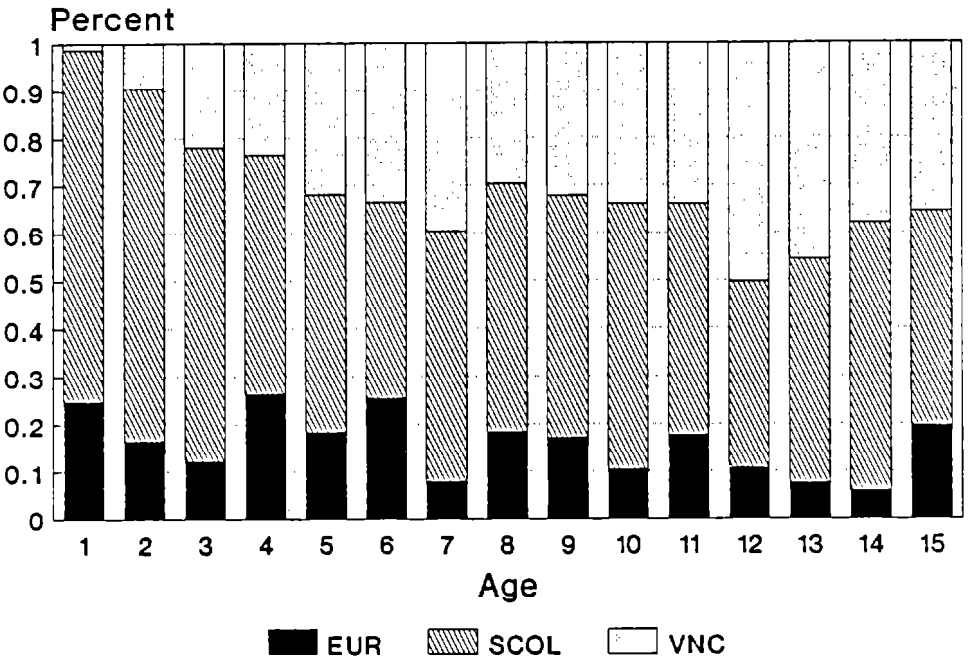


Figure 11. --Mean fraction of the catch at age of Pacific whiting (1978-88) in each geographic region for fish age 1 to age 15. See Figure 2 for a chart showing where the regions EUR, SCOL, and VNC are located.

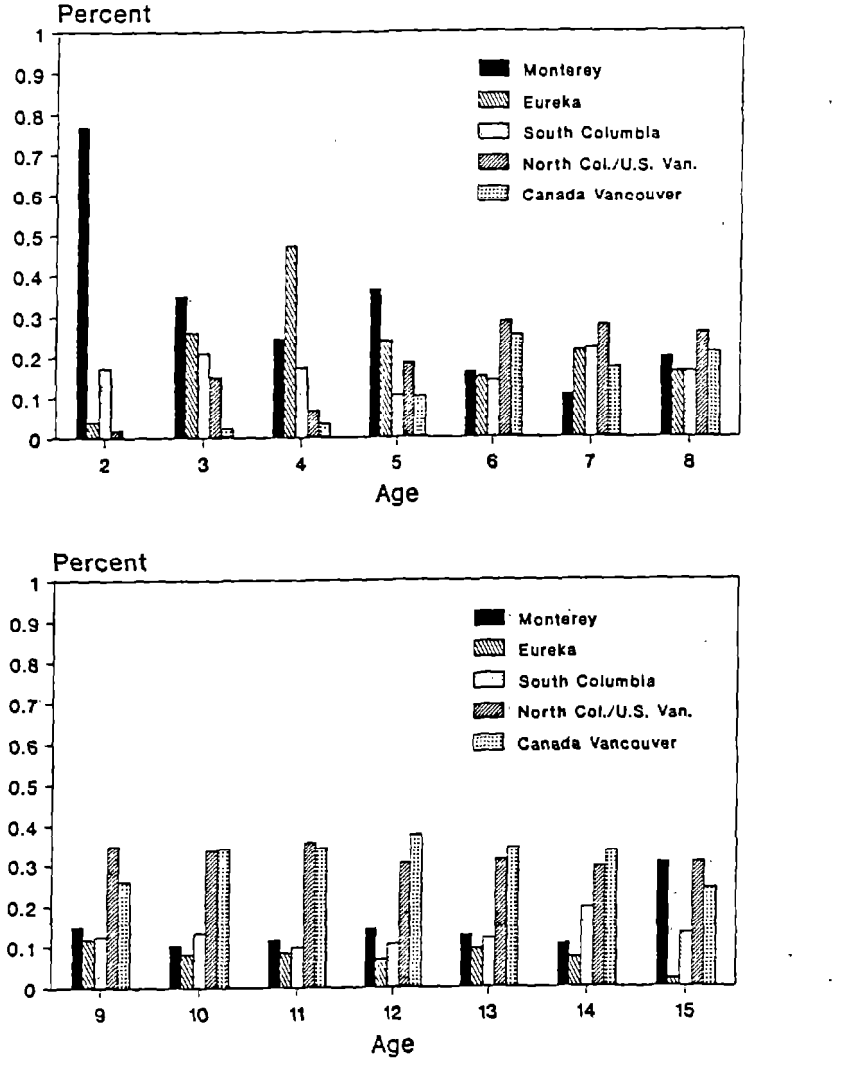


Figure 12. --Mean fraction of the population in each geographic zone for Pacific whiting from age 2 to age 15. Estimates were obtained by averaging triennial AFSC survey results in 1977, 1980, 1983, and 1986. The top panel gives ages 2-8 and the bottom panel gives ages 9-15. Following the usual procedure, results from the trawl and acoustic surveys were added together to estimate the total number by region. Sources: Dark et al. 1980; Weinberg et al. 1984; Nelson and Dark 1985; Coleman 1986 and 1988; and Neal Williamson, Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA, BIN C15700, 7600 Sand Point Way NE., Seattle, WA 98115. Pers. commun., May 1989. INPFC regions are used, except that the northern part of Columbia region (north of Cape Falcon at lat. 46°45'N) was split off and combined with the U.S. part of the Vancouver INPFC region (VNC). Abundance in the Canadian zone (up to about lat. 50°OO'N) is also included.

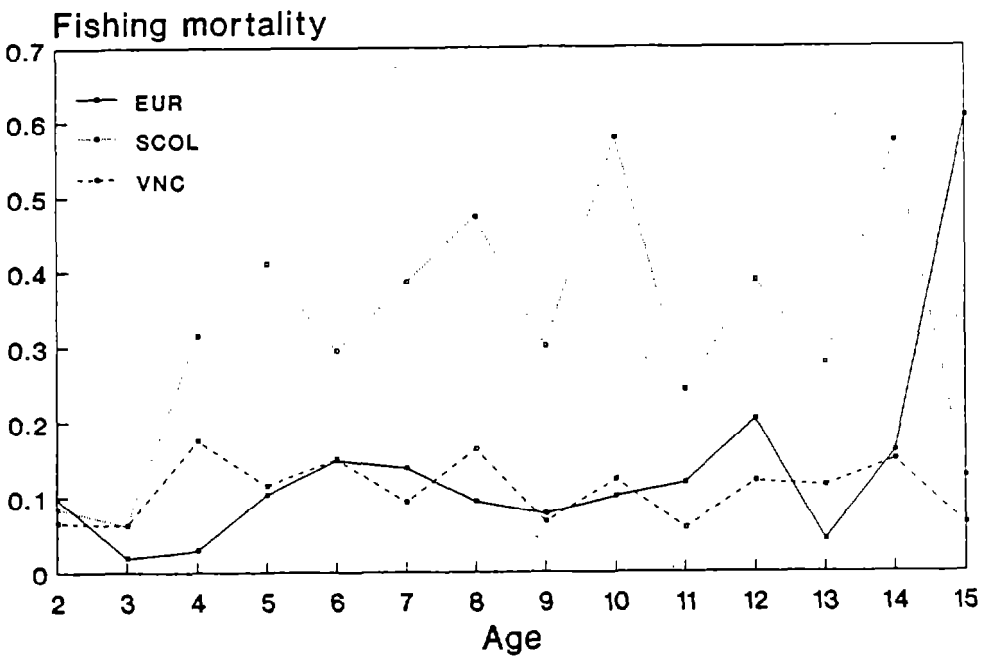
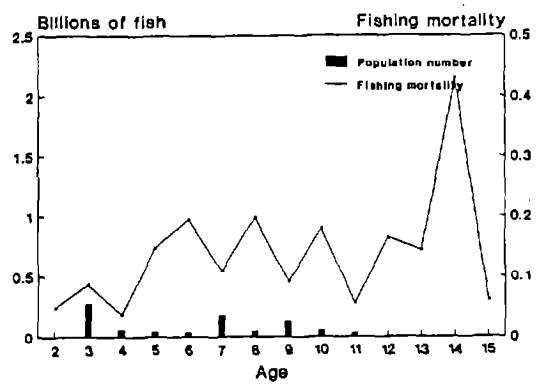
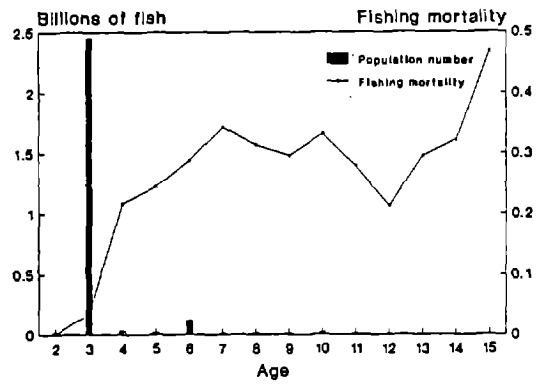


Figure 13. --Age-specific fishing mortality rate of Pacific whiting by geographic region (average of the triennial survey years 1980, 1983, and 1986). See Figure 2 for a chart showing where the regions EUR, SCOL, and VNC are located.



1983



1986

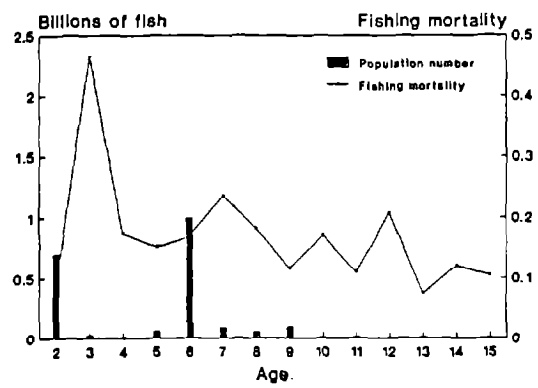


Figure 14. --The relationship between population abundance and fishing mortality for Pacific whiting from age 2 to age 15. Separate panels show the comparison for the triennial survey years 1980, 1983, and 1986.

APPENDIX

This section consists of tables of Pacific whiting catch-at-age and length-at-age data for geographic and temporal strata for the years 1978-88. Appendix Tables lA-11C contain the strata estimates of catch at age in millions of fish by sex, the coefficient of variation of catch at age (CV), length at age by sex in centimeters, and the standard deviation of length at age (SD). Annual summary statistics are presented in Appendix Table 12. In some cases, a length or a catch for a particular age is reported, but no variance estimate is given. This occurs when the estimate is based on a single fish. Cells with an estimated catch of zero contain dashes, but entries with 0.000 have an estimated catch of fewer than a thousand fish.

Appendix Table 1A. --Catch statistics in the Eureka region (EUR) in 1978.

	Age	No. of males	CV	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.002	1.428	0.001	4.733	36.65	0.542	37.00	---
	3	0.929	0.147	0.789	0.134	42.35	0.278	42.57	0.199
	4	1.154	0.161	0.969	0.150	43.85	0.252	43.96	0.269
	5	5.328	0.067	5.107	0.053	45.48	0.127	46.23	0.114
	6	1.115	0.190	1.106	0.163	45.93	0.362	46.86	0.335
	7	1.944	0.130	0.730	0.202	48.31	0.236	48.88	0.369
	8	2.234	0.115	1.882	0.100	48.80	0.222	49.92	0.210
	9	0.277	0.226	0.166	0.309	51.53	0.324	52.32	0.832
	10	0.177	0.395	0.087	0.269	50.55	0.884	54.57	0.659
	11	0.039	0.535	0.066	0.340	52.42	0.736	54.05	0.538
	12	0.006	0.920	0.017	0.541	54.29	0.996	56.78	1.256
	13	0.000	7.047	0.007	0.866	58.00	---	56.05	2.557
	14	---	---	0.000	4.311	---	---	60.00	---
	15	---	---	---	---	---	---	---	---
Middle period	1	0.001	1.000	0.001	1.414	23.00	---	22.00	---
	2	0.000	1.766	0.000	2.887	36.53	0.701	37.00	---
	3	0.659	0.197	0.497	0.228	41.80	0.280	42.48	0.410
	4	1.051	0.262	0.872	0.219	43.67	0.543	44.24	0.293
	5	4.269	0.122	3.859	0.100	45.87	0.232	45.89	0.218
	6	1.008	0.297	0.537	0.389	45.77	0.552	47.45	0.534
	7	1.627	0.240	0.436	0.433	47.28	0.456	48.39	0.702
	8	1.612	0.209	2.365	0.140	49.11	0.300	49.34	0.223
	9	0.502	0.433	0.157	0.428	49.20	0.728	51.96	1.036
	10	0.035	0.753	0.104	0.520	52.34	2.580	52.51	1.410
	11	0.003	1.204	0.053	0.271	55.41	3.789	55.43	0.569
	12	0.029	0.528	0.020	0.414	53.22	0.708	55.80	1.164
	13	0.000	6.887	0.049	0.604	58.00	---	52.53	0.939
	14	0.000	5.507	0.008	0.619	60.00	---	58.47	1.957
	15	---	---	0.000	1.527	---	---	65.00	---
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 1B. --Catch statistics for the South Columbia region (SCOL) in 1978.

	Age	No. of males	CV	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.001	2.236	0.000	3.756	37.00	---	37.00	---
	3	0.127	0.228	0.156	0.237	41.38	0.323	42.00	0.400
	4	0.301	0.201	0.453	0.181	43.98	0.543	44.65	0.385
	5	2.559	0.063	3.173	0.058	45.86	0.141	46.57	0.127
	6	0.551	0.180	0.455	0.213	46.89	0.344	48.10	0.453
	7	1.601	0.097	0.998	0.137	49.20	0.201	49.29	0.274
	8	2.216	0.075	3.576	0.053	49.88	0.175	50.76	0.137
	9	0.308	0.194	0.626	0.148	52.86	0.467	52.47	0.491
	10	0.145	0.275	0.371	0.172	53.27	0.623	54.13	0.615
	11	0.041	0.479	0.226	0.187	53.54	0.862	56.29	0.552
	12	0.018	0.722	0.128	0.255	53.77	1.571	56.76	0.992
	13	0.000	6.872	0.066	0.319	58.00	---	57.75	1.056
	14	0.000	4.230	0.007	0.703	60.00	---	60.38	0.323
	15	---	---	0.004	0.796	---	---	66.46	0.498
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.436	0.171	0.506	0.183	42.96	0.223	43.86	0.376
	4	1.249	0.159	0.865	0.186	44.95	0.283	45.35	0.357
	5	8.217	0.057	9.174	0.047	46.48	0.113	47.18	0.097
	6	1.358	0.180	1.545	0.164	47.14	0.318	48.24	0.305
	7	4.621	0.092	2.632	0.124	49.03	0.148	49.66	0.192
	8	7.391	0.064	6.885	0.060	49.53	0.113	50.60	0.124
	9	1.355	0.151	1.033	0.165	51.34	0.321	52.46	0.415
	10	0.512	0.252	0.389	0.166	51.45	0.445	54.86	0.375
	11	0.119	0.295	0.339	0.196	53.75	0.465	54.13	0.633
	12	0.024	0.530	0.157	0.303	54.99	1.065	54.88	0.973
	13	0.002	0.994	0.061	0.269	58.00	---	57.86	0.836
	14	0.001	1.061	0.025	0.373	60.00	---	58.32	1.039
	15	---	---	0.002	1.002	---	---	58.00	--
Late period	1	0.008	0.341	0.006	0.380	25.59	0.334	27.25	0.307
	2	0.022	0.212	0.016	0.238	27.47	0.318	27.15	0.286
	3	0.166	0.456	0.175	0.327	44.52	1.019	44.10	0.516
	4	0.799	0.244	0.590	0.224	45.59	0.360	45.84	0.371
	5	3.572	0.115	3.914	0.082	46.81	0.224	48.00	0.165
	6	0.703	0.299	0.634	0.275	47.39	0.508	48.95	0.438
	7	3.168	0.135	0.886	0.229	49.34	0.225	49.51	0.338
	8	4.453	0.101	3.189	0.093	49.64	0.162	50.82	0.199
	9	0.414	0.314	0.255	0.238	51.59	0.794	54.77	0.655
	10	0.118	0.639	0.315	0.273	49.35	2.083	53.57	0.708
	11	0.034	0.758	0.191	0.375	53.73	0.852	54.01	0.953
	12	0.026	0.927	0.032	0.457	53.17	0.378	56.80	1.219
	13	0.000	6.658	0.004	0.565	58.00	---	60.93	1.640
	14	0.000	4.472	0.004	0.557	60.00	---	60.88	1.705
	15	---	---	0.000	1.049	---	---	66.00	---

Appendix Table 1C. --Catch statistics for the North Columbia/Vancouver region (WC) in 1978.

	Age	No. of males	CV	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.011	0.990	0.017	1.365	41.13	1.798	42.22	2.251
	4	0.031	0.567	0.051	0.815	42.76	0.996	45.25	1.378
	5	0.122	0.295	0.209	0.360	44.91	0.672	46.51	0.789
	6	0.019	0.795	0.031	1.350	48.16	2.043	46.59	2.545
	7	0.114	0.364	0.072	0.777	48.71	0.499	49.02	1.534
	8	0.174	0.268	0.204	0.318	48.79	0.472	51.35	1.021
	9	0.039	0.647	0.024	0.950	50.09	0.866	53.69	3.219
	10	0.006	1.253	0.011	1.490	54.79	3.791	53.65	5.555
	11	0.001	4.012	0.003	2.080	52.91	3.694	55.12	3.314
	12	0.000	5.579	0.002	2.621	53.30	5.854	56.33	5.637
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.037	0.613	0.017	0.630	43.40	0.584	42.58	0.924
	4	0.022	1.110	0.058	0.454	44.32	2.355	44.56	0.629
	5	0.622	0.153	0.792	0.133	47.11	0.309	47.68	0.298
	6	0.058	0.677	0.204	0.352	47.17	1.416	47.85	0.679
	7	0.232	0.315	0.362	0.265	50.24	0.524	49.62	0.351
	8	0.375	0.237	0.592	0.166	50.00	0.490	51.70	0.381
	9	0.159	0.406	0.108	0.489	50.75	0.734	51.79	0.850
	10	0.019	0.876	0.024	0.626	53.53	2.658	56.05	3.078
	11	0.006	1.100	0.092	0.409	55.15	3.726	52.55	1.387
	12	0.003	1.067	0.011	0.521	57.86	5.452	59.51	2.929
	13	0.000	6.494	0.005	0.459	58.00	---	63.79	0.986
	14	0.000	4.459	0.000	4.054	60.00	---	60.00	---
	15	---	---	0.001	1.021	---	---	60.00	---
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.002	5.083	0.001	5.471	44.87	10.488	45.17	9.679
	4	0.017	2.333	0.016	1.467	46.36	3.723	45.45	4.282
	5	0.283	0.561	0.247	0.569	47.93	0.785	48.85	0.757
	6	0.053	1.597	0.036	1.758	48.02	2.002	48.90	2.557
	7	0.330	0.517	0.454	0.370	50.08	0.828	50.83	0.704
	8	0.483	0.386	0.713	0.262	50.36	0.685	51.88	0.643
	9	0.130	0.656	0.145	0.628	52.25	1.641	53.76	2.228
	10	0.062	0.821	0.088	0.739	54.04	3.308	54.09	2.442
	11	0.014	0.998	0.043	0.537	53.29	1.084	57.41	1.535
	12	0.002	3.241	0.042	0.840	55.02	8.902	53.41	0.694
	13	0.000	6.862	0.000	6.251	58.00	---	58.00	---
	14	---	---	0.000	4.076	---	---	60.00	---
	15	---	---	---	---	---	---	---	---

Appendix Table 2A. --Catch statistics in the Eureka region (EUR) in 1979.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.142	0.245	0.139	0.236	31.84	0.839	31.58	0.963
	3	0.406	0.147	0.463	0.138	33.44	0.811	34.43	0.845
	4	3.667	0.081	2.778	0.086	43.67	0.208	44.23	0.213
	5	1.980	0.138	1.298	0.157	45.70	0.264	45.96	0.291
	6	6.302	0.063	5.028	0.062	46.53	0.125	47.42	0.136
	7	1.342	0.158	0.946	0.169	49.12	0.298	50.17	0.397
	8	2.063	0.123	1.619	0.124	49.08	0.238	49.86	0.230
	9	0.863	0.184	0.886	0.156	50.27	0.406	51.75	0.375
	10	0.181	0.360	0.238	0.281	51.72	0.531	53.16	0.665
	11	0.017	0.864	0.088	0.353	55.20	1.162	55.83	1.109
	12	0.001	3.086	0.028	0.766	56.38	7.983	56.27	2.760
	13	---	---	0.025	0.548	---	---	56.43	0.748
	14	0.000	6.232	0.001	1.864	56.00	---	68.74	19.783
	15	---	---	0.004	0.913	---	---	61.00	---
Middle period	1	---	---	---	---	---	---	---	---
	2	0.736	0.222	0.985	0.181	33.25	0.356	33.36	0.307
	3	1.922	0.105	1.593	0.124	34.70	0.318	34.48	0.250
	4	3.351	0.287	2.388	0.171	44.93	0.638	44.76	0.678
	5	1.161	0.708	1.255	0.253	45.85	0.776	46.64	0.485
	6	6.736	0.184	5.243	0.108	46.87	0.313	48.15	0.215
	7	1.657	0.359	1.086	0.294	47.93	0.734	50.17	0.442
	8	2.475	0.239	1.856	0.201	50.05	0.744	50.66	0.421
	9	1.472	0.259	1.602	0.203	50.42	0.448	51.03	0.620
	10	0.289	0.488	0.175	0.419	51.84	1.142	55.30	1.552
	11	0.056	0.595	0.166	0.381	55.11	0.884	53.47	2.895
	12	0.002	3.766	0.030	0.727	55.83	7.372	56.59	1.042
	13	---	---	0.002	1.000	---	---	72.00	---
	14	0.000	6.157	0.007	1.017	56.00	---	58.74	1.454
	15	---	---	---	---	---	---	---	---
Late period	1	---	---	---	---	---	---	---	---
	2	0.037	0.898	0.035	0.840	34.39	0.855	34.38	0.966
	3	0.133	0.298	0.126	0.298	35.35	0.394	35.44	0.386
	4	0.055	0.632	0.034	0.726	41.81	3.113	39.35	2.794
	5	0.029	1.108	0.007	1.219	46.30	1.724	46.00	1.651
	6	0.107	0.470	0.035	0.481	46.99	0.795	46.91	0.828
	7	0.026	1.148	0.009	1.060	48.72	1.643	49.35	2.250
	8	0.050	0.760	0.018	0.707	49.02	1.083	49.65	1.638
	9	0.022	1.195	0.011	0.857	49.68	1.721	51.76	2.591
	10	0.003	2.995	0.003	1.596	50.70	5.719	53.78	4.652
	11	0.001	2.870	0.001	3.234	54.25	6.445	54.98	7.498
	12	0.000	8.996	0.000	4.294	53.15	6.316	56.61	8.664
	13	---	---	---	---	---	---	---	---
	14	0.000	8.534	---	---	56.00	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 2B. --Catch statistics in the South Columbia region (SCOL) in 1979.

	Age	No. of males	CV	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.131	0.392	0.178	0.338	31.36	1.642	31.02	1.096
	3	0.462	0.177	0.375	0.226	34.36	1.027	34.02	1.241
	4	0.603	0.254	0.762	0.315	43.64	0.906	44.29	0.894
	5	0.229	0.539	0.455	0.501	46.25	0.922	47.30	0.995
	6	2.083	0.127	2.000	0.190	47.16	0.272	48.05	0.416
	7	0.430	0.367	0.494	0.449	49.84	0.569	49.21	1.012
	8	0.936	0.232	1.056	0.248	50.45	0.455	51.43	0.836
	9	0.884	0.234	0.930	0.275	50.33	0.511	51.46	0.791
	10	0.184	0.610	0.074	0.722	49.87	1.153	57.89	4.252
	11	0.011	1.442	0.142	0.365	55.14	2.856	56.07	1.065
	12	0.002	4.500	0.007	2.062	54.79	12.155	59.75	10.722
	13	---	---	---	---	---	---	---	---
	14	0.000	6.158	0.001	6.083	56.00	---	56.00	---
	15	---	---	---	---	---	---	---	---
Middle period	1	---	---	---	---	---	---	---	---
	2	0.662	0.107	0.585	0.130	32.65	0.224	32.71	0.307
	3	0.570	0.174	0.737	0.129	35.52	0.994	34.07	0.596
	4	1.213	0.201	1.212	0.214	45.06	0.568	46.44	0.689
	5	1.171	0.255	1.105	0.222	47.09	0.380	47.12	0.457
	6	6.092	0.090	6.243	0.083	47.89	0.160	49.03	0.180
	7	2.676	0.144	2.064	0.173	50.27	0.268	51.09	0.334
	8	5.556	0.096	3.925	0.112	49.92	0.193	51.37	0.244
	9	2.414	0.131	3.590	0.109	51.78	0.363	52.68	0.310
	10	0.400	0.327	0.556	0.265	52.73	0.724	54.74	0.889
	11	0.305	0.288	0.273	0.241	54.11	0.610	57.08	0.558
	12	0.074	0.649	0.147	0.426	53.19	0.810	56.41	1.704
	13	---	---	0.077	0.533	---	---	57.12	1.656
	14	0.000	6.091	0.001	6.085	56.00	---	56.00	---
	15	---	---	0.019	0.727	---	---	59.99	2.495
Late period	1	---	---	---	---	---	---	---	---
	2	0.179	0.249	0.487	0.153	32.54	0.472	34.02	0.331
	3	1.047	0.059	0.910	0.093	35.13	0.136	35.47	0.194
	4	0.652	0.405	0.365	0.286	44.06	1.331	41.73	1.630
	5	0.247	0.662	0.906	0.334	45.91	1.430	48.41	0.382
	6	2.476	0.247	3.725	0.151	48.34	0.493	49.46	0.258
	7	2.294	0.298	1.770	0.250	48.98	0.375	51.43	0.438
	8	5.873	0.143	2.394	0.215	50.35	0.267	51.71	0.439
	9	3.443	0.220	3.357	0.166	50.77	0.364	52.70	0.348
	10	1.168	0.410	0.679	0.348	51.65	0.831	54.90	0.973
	11	0.203	0.671	0.318	0.558	54.06	0.913	54.03	1.630
	12	0.016	1.862	0.150	0.424	56.77	8.195	57.25	0.984
	13	---	---	0.112	0.441	---	---	58.18	0.790
	14	0.027	0.915	0.007	1.050	56.00	---	66.06	9.449
	15	---	---	0.003	0.913	---	---	64.00	---

Appendix Table 2C. --Catch statistics in the North Columbia/Vancouver region (VNC) in 1979.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	0.000	4.121	---	---	39.00	---
	3	0.001	2.485	0.002	1.629	42.17	2.913	40.46	3.364
	4	0.015	0.727	0.033	0.520	44.29	1.850	44.61	1.222
	5	0.050	0.413	0.030	0.626	46.33	0.493	46.42	1.098
	6	0.135	0.225	0.244	0.209	47.53	0.451	49.40	0.481
	7	0.017	0.917	0.060	0.540	50.38	2.279	50.81	1.229
	8	0.113	0.259	0.091	0.450	50.80	0.625	51.89	1.347
	9	0.041	0.466	0.195	0.252	52.69	1.210	53.23	0.713
	10	0.008	1.149	0.027	0.778	54.47	2.865	56.48	2.450
	11	0.005	1.490	0.017	0.965	55.15	2.184	57.30	2.370
	12	0.001	4.131	0.002	3.110	55.54	6.760	56.46	5.395
	13	---	---	---	---	---	---	---	---
	14	0.000	6.942	0.000	6.295	56.00	---	56.00	---
	15	---	---	---	---	---	---	---	---
Middle period	1	---	---	---	---	---	---	---	---
	2	0.000	3.000	0.001	1.343	35.00	---	32.01	3.077
	3	0.002	2.281	0.003	0.906	40.82	6.928	36.48	5.273
	4	0.064	0.499	0.095	0.360	45.42	0.803	45.56	0.491
	5	0.088	0.418	0.081	0.516	47.58	0.641	48.82	0.979
	6	0.362	0.176	0.706	0.136	48.27	0.330	50.00	0.309
	7	0.117	0.336	0.207	0.283	49.23	0.728	51.91	0.732
	8	0.367	0.150	0.509	0.172	51.18	0.351	51.66	0.449
	9	0.309	0.177	0.224	0.235	51.55	0.511	54.22	0.736
	10	0.063	0.317	0.090	0.297	53.88	0.595	55.94	0.911
	11	0.022	0.474	0.030	0.463	55.62	1.202	57.50	1.624
	12	0.001	3.183	0.002	2.350	56.12	8.198	58.84	13.272
	13	---	---	0.002	0.822	---	---	64.59	1.987
	14	0.000	6.143	0.004	0.740	56.00	---	60.93	2.405
	15	---	---	---	---	---	---	---	---
Late period	1	---	---	---	---	---	---	---	---
	2	0.003	0.723	0.002	0.803	32.46	1.541	32.17	0.995
	3	0.007	0.477	0.004	0.540	34.54	1.877	33.02	1.749
	4	0.011	0.904	0.007	0.738	43.72	3.326	44.43	2.747
	5	0.009	1.353	0.005	1.338	46.89	1.681	47.14	2.921
	6	0.087	0.281	0.135	0.261	48.45	0.462	50.12	0.516
	7	0.064	0.409	0.067	0.441	51.23	0.741	51.69	0.869
	8	0.179	0.190	0.158	0.239	50.84	0.384	51.96	0.577
	9	0.114	0.238	0.267	0.170	52.72	0.485	54.11	0.500
	10	0.018	0.607	0.057	0.426	54.59	1.352	55.25	1.323
	11	0.010	0.726	0.015	0.789	54.98	0.999	58.47	2.474
	12	0.000	4.872	0.035	0.489	54.32	10.686	56.25	0.863
	13	---	---	---	---	---	---	---	---
	14	0.000	6.242	0.004	1.010	56.00	---	58.72	1.535
	15	---	---	---	---	---	---	---	---

Appendix Table 3A. --Catch statistics in the Eureka region (EUR) in 1980.

	Age	No. of males	CV	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.001	3.876	0.000	10.995	36.16	17.024	42.00	---
	3	0.267	0.142	0.202	0.168	38.63	0.626	38.97	0.562
	4	0.048	0.667	0.045	0.620	41.08	2.488	39.14	2.383
	5	0.104	0.471	0.092	0.412	46.24	0.837	46.94	1.013
	6	0.143	0.416	0.118	0.446	47.86	0.703	48.90	0.777
	7	0.347	0.225	0.211	0.335	48.68	0.518	49.80	0.694
	8	0.137	0.411	0.099	0.591	49.83	0.863	50.88	0.929
	9	0.156	0.374	0.109	0.556	50.93	0.906	52.26	1.089
	10	0.069	0.595	0.130	0.486	51.02	1.451	51.92	0.752
	11	0.009	1.569	0.012	1.621	54.38	4.893	54.43	4.519
	12	0.046	0.762	0.009	1.970	51.42	0.703	54.64	5.906
	13	0.005	2.077	0.008	2.361	54.36	7.099	53.74	5.041
	14	0.002	4.304	0.003	3.688	52.52	8.661	53.63	8.518
	15	0.001	5.028	0.001	4.795	54.16	5.513	54.25	6.051
Middle period	1	---	---	---	---	---	---	---	---
	2	0.010	0.705	0.004	0.930	33.01	1.032	36.01	1.283
	3	1.415	0.036	1.429	0.033	39.44	0.095	40.29	0.080
	4	0.248	0.176	0.173	0.205	42.68	0.745	42.43	0.436
	5	0.362	0.149	0.283	0.155	46.22	0.436	47.06	0.354
	6	0.298	0.176	0.265	0.169	47.59	0.468	47.78	0.358
	7	0.588	0.117	0.375	0.135	48.13	0.311	49.56	0.352
	8	0.250	0.192	0.130	0.231	48.78	0.364	51.87	0.652
	9	0.333	0.167	0.147	0.230	49.63	0.364	51.50	0.522
	10	0.117	0.275	0.162	0.199	51.24	0.645	52.52	0.470
	11	0.008	0.802	0.066	0.271	55.01	2.278	54.71	0.880
	12	0.003	1.692	0.005	0.674	55.23	5.132	60.05	4.446
	13	0.008	0.895	0.006	0.639	53.37	1.357	60.32	4.565
	14	0.001	3.459	0.005	0.601	53.90	9.260	60.22	3.657
	15	0.010	0.684	0.013	0.496	53.44	0.402	55.93	0.639
Late period	1	0.000	1.732	---	---	24.00	---	---	---
	2	0.053	0.903	0.043	0.658	41.14	1.559	37.77	0.887
	3	5.437	0.020	5.348	0.022	40.31	0.060	40.98	0.060
	4	0.157	0.330	0.135	0.438	44.88	1.313	44.13	1.506
	5	0.301	0.211	0.344	0.209	47.27	0.664	46.49	0.979
	6	0.316	0.208	0.172	0.234	47.86	0.776	49.96	1.005
	7	0.413	0.166	0.421	0.144	49.09	0.484	49.78	0.543
	8	0.211	0.250	0.121	0.270	50.08	0.421	52.04	1.063
	9	0.307	0.201	0.194	0.202	50.35	0.379	52.35	0.580
	10	0.155	0.291	0.083	0.305	50.43	0.856	53.18	1.107
	11	0.018	0.697	0.046	0.395	53.25	1.419	53.68	0.827
	12	0.011	0.738	0.060	0.442	54.40	1.169	50.06	4.454
	13	0.037	0.503	0.003	1.599	52.59	0.380	56.05	5.201
	14	0.001	3.502	0.001	3.043	53.54	9.233	54.30	8.743
	15	0.000	5.342	0.000	4.452	53.79	4.805	55.01	8.017

Appendix Table 3B. --Catch statistics in the South Columbia region (SCOL) in 1980.

	Age	No. of males	CV	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.000	3.650	0.000	3.766	35.59	13.814	36.09	16.737
	3	0.289	0.072	0.289	0.074	39.47	0.269	39.43	0.233
	4	0.055	0.255	0.132	0.191	41.94	0.756	42.31	0.608
	5	0.544	0.171	0.453	0.178	46.80	0.242	47.43	0.306
	6	0.472	0.208	0.436	0.192	48.46	0.345	48.23	0.309
	7	1.287	0.111	1.612	0.085	49.01	0.206	49.96	0.161
	8	0.552	0.185	0.437	0.192	50.03	0.354	51.35	0.393
	9	0.904	0.137	0.936	0.121	50.24	0.253	51.23	0.237
	10	0.495	0.184	0.415	0.164	51.18	0.366	53.48	0.398
	11	0.084	0.480	0.155	0.265	51.76	0.974	54.10	0.781
	12	0.057	0.480	0.054	0.400	52.25	0.575	55.47	1.252
	13	0.003	2.065	0.029	0.542	54.10	6.424	55.33	1.367
	14	0.001	3.632	0.019	0.601	53.53	10.936	56.24	1.842
	15	0.000	4.928	0.005	0.786	54.16	6.495	62.11	2.962
Middle period	1	0.001	1.155	0.001	1.000	24.00	---	21.50	0.433
	2	0.000	3.603	0.000	4.332	35.93	15.916	36.69	19.390
	3	0.927	0.064	0.900	0.052	41.04	0.348	40.85	0.119
	4	0.164	0.211	0.225	0.160	41.66	0.657	41.88	0.373
	5	0.959	0.157	0.816	0.160	47.63	0.257	48.55	0.305
	6	0.670	0.201	0.928	0.152	48.23	0.285	49.15	0.292
	7	2.507	0.088	2.309	0.089	49.15	0.160	50.14	0.166
	8	1.309	0.136	1.074	0.149	49.91	0.222	50.97	0.252
	9	1.550	0.122	1.180	0.129	50.08	0.212	51.91	0.282
	10	1.101	0.145	1.081	0.137	50.97	0.256	52.51	0.304
	11	0.139	0.393	0.189	0.318	51.99	0.414	54.03	0.709
	12	0.061	0.559	0.078	0.293	53.22	1.240	56.96	1.147
	13	0.086	0.526	0.104	0.347	51.81	0.860	55.46	0.739
	14	0.013	0.861	0.044	0.711	54.46	1.614	52.73	2.045
	15	0.000	5.324	0.053	0.692	53.76	4.387	53.68	1.234
Late period	1	---	---	---	---	---	---	---	---
	2	0.001	4.912	0.014	0.668	37.48	21.286	37.26	2.037
	3	3.450	0.063	3.864	0.042	41.99	0.381	42.29	0.080
	4	0.312	0.286	0.325	0.295	43.58	0.609	44.55	0.646
	5	0.932	0.271	0.958	0.215	47.57	0.696	47.01	0.699
	6	1.090	0.311	0.943	0.240	47.22	0.715	49.17	0.496
	7	4.010	0.141	2.453	0.124	49.17	0.262	49.95	0.301
	8	1.916	0.190	1.658	0.167	50.56	0.377	50.95	0.345
	9	1.576	0.234	2.139	0.140	50.18	0.467	52.36	0.272
	10	2.933	0.179	1.653	0.151	50.62	0.298	52.92	0.384
	11	0.205	0.395	0.410	0.238	52.86	1.042	54.54	0.865
	12	0.212	0.664	0.553	0.288	52.19	1.515	53.83	0.704
	13	0.326	0.522	0.267	0.354	51.87	0.861	55.01	0.722
	14	0.287	0.578	0.137	0.529	51.39	0.760	50.88	1.506
	15	0.001	4.912	0.020	0.725	54.08	6.036	58.36	2.498

Appendix Table 3C. --Catch statistics in the North Columbia/Vancouver region (VNC) in 1980.

	Age	No. of males	CV	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.003	1.228	0.002	2.268	42.79	7.037	44.59	14.236
	4	0.001	2.556	0.001	4.449	46.16	4.001	48.00	15.861
	5	0.010	1.111	0.009	1.471	47.86	1.447	49.13	2.351
	6	0.011	1.081	0.013	1.301	48.49	1.408	49.77	1.758
	7	0.045	0.408	0.064	0.458	49.99	0.767	50.78	0.723
	8	0.024	0.601	0.029	0.813	50.30	1.048	51.85	1.427
	9	0.020	0.712	0.039	0.695	50.50	1.422	51.58	1.123
	10	0.022	0.541	0.034	0.692	51.86	1.308	52.99	1.589
	11	0.002	1.461	0.010	1.001	53.92	4.727	55.03	3.168
	12	0.001	2.994	0.004	2.133	52.57	4.485	54.28	6.089
	13	0.001	2.821	0.004	2.405	52.46	3.745	53.15	4.523
	14	0.000	4.853	0.001	4.341	51.99	6.562	52.49	7.810
	15	0.000	6.067	0.001	5.866	53.42	2.902	53.53	3.646
Middle period	1	---	---	---	---	---	---	---	---
	2	0.000	10.810	0.000	10.729	42.00	---	42.00	---
	3	0.018	0.362	0.033	0.288	42.09	1.823	43.55	1.420
	4	0.019	0.493	0.020	0.375	44.76	1.108	44.66	1.081
	5	0.138	0.323	0.340	0.240	46.82	0.624	49.33	0.641
	6	0.439	0.205	0.538	0.210	48.36	0.298	49.43	0.332
	7	1.185	0.110	1.405	0.114	50.10	0.183	50.83	0.217
	8	0.482	0.189	0.805	0.162	51.03	0.369	52.54	0.316
	9	0.858	0.134	1.153	0.135	51.00	0.248	52.09	0.275
	10	0.384	0.192	0.855	0.136	51.74	0.465	54.63	0.467
	11	0.125	0.305	0.253	0.273	53.01	0.866	53.97	0.799
	12	0.061	0.382	0.133	0.323	54.21	0.541	55.79	1.168
	13	0.063	0.509	0.067	0.457	52.87	0.852	57.32	1.645
	14	0.033	0.726	0.027	0.486	52.28	1.064	58.53	2.086
	15	0.016	0.866	0.010	0.734	53.46	0.555	57.59	2.255
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.005	2.530	0.005	3.663	45.09	15.614	46.12	21.055
	4	0.003	4.112	0.002	7.472	48.03	12.620	49.90	15.806
	5	0.032	1.352	0.025	1.679	48.97	2.259	49.37	3.401
	6	0.046	1.189	0.044	1.397	49.60	1.901	50.28	2.267
	7	0.172	0.539	0.265	0.475	51.04	0.909	51.40	0.772
	8	0.092	0.822	0.145	0.738	51.30	1.368	53.18	1.347
	9	0.125	0.682	0.206	0.590	51.38	1.115	52.90	0.960
	10	0.098	0.758	0.163	0.686	52.26	1.347	53.64	1.379
	11	0.016	1.985	0.047	1.135	53.23	3.485	55.63	3.450
	12	0.009	2.642	0.030	1.380	53.24	4.873	56.20	5.347
	13	0.009	2.899	0.036	1.159	52.24	3.288	55.55	4.103
	14	0.004	4.405	0.007	4.037	52.32	7.019	52.95	6.262
	15	0.005	2.319	0.003	5.638	55.02	4.265	53.63	3.412

Appendix Table 4A. --Catch statistics in the Eureka region (EUR) in 1981.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	0.017	0.325	0.030	0.234	23.70	0.847	22.23	0.486
	2	0.024	0.398	0.025	0.313	27.99	3.510	30.20	2.137
	3	0.171	0.537	0.093	0.381	39.10	1.034	38.52	0.857
	4	8.656	0.021	9.100	0.017	42.30	0.061	42.95	0.052
	5	0.073	0.664	0.145	0.508	46.74	1.631	46.05	0.870
	6	0.481	0.239	0.271	0.284	47.22	0.504	48.88	0.868
	7	0.331	0.251	0.434	0.198	48.79	0.442	50.01	0.365
	8	0.830	0.142	0.812	0.125	48.91	0.279	50.85	0.274
	9	0.448	0.190	0.374	0.202	50.13	0.367	51.65	0.452
	10	0.302	0.231	0.189	0.289	50.68	0.317	52.27	0.712
	11	0.222	0.254	0.164	0.198	51.19	0.349	55.85	0.731
	12	0.002	2.238	0.036	0.370	54.01	5.288	58.70	1.865
	13	0.003	1.379	0.005	0.952	57.78	9.940	60.38	7.568
	14	0.000	3.761	0.007	0.774	54.96	6.782	57.85	1.724
	15	0.005	0.906	0.012	0.497	56.00	---	59.25	0.520
Middle period	1	1.697	0.038	1.766	0.036	24.85	0.065	25.09	0.059
	2	0.147	0.302	0.164	0.232	30.81	1.932	33.14	1.446
	3	0.635	0.332	0.390	0.287	40.82	0.797	39.88	0.506
	4	21.814	0.024	20.345	0.020	42.87	0.047	43.64	0.040
	5	1.758	0.210	1.439	0.226	44.76	0.381	44.72	0.358
	6	1.574	0.192	0.479	0.234	46.40	0.519	48.69	0.574
	7	0.747	0.196	0.582	0.271	48.31	0.355	48.08	0.761
	8	2.217	0.095	1.504	0.094	49.23	0.194	50.73	0.225
	9	0.362	0.263	0.529	0.172	49.70	0.535	51.32	0.384
	10	0.771	0.195	0.320	0.230	48.81	0.395	51.52	0.566
	11	0.495	0.196	0.466	0.174	50.82	0.453	52.97	0.571
	12	0.024	0.878	0.038	0.567	51.70	1.035	55.81	2.079
	13	0.029	0.943	0.008	0.933	48.45	0.864	58.19	3.640
	14	0.014	0.698	0.022	0.675	53.85	0.719	54.61	0.444
	15	0.000	6.230	0.011	0.925	56.00	---	56.00	---
Late period	1	0.111	0.142	0.130	0.137	26.66	0.203	26.69	0.173
	2	0.056	0.448	0.020	0.899	36.57	2.313	32.17	4.881
	3	0.128	0.323	0.076	0.531	38.24	0.717	39.02	1.093
	4	2.615	0.070	2.245	0.048	43.05	0.204	43.62	0.154
	5	0.176	0.632	0.130	0.445	44.73	0.712	46.88	0.690
	6	0.525	0.250	0.188	0.369	46.39	0.598	48.04	0.661
	7	0.274	0.354	0.155	0.352	50.33	0.656	50.51	1.112
	8	0.667	0.214	0.462	0.180	48.39	0.473	50.65	0.542
	9	0.194	0.419	0.163	0.297	49.43	0.894	53.35	0.801
	10	0.249	0.368	0.196	0.322	49.37	0.890	50.11	1.064
	11	0.366	0.305	0.186	0.253	50.06	0.679	54.52	0.907
	12	0.006	2.397	0.006	1.533	53.76	5.117	56.29	4.021
	13	0.002	3.233	0.004	1.410	54.58	14.788	60.85	12.479
	14	0.001	4.660	0.002	2.498	54.08	5.390	60.44	11.907
	15	0.000	6.145	0.001	6.027	56.00	---	56.00	---

Appendix Table 4B. --Catch statistics in the South Columbia region (SCOL) in 1981.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	0.006	0.506	0.005	0.565	30.14	1.348	28.53	1.954
	2	0.004	0.902	0.005	0.694	33.55	1.668	32.28	2.048
	3	0.028	0.513	0.006	0.894	39.46	0.984	36.98	4.271
	4	1.370	0.061	1.919	0.056	43.21	0.189	43.95	0.161
	5	0.108	0.418	0.161	0.389	46.38	0.591	46.01	0.526
	6	0.542	0.231	0.512	0.258	47.79	0.511	49.26	0.609
	7	0.282	0.355	0.330	0.352	50.19	0.668	50.74	0.593
	8	2.250	0.090	2.409	0.095	50.01	0.165	51.34	0.224
	9	0.468	0.279	0.475	0.285	50.85	0.519	51.80	0.516
	10	0.321	0.299	0.446	0.264	52.41	0.670	53.30	0.627
	11	0.593	0.198	1.053	0.160	52.99	0.490	53.65	0.499
	12	0.111	0.498	0.259	0.290	52.65	0.434	56.28	0.853
	13	0.015	0.813	0.113	0.238	55.98	2.953	60.20	0.796
	14	0.001	3.867	0.025	0.501	54.85	7.456	61.84	2.756
	15	0.000	6.032	0.018	0.609	56.00	---	62.49	1.455
Middle period	1	2.384	0.044	2.423	0.039	26.30	0.088	26.60	0.098
	2	0.267	0.313	0.209	0.339	28.16	1.124	26.88	1.393
	3	0.095	0.553	0.129	0.558	37.16	2.428	39.22	1.740
	4	7.770	0.062	6.917	0.080	43.71	0.112	44.09	0.179
	5	1.238	0.305	0.521	0.461	46.19	0.636	46.22	0.965
	6	1.497	0.269	1.345	0.250	47.06	0.683	48.99	0.672
	7	0.825	0.325	0.599	0.463	49.17	0.853	47.31	1.323
	8	3.156	0.129	3.095	0.167	49.53	0.327	49.34	0.511
	9	0.542	0.336	0.899	0.239	50.25	0.744	50.63	0.591
	10	0.484	0.305	0.780	0.265	51.29	0.734	50.74	0.637
	11	0.692	0.260	1.029	0.191	51.38	0.640	52.75	0.538
	12	0.096	0.662	0.117	0.541	51.66	0.552	53.08	1.058
	13	0.073	0.750	0.082	0.555	52.11	1.239	55.07	1.608
	14	0.002	3.834	0.003	3.159	54.85	7.022	56.35	6.902
	15	0.000	6.092	0.055	0.499	56.00	---	58.58	0.342
Late period	1	2.139	0.024	2.236	0.028	26.91	0.047	26.97	0.066
	2	0.122	0.265	0.170	0.278	33.71	1.407	33.78	1.619
	3	0.199	0.216	0.316	0.429	38.52	0.697	42.30	0.768
	4	7.386	0.064	6.184	0.059	44.64	0.146	45.47	0.119
	5	0.399	0.595	0.456	0.404	46.85	0.763	48.17	0.718
	6	1.133	0.334	0.634	0.320	47.87	0.694	50.19	1.045
	7	1.135	0.292	0.521	0.292	49.37	0.639	52.18	0.853
	8	2.291	0.169	1.767	0.143	50.68	0.535	52.21	0.491
	9	0.702	0.312	0.478	0.273	50.71	0.605	53.77	0.787
	10	1.213	0.257	1.025	0.255	50.95	0.485	51.13	1.013
	11	0.502	0.381	0.603	0.213	52.10	0.819	55.28	0.721
	12	0.074	0.502	0.100	0.362	54.85	0.906	59.02	1.264
	13	0.010	1.970	0.104	0.545	55.19	12.522	55.07	1.663
	14	0.002	4.290	0.013	0.883	54.41	6.493	59.31	4.000
	15	0.000	6.019	0.024	0.920	56.00	---	56.98	0.125

Appendix Table 4C. --Catch statistics in the Vancouver/North Columbia region (VNC) in 1981.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.000	3.380	0.000	3.701	41.59	6.180	41.73	6.855
	4	0.048	0.282	0.052	0.184	44.54	0.877	44.59	0.469
	5	0.005	1.676	0.003	1.544	46.93	3.143	46.71	2.993
	6	0.026	0.748	0.062	0.402	49.47	1.439	50.22	0.805
	7	0.026	0.770	0.037	0.652	50.46	1.498	51.44	1.370
	8	0.092	0.352	0.142	0.306	50.95	0.665	51.90	0.607
	9	0.023	0.864	0.039	0.750	52.16	1.803	53.38	1.794
	10	0.022	0.954	0.049	0.634	51.94	1.833	53.12	1.445
	11	0.025	0.814	0.077	0.413	53.07	1.872	54.44	1.066
	12	0.003	2.250	0.010	1.160	54.24	5.899	56.69	5.034
	13	0.001	3.545	0.004	2.529	54.04	14.207	56.04	9.564
	14	0.001	5.369	0.001	4.123	53.60	3.576	54.51	5.178
	15	0.000	6.240	0.001	5.985	56.00	---	56.00	---
Late period	1	0.103	0.091	0.104	0.093	28.02	0.181	27.70	0.179
	2	0.005	0.867	0.009	0.607	30.30	2.190	30.33	1.160
	3	0.002	1.518	0.003	1.468	37.68	7.435	37.62	7.519
	4	0.438	0.190	0.430	0.204	46.73	0.390	46.73	0.614
	5	0.056	0.582	0.210	0.409	45.86	0.834	48.79	0.739
	6	0.082	0.493	0.249	0.331	52.09	1.764	51.30	0.772
	7	0.261	0.328	0.179	0.394	50.14	0.533	51.82	1.073
	8	0.696	0.167	0.680	0.198	51.36	0.349	51.79	0.466
	9	0.232	0.347	0.246	0.336	49.97	0.671	52.45	0.818
	10	0.334	0.273	0.438	0.253	51.31	0.506	52.88	0.642
	11	0.179	0.360	0.276	0.278	52.89	0.676	54.64	0.708
	12	0.021	0.605	0.020	0.805	56.11	1.902	58.44	4.437
	13	0.002	3.047	0.006	1.503	54.30	13.161	59.16	11.146
	14	0.025	0.846	0.002	3.901	53.48	0.570	54.71	6.623
	15	0.000	6.036	0.001	6.003	56.00	---	56.00	---

Appendix Table 5A. --Catch statistics in the Eureka region (ELJR) in 1982.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	1.055	0.044	1.115	0.034	30.21	0.105	30.43	0.083
	3	0.104	0.378	0.063	0.351	35.63	1.912	35.05	2.307
	4	0.089	0.490	0.101	0.432	41.14	0.922	41.93	1.287
	5	2.680	0.077	2.227	0.088	45.03	0.237	45.85	0.287
	6	0.462	0.350	0.196	0.473	46.13	0.991	46.79	1.291
	7	0.329	0.405	0.373	0.350	50.18	0.812	50.68	1.069
	8	0.389	0.342	0.241	0.481	50.68	0.740	50.51	0.900
	9	0.748	0.275	1.017	0.179	49.19	0.501	51.34	0.493
	10	0.304	0.434	0.242	0.512	50.74	0.986	51.11	0.904
	11	0.424	0.429	0.063	1.038	50.48	0.690	54.09	2.422
	12	0.332	0.483	0.181	0.458	50.72	0.384	55.42	1.487
	13	0.002	3.429	0.029	0.820	54.64	9.014	58.89	4.719
	14	0.004	1.042	0.005	2.993	59.11	5.006	57.79	13.787
	15	0.001	3.057	0.002	4.684	57.59	3.033	56.33	6.386
Middle period	1	---	---	---	---	---	---	---	---
	2	0.603	0.061	0.539	0.073	33.52	0.084	33.85	0.096
	3	0.049	0.659	0.026	1.289	39.90	3.557	37.15	3.596
	4	0.014	0.989	0.008	1.648	42.26	3.419	40.61	8.637
	5	0.121	0.198	0.081	0.159	44.46	0.309	45.38	0.576
	6	0.005	1.847	0.005	1.283	44.53	2.803	46.45	3.350
	7	0.019	0.599	0.007	0.788	46.89	0.965	52.17	3.377
	8	0.003	0.940	0.005	1.037	49.96	2.892	51.62	3.216
	9	0.010	0.510	0.014	0.523	49.79	1.685	53.44	2.301
	10	0.002	0.912	0.003	1.266	52.48	3.974	54.34	4.802
	11	0.002	0.985	0.005	0.774	51.24	3.969	57.71	4.366
	12	0.003	0.875	0.007	0.587	51.71	3.018	57.52	2.842
	13	0.000	6.661	0.001	1.247	52.20	1.804	60.34	4.790
	14	0.000	6.282	0.002	1.237	55.95	8.134	60.01	2.763
	15	0.000	11.267	0.000	3.518	55.00	---	57.23	4.896
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 5B. --Catch statistics in the South Columbia region (SCOL) in 1982.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	--
	2	0.704	0.041	0.777	0.033	30.44	0.227	30.83	0.164
	3	0.080	0.420	0.048	0.622	38.30	1.277	39.79	1.749
	4	0.127	0.440	0.021	1.466	41.84	0.745	42.07	2.449
	5	2.079	0.065	2.596	0.052	44.88	0.148	45.71	0.153
	6	0.085	0.604	0.170	0.419	45.58	1.412	49.59	1.362
	7	0.105	0.365	0.316	0.261	50.03	0.824	50.57	0.695
	8	0.150	0.296	0.301	0.277	50.92	0.619	51.25	0.778
	9	0.619	0.157	0.568	0.178	50.01	0.466	52.21	0.612
	10	0.133	0.314	0.117	0.332	50.65	0.748	54.24	1.016
	11	0.089	0.581	0.124	0.310	48.41	2.025	54.77	1.135
	12	0.235	0.286	0.388	0.171	50.10	0.924	54.16	0.564
	13	0.024	0.662	0.017	0.590	52.67	0.487	57.19	1.073
	14	0.002	0.885	0.003	1.204	59.36	2.733	60.08	4.127
	15	0.003	0.900	0.002	1.391	57.94	0.505	61.80	7.735
Middle period	1	---	---	---	---	---	---	---	---
	2	2.654	0.020	2.606	0.019	33.43	0.048	33.63	0.040
	3	0.093	0.346	0.055	0.416	38.63	0.891	38.82	1.254
	4	0.065	0.515	0.075	0.367	42.77	1.143	44.06	1.125
	5	0.947	0.077	0.767	0.078	44.70	0.209	45.79	0.240
	6	0.154	0.368	0.052	0.564	46.46	0.700	45.87	1.455
	7	0.048	0.679	0.111	0.349	49.00	1.079	50.06	0.807
	8	0.054	0.542	0.052	0.546	51.01	0.880	51.40	1.501
	9	0.133	0.348	0.124	0.329	50.58	0.598	52.32	1.022
	10	0.034	0.715	0.028	0.651	50.36	0.769	54.64	2.298
	11	0.083	0.487	0.049	0.529	49.58	0.687	53.49	1.159
	12	0.015	1.108	0.049	0.502	52.29	2.470	54.74	1.500
	13	0.001	4.775	0.004	1.310	52.94	4.422	59.47	8.076
	14	0.000	2.908	0.003	1.337	58.81	14.640	59.32	3.961
	15	0.000	5.652	0.001	3.517	56.04	5.843	56.98	5.759
Late period	1	---	---	---	---	---	---	---	---
	2	6.298	0.019	5.907	0.015	34.16	0.026	34.31	0.027
	3	0.315	0.282	0.165	0.265	38.26	1.131	38.61	0.692
	4	0.038	0.430	0.004	2.908	41.53	1.611	39.65	13.273
	5	0.661	0.066	0.632	0.061	44.74	0.138	45.64	0.147
	6	0.078	0.296	0.100	0.282	46.90	0.479	46.37	0.490
	7	0.033	0.385	0.046	0.264	48.56	0.879	54.38	1.266
	8	0.050	0.334	0.029	0.321	48.02	0.694	54.25	1.599
	9	0.060	0.278	0.066	0.205	49.04	0.686	54.75	0.972
	10	0.009	0.636	0.022	0.343	50.87	0.822	55.56	1.347
	11	0.017	0.455	0.028	0.320	51.68	0.822	55.32	1.068
	12	0.003	1.140	0.041	0.237	52.82	2.727	58.30	1.028
	13	0.000	5.536	0.005	0.808	52.25	2.110	61.42	1.574
	14	0.000	9.591	0.002	1.162	53.00	---	60.79	3.155
	15	0.000	8.888	0.000	3.175	55.00	---	57.62	2.836

Appendix Table 5C. --Catch statistics in the Vancouver/North Columbia region (VNC) in 1982.

	Age	No. of males	CV	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	--
	2	0.982	0.031	1.191	0.031	32.54	0.090	32.89	0.140
	3	0.171	0.275	0.215	0.453	40.24	0.583	42.23	1.217
	4	0.338	0.391	0.080	0.543	42.65	0.446	41.34	1.124
	5	11.406	0.032	11.338	0.036	45.23	0.073	45.79	0.078
	6	0.878	0.249	1.072	0.240	47.70	0.499	47.95	0.432
	7	0.965	0.214	1.200	0.200	48.94	0.690	49.96	0.615
	8	0.734	0.207	1.187	0.201	49.88	0.414	50.10	0.621
	9	1.394	0.136	2.112	0.116	50.66	0.362	52.16	0.480
	10	0.202	0.508	0.401	0.284	49.04	1.507	52.29	0.906
	11	0.178	0.285	0.299	0.259	53.32	1.080	54.64	0.828
	12	0.307	0.227	0.900	0.139	52.51	0.464	55.00	0.498
	13	0.015	0.596	0.054	0.436	58.40	1.385	58.39	1.466
	14	0.023	0.623	0.005	1.267	55.31	1.635	60.32	5.533
	15	0.001	3.085	0.001	3.178	57.71	2.231	57.27	4.782
Middle period	1	---	---	---	---	---	---	---	---
	2	0.835	0.048	0.976	0.038	34.76	0.270	34.89	0.187
	3	0.193	0.316	0.078	0.480	41.56	0.429	41.51	0.867
	4	0.200	0.433	0.227	0.433	44.89	1.010	44.54	0.473
	5	8.024	0.032	8.814	0.033	45.57	0.080	46.65	0.092
	6	0.640	0.242	0.732	0.241	47.36	0.569	48.12	0.570
	7	0.869	0.180	0.701	0.219	50.02	0.420	50.88	0.656
	8	0.615	0.194	0.851	0.177	51.01	0.408	52.06	0.455
	9	1.706	0.108	2.037	0.099	50.81	0.286	53.37	0.364
	10	0.231	0.313	0.379	0.260	51.50	0.726	53.36	0.854
	11	0.298	0.245	0.522	0.205	52.57	0.593	54.06	0.535
	12	0.384	0.193	0.996	0.131	53.43	0.477	55.73	0.516
	13	0.022	0.803	0.134	0.393	53.70	1.481	56.16	1.858
	14	0.010	0.666	0.050	0.492	58.73	1.581	60.55	1.271
	15	0.010	0.936	0.004	1.242	55.17	0.546	64.25	8.311
Late period	1	---	---	---	---	---	---	---	---
	2	0.297	0.152	0.439	0.154	35.95	0.307	36.25	0.210
	3	0.076	0.632	0.168	0.437	38.55	0.956	40.53	1.560
	4	0.048	0.663	0.106	0.536	42.60	1.749	44.94	1.581
	5	2.328	0.058	2.376	0.074	46.01	0.173	47.41	0.241
	6	0.187	0.466	0.133	0.495	48.58	0.688	49.06	1.619
	7	0.093	0.528	0.494	0.274	51.32	1.379	50.80	0.758
	8	0.158	0.392	0.147	0.444	51.06	0.738	52.91	1.012
	9	0.750	0.155	0.466	0.220	51.62	0.416	53.81	0.741
	10	0.088	0.506	0.206	0.350	52.10	0.961	53.42	1.064
	11	0.158	0.432	0.171	0.316	51.46	1.385	55.03	0.855
	12	0.299	0.244	0.441	0.210	52.65	0.616	54.17	0.672
	13	0.004	2.225	0.026	0.559	57.55	6.036	59.11	1.980
	14	0.003	1.375	0.020	1.124	59.35	5.768	59.86	1.685
	15	0.002	3.099	0.001	3.089	57.88	1.014	57.42	4.070

Appendix Table 6A. --Catch statistics in the Eureka region (EUR) in 1983.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	2.378	0.048	2.752	0.039	36.39	0.143	37.03	0.225
	4	0.303	0.322	0.247	0.319	38.70	0.774	40.03	1.000
	5	0.057	0.780	0.155	0.521	43.75	2.246	46.34	1.250
	6	1.767	0.092	1.425	0.098	46.07	0.257	46.88	0.304
	7	0.213	0.393	0.196	0.436	48.60	0.604	50.28	1.315
	8	0.464	0.273	0.162	0.478	48.41	0.706	51.89	1.000
	9	0.282	0.370	0.190	0.425	48.90	0.965	52.25	1.021
	10	0.160	0.441	0.163	0.488	51.36	1.317	54.27	1.297
	11	0.175	0.424	0.100	0.479	50.41	0.909	54.26	1.596
	12	0.019	1.492	0.060	0.847	53.19	3.157	52.95	2.110
	13	0.011	1.850	0.026	1.270	51.80	4.036	52.96	2.604
	14	0.002	5.191	0.049	0.876	53.11	6.193	51.13	0.862
	15	0.033	0.909	0.001	7.355	51.00	---	51.00	---
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 6B. --Catch statistics in the South Columbia region (SCOL) in 1983.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	13.453	0.026	16.140	0.020	36.64	0.056	37.21	0.053
	4	1.535	0.218	0.910	0.325	38.76	0.558	38.79	0.964
	5	0.266	0.313	0.152	0.389	44.52	1.043	45.82	1.473
	6	2.279	0.058	2.070	0.059	46.39	0.209	47.32	0.227
	7	0.294	0.261	0.250	0.251	47.17	0.758	50.54	1.007
	8	0.121	0.355	0.123	0.293	50.74	0.605	53.42	0.890
	9	0.165	0.337	0.193	0.236	50.62	0.778	52.83	0.701
	10	0.189	0.217	0.347	0.166	52.72	0.665	53.66	0.657
	11	0.078	0.442	0.087	0.359	50.78	0.922	55.14	1.645
	12	0.015	0.828	0.051	0.401	53.63	2.936	55.16	0.858
	13	0.027	0.839	0.061	0.411	51.02	0.719	53.23	0.919
	14	0.001	5.530	0.010	0.869	51.91	6.282	55.91	2.629
	15	0.000	7.361	0.000	7.360	51.00	---	51.00	---
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	5.055	0.058	4.370	0.075	37.08	0.119	37.48	0.121
	4	0.164	1.098	0.570	0.510	39.61	1.945	37.74	0.607
	5	0.411	0.535	0.177	0.729	39.77	0.460	40.50	0.673
	6	0.194	0.355	0.425	0.207	43.39	1.314	43.12	0.531
	7	0.013	0.748	0.020	0.656	46.75	2.100	48.64	2.784
	8	0.028	0.434	0.009	1.003	48.41	1.061	51.15	2.890
	9	0.031	0.427	0.010	0.874	48.69	1.110	52.15	2.685
	10	0.036	0.393	0.056	0.296	48.12	1.091	50.98	1.152
	11	0.014	0.631	0.016	0.477	46.37	1.441	55.89	2.029
	12	0.002	1.724	0.003	1.404	52.98	5.014	53.79	4.236
	13	0.001	2.250	0.006	0.984	50.88	4.624	57.10	5.195
	14	0.000	5.353	0.004	1.038	52.55	7.412	50.19	0.870
	15	0.000	7.717	0.000	7.582	51.00	---	51.00	---
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 6C. --Catch statistics in the Vancouver/North Columbia region (VNC) in 1983.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	3.336	0.076	4.989	0.057	38.63	0.267	39.44	0.291
	4	0.449	0.463	0.419	0.485	39.05	0.748	44.17	1.881
	5	0.363	0.365	0.435	0.422	45.34	1.273	45.67	1.285
	6	5.179	0.053	5.436	0.074	46.90	0.136	48.14	0.189
	7	0.520	0.288	0.574	0.344	49.53	0.532	49.33	0.846
	8	0.281	0.422	0.659	0.289	49.78	0.836	51.14	0.907
	9	0.428	0.271	0.435	0.307	51.12	0.578	52.09	0.963
	10	0.306	0.294	0.553	0.214	52.20	0.938	52.96	0.913
	11	0.130	0.488	0.221	0.348	51.72	1.321	53.88	1.385
	12	0.128	0.476	0.154	0.361	51.39	1.024	54.90	1.457
	13	0.143	0.549	0.060	0.616	50.47	0.887	56.36	3.815
	14	0.006	1.151	0.020	0.609	53.70	2.029	58.45	2.453
	15	0.001	7.350	0.007	1.196	51.00	---	56.32	4.444
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	11.755	0.026	14.149	0.025	39.34	0.080	39.75	0.072
	4	0.962	0.233	1.229	0.223	42.80	0.607	42.72	0.651
	5	0.380	0.384	0.832	0.260	44.74	1.102	45.56	1.088
	6	8.768	0.050	7.222	0.053	46.83	0.164	47.66	0.153
	7	1.139	0.206	1.244	0.186	48.51	0.452	49.14	0.564
	8	0.817	0.228	0.859	0.195	50.22	0.493	51.86	0.688
	9	0.749	0.212	0.620	0.222	51.18	0.642	52.57	0.578
	10	1.188	0.178	1.911	0.122	50.77	0.540	52.35	0.450
	11	0.292	0.383	0.404	0.219	50.90	1.117	55.23	0.668
	12	0.197	0.354	0.284	0.237	52.82	0.655	56.69	0.885
	13	0.230	0.421	0.319	0.256	51.02	1.077	55.59	0.938
	14	0.001	5.616	0.060	0.388	51.85	6.069	59.02	1.009
	15	0.001	7.454	0.090	0.417	51.00	---	56.48	0.863
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	3.261	0.044	3.712	0.028	37.90	0.111	38.51	0.080
	4	0.139	0.524	0.191	0.371	38.52	1.208	39.46	0.833
	5	0.312	0.319	0.037	0.590	40.93	0.631	45.28	2.410
	6	0.824	0.117	0.669	0.110	44.77	0.425	45.94	0.431
	7	0.070	0.363	0.074	0.393	47.36	1.121	46.03	1.288
	8	0.103	0.282	0.040	0.402	49.16	0.640	51.82	1.073
	9	0.092	0.298	0.079	0.297	49.02	0.828	49.99	0.966
	10	0.128	0.227	0.129	0.221	50.21	0.672	51.46	0.922
	11	0.028	0.506	0.054	0.350	50.74	1.058	51.52	1.380
	12	0.037	0.505	0.038	0.383	48.38	0.960	51.65	0.844
	13	0.042	0.452	0.062	0.305	50.10	1.076	51.86	0.761
	14	0.010	0.928	0.000	5.190	51.03	0.207	52.20	7.157
	15	0.000	7.635	0.002	0.918	51.00	---	65.14	5.961

Appendix Table 7A. --Catch statistics in the Eureka region (EUR) in 1984.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.019	0.988	0.031	0.629	36.29	0.758	37.69	1.195
	4	1.130	0.032	1.077	0.032	38.55	0.083	38.95	0.079
	5	0.039	0.443	0.017	0.811	41.96	0.866	41.02	1.862
	6	0.035	0.467	0.009	0.995	45.80	1.019	46.78	2.512
	7	0.079	0.268	0.087	0.194	47.87	0.506	48.18	0.448
	8	0.008	1.160	0.016	0.576	50.81	2.808	51.79	1.347
	9	0.014	0.650	0.007	0.943	50.72	1.011	52.80	2.312
	10	0.004	1.254	0.005	1.181	51.68	2.721	52.26	2.802
	11	0.016	0.636	0.006	0.995	49.90	0.929	53.06	2.531
	12	0.000	3.326	0.000	3.041	53.27	7.133	53.59	7.234
	13	0.001	3.867	0.002	2.002	51.16	3.663	54.14	6.689
	14	0.002	1.800	0.002	1.585	52.74	3.264	53.09	3.043
	15	---	---	---	---	---	---	---	---
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.022	0.858	0.072	0.492	37.09	0.671	39.85	0.432
	4	3.175	0.020	2.750	0.023	40.06	0.044	40.57	0.043
	5	0.071	0.557	0.048	0.624	41.25	1.110	41.75	1.143
	6	0.098	0.255	0.031	0.526	46.11	0.559	47.40	1.549
	7	0.116	0.243	0.125	0.206	47.85	0.655	48.02	0.569
	8	0.022	0.698	0.028	0.491	47.82	0.975	49.40	0.806
	9	0.005	1.246	0.007	1.036	51.81	2.954	53.58	3.736
	10	0.005	1.428	0.014	0.605	51.30	2.252	51.36	0.836
	11	0.009	0.841	0.009	0.791	51.68	1.402	55.18	3.682
	12	0.001	3.678	0.003	0.946	52.83	6.672	61.78	7.076
	13	0.001	2.104	0.001	4.326	54.13	7.156	50.60	3.176
	14	0.005	0.901	0.008	0.767	51.90	1.857	52.25	0.779
	15	---	---	---	---	---	---	---	---
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 7B. --Catch statistics in the South Columbia region (SCOL) in 1984.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.096	0.923	0.096	0.929	40.61	0.982	40.65	0.888
	4	19.885	0.016	21.086	0.014	39.60	0.037	39.97	0.029
	5	0.805	0.311	0.665	0.351	41.22	0.496	41.56	0.571
	6	0.550	0.268	0.331	0.311	45.32	0.701	46.42	0.876
	7	1.019	0.140	0.662	0.174	46.88	0.395	47.55	0.615
	8	0.111	0.457	0.114	0.402	49.54	1.154	51.11	1.019
	9	0.037	0.708	0.112	0.397	50.28	1.016	51.84	1.134
	10	0.027	0.674	0.035	0.703	52.41	1.707	54.57	2.395
	11	0.043	0.511	0.166	0.285	51.79	0.728	52.81	0.682
	12	0.004	1.029	0.036	0.506	55.39	2.973	56.87	1.211
	13	0.018	0.804	0.016	0.778	52.71	1.432	55.45	1.961
	14	0.054	0.656	0.043	0.557	48.64	1.196	56.02	1.942
	15	---	---	0.006	0.544	---	---	64.00	---
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.686	0.390	0.198	0.620	38.05	0.349	37.55	0.923
	4	21.478	0.021	18.676	0.021	40.23	0.049	40.59	0.056
	5	0.791	0.384	0.619	0.430	41.84	0.476	42.44	0.620
	6	0.549	0.356	0.515	0.453	44.36	1.121	45.55	0.802
	7	1.183	0.192	0.700	0.231	46.76	0.515	47.31	0.673
	8	0.055	0.792	0.135	0.395	49.93	1.988	50.92	1.389
	9	0.028	1.212	0.029	0.820	51.81	2.430	53.54	2.748
	10	0.058	0.760	0.067	0.661	50.75	1.581	50.00	1.827
	11	0.066	0.740	0.118	0.404	50.24	0.998	52.79	1.649
	12	0.003	4.316	0.023	0.795	52.04	4.674	51.92	1.466
	13	0.028	0.858	0.034	0.686	50.17	0.337	52.83	1.023
	14	0.010	1.942	0.020	0.675	52.28	5.273	60.05	5.769
	15	---	---	0.022	0.831	---	---	53.00	---
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.876	0.630	0.303	0.955	39.70	0.752	40.26	1.686
	4	15.266	0.045	11.062	0.034	40.03	0.085	40.47	0.078
	5	0.421	0.821	0.101	1.624	41.48	1.264	42.40	4.646
	6	0.178	1.014	0.118	1.135	45.80	3.888	45.51	5.485
	7	0.938	0.256	0.475	0.322	47.12	0.690	48.06	1.161
	8	0.069	1.272	0.067	0.850	49.55	3.055	51.73	2.952
	9	0.038	1.333	0.047	0.942	51.30	2.893	52.62	2.684
	10	0.032	1.708	0.039	1.140	50.30	5.101	51.82	3.291
	11	0.036	1.367	0.059	0.738	51.60	3.050	54.77	3.008
	12	0.046	0.685	0.006	2.298	51.06	0.121	54.15	6.598
	13	0.006	3.540	0.011	1.662	51.51	4.924	54.55	5.914
	14	0.010	1.960	0.013	1.912	52.06	6.872	52.12	6.099
	15	---	---	---	---	---	---	---	---

Appendix Table 7C. --Catch statistics in the Vancouver/North Columbia region (VNC) in 1984.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.006	3.158	0.042	0.935	37.90	2.564	39.80	0.621
	4	3.783	0.041	5.422	0.026	41.07	0.114	41.71	0.080
	5	0.455	0.280	0.558	0.205	42.33	1.041	44.26	0.573
	6	0.432	0.205	0.250	0.264	45.63	0.502	47.38	0.725
	7	1.719	0.076	1.251	0.089	46.87	0.228	48.00	0.247
	8	0.086	0.384	0.196	0.264	49.07	0.838	50.26	0.797
	9	0.091	0.525	0.095	0.389	49.65	1.358	50.58	1.111
	10	0.075	0.355	0.051	0.504	50.60	0.829	52.09	1.451
	11	0.091	0.363	0.082	0.329	51.09	0.646	53.71	0.556
	12	0.002	2.034	0.004	1.287	54.61	5.754	57.75	3.660
	13	0.002	2.221	0.034	0.500	53.63	6.527	52.02	0.844
	14	0.005	1.736	0.035	0.596	52.60	6.004	53.31	0.586
	15	---	---	---	---	---	---	---	---
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.011	2.582	0.008	2.554	37.42	4.023	37.39	4.014
	4	12.401	0.026	14.234	0.026	41.88	0.090	42.40	0.086
	5	0.441	0.381	1.123	0.233	43.41	0.560	43.51	0.554
	6	0.904	0.239	0.455	0.352	46.87	0.413	47.43	0.588
	7	3.442	0.094	2.735	0.104	47.83	0.246	48.81	0.324
	8	0.479	0.303	0.226	0.394	49.51	0.818	51.90	0.925
	9	0.269	0.376	0.181	0.454	51.10	0.915	53.33	0.917
	10	0.070	0.714	0.088	0.615	50.82	1.726	55.93	2.114
	11	0.182	0.391	0.246	0.400	52.04	0.737	52.22	1.428
	12	0.004	2.376	0.064	0.724	54.14	6.773	55.71	0.664
	13	0.007	1.770	0.018	1.274	54.42	6.788	55.69	4.265
	14	0.045	0.684	0.039	0.701	53.68	1.413	55.86	2.097
	15	---	---	---	---	---	---	---	---
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.004	2.711	0.057	0.645	37.84	4.496	38.42	0.468
	4	4.297	0.031	4.633	0.028	41.60	0.077	42.00	0.082
	5	0.384	0.231	0.440	0.213	43.14	0.491	44.41	0.493
	6	0.349	0.214	0.223	0.277	46.09	0.423	47.80	0.644
	7	1.554	0.081	0.939	0.117	47.37	0.258	47.70	0.403
	8	0.183	0.272	0.306	0.217	49.76	0.441	50.72	0.553
	9	0.118	0.344	0.128	0.334	51.58	0.609	52.28	0.946
	10	0.113	0.333	0.111	0.392	49.82	0.839	52.23	0.787
	11	0.040	0.561	0.132	0.304	52.50	0.977	53.25	0.614
	12	0.002	2.142	0.008	1.673	54.43	6.195	55.45	2.818
	13	0.004	1.445	0.008	1.000	55.10	5.982	57.15	3.470
	14	0.007	1.555	0.005	1.701	53.34	2.366	52.86	3.391
	15	---	---	---	---	---	---	---	---

Appendix Table 8A. --Catch statistics in the Eureka region (EUR) in 1985.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---
Middle period	1	---	---	---	---	---	---	---	---
	2	0.012	0.513	0.000	7.144	36.25	1.696	40.00	---
	3	0.161	0.075	0.030	0.718	38.01	0.066	38.03	0.230
	4	0.939	0.167	0.673	0.171	41.04	0.227	41.88	0.278
	5	5.247	0.037	3.753	0.037	42.30	0.072	42.95	0.078
	6	0.386	0.307	0.143	0.445	43.52	0.627	43.73	0.837
	7	0.026	0.845	0.024	1.166	47.90	1.451	48.13	1.699
	8	0.027	0.953	0.030	0.850	48.54	1.918	48.99	1.836
	9	0.002	3.409	0.002	2.438	49.05	3.353	50.19	3.960
	10	0.000	4.983	0.001	1.992	50.41	2.327	52.59	3.405
	11	---	---	---	---	---	---	---	---
	12	---	---	0.001	0.707	---	---	56.00	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---
Late period	1	0.017	0.191	0.011	0.263	30.77	0.196	31.82	0.256
	2	0.002	1.386	0.002	1.299	33.07	6.683	32.91	5.787
	3	0.004	0.516	0.002	0.859	33.97	2.418	33.71	4.520
	4	0.076	0.425	0.048	0.507	41.75	0.372	43.35	0.863
	5	0.474	0.082	0.285	0.101	42.61	0.120	43.16	0.162
	6	0.037	0.538	0.019	0.792	44.37	0.855	43.45	1.199
	7	0.005	1.054	0.004	0.805	48.43	2.360	50.03	3.082
	8	0.007	0.869	0.004	0.659	48.67	1.767	50.46	2.062
	9	0.000	3.048	0.001	1.540	49.37	3.037	52.50	3.576
	10	0.000	4.036	0.000	2.171	50.99	3.560	52.59	3.446
	11	---	---	---	---	---	---	---	---
	12	---	---	0.000	1.000	---	---	56.00	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 8B. --Catch statistics in the South Columbia reg on (SCOL) in 1985

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	0.005	0.408	0.001	1.000	27.33	1.217	34.00	---
	2	0.016	4.148	0.006	7.081	38.19	7.516	40.00	---
	3	0.061	1.097	0.036	1.119	38.31	1.846	38.31	1.871
	4	0.925	0.508	0.300	1.110	41.69	0.659	41.44	1.307
	5	5.418	0.097	6.277	0.066	42.82	0.194	43.30	0.139
	6	0.268	0.784	0.217	1.033	46.12	2.758	45.55	3.260
	7	0.118	0.998	0.130	0.780	48.47	2.334	49.49	2.437
	8	0.154	0.744	0.218	0.505	49.19	2.013	50.37	1.622
	9	0.012	2.037	0.028	1.200	50.91	3.916	52.84	4.268
	10	0.004	2.437	0.015	1.363	51.99	3.893	53.34	1.774
	11	---	---	---	---	---	---	---	---
	12	0.002	0.577	0.013	0.250	56.00	---	56.00	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---
Middle period	1	0.034	0.128	0.002	0.577	26.33	0.168	32.00	0.544
	2	0.016	0.680	0.031	0.875	36.26	2.453	37.93	0.727
	3	0.214	0.070	0.030	0.899	38.00	0.097	38.10	0.668
	4	2.333	0.184	0.927	0.282	41.68	0.260	42.46	0.450
	5	15.833	0.037	12.186	0.035	42.67	0.060	43.23	0.067
	6	2.348	0.179	1.687	0.204	44.05	0.335	44.11	0.358
	7	0.567	0.295	0.396	0.286	46.83	0.795	48.74	0.502
	8	0.414	0.275	0.247	0.250	48.96	0.612	51.30	0.859
	9	0.040	0.709	0.022	0.774	50.87	1.048	55.09	2.924
	10	0.010	0.808	0.007	1.495	53.52	1.732	53.27	2.169
	11	---	---	0.032	0.641	---	---	52.38	0.295
	12	0.006	0.316	0.046	0.288	56.00	---	55.34	0.369
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---
Late period	1	1.023	0.160	1.066	0.131	30.48	0.103	30.61	0.283
	2	0.328	0.462	0.107	0.655	36.28	1.766	32.95	1.203
	3	0.450	0.305	0.112	0.342	37.17	0.862	36.29	1.141
	4	2.518	0.188	1.338	0.231	41.93	0.268	42.41	0.355
	5	20.058	0.028	12.369	0.031	42.80	0.061	43.60	0.074
	6	1.127	0.239	0.810	0.266	46.18	0.618	45.54	0.738
	7	0.673	0.264	0.340	0.414	48.88	0.599	50.10	0.935
	8	0.633	0.266	0.388	0.357	49.49	0.653	51.61	0.817
	9	0.056	0.729	0.142	0.523	52.61	2.026	53.15	1.013
	10	0.041	0.747	0.040	1.302	52.59	0.868	53.60	1.195
	11	---	---	0.032	0.715	---	---	56.00	---
	12	0.018	0.215	0.157	0.432	56.00	---	52.42	1.003
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 8C. --Catch statistics in the Vancouver/North Columbia region (VNC) in 1985.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.001	7.141	0.001	7.148	40.00	---	40.00	---
	3	0.010	0.501	0.008	0.537	38.12	0.819	38.13	0.864
	4	0.129	0.448	0.102	0.409	41.78	0.597	42.37	0.680
	5	1.172	0.067	1.345	0.052	43.81	0.177	44.09	0.137
	6	0.145	0.324	0.129	0.326	46.93	0.825	47.29	0.907
	7	0.180	0.243	0.111	0.275	48.53	0.450	48.99	0.541
	8	0.119	0.300	0.180	0.221	49.03	0.463	49.36	0.652
	9	0.005	1.307	0.024	0.690	52.61	4.468	50.32	1.057
	10	0.002	1.807	0.003	1.516	52.69	3.332	53.22	2.122
	11	---	---	---	---	---	---	---	---
	12	0.001	0.707	0.004	0.409	56.00	---	56.00	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---
Middle period	1	0.001	1.000	0.001	1.000	34.00	---	31.00	---
	2	0.004	3.749	0.002	7.124	38.10	7.134	40.00	---
	3	0.080	0.183	0.047	0.326	38.01	0.327	38.09	0.589
	4	0.813	0.223	0.595	0.255	41.96	0.382	42.68	0.572
	5	10.947	0.027	12.073	0.022	44.07	0.082	44.61	0.074
	6	1.232	0.161	0.633	0.218	46.76	0.425	47.11	0.480
	7	0.723	0.201	0.731	0.187	48.81	0.439	48.83	0.389
	8	1.767	0.106	2.116	0.094	49.53	0.246	50.12	0.232
	9	0.147	0.422	0.087	0.422	50.57	0.927	55.03	0.864
	10	0.051	0.620	0.145	0.448	51.87	1.161	52.81	0.755
	11	---	---	0.164	0.419	---	---	53.36	0.671
	12	0.023	0.248	0.072	0.505	56.00	---	55.74	0.557
	13	---	---	0.001	1.886	---	---	68.00	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---
Late period	1	0.007	0.213	0.000	0.882	26.55	0.292	33.33	0.770
	2	0.000	7.123	0.000	4.905	40.00	---	37.47	12.487
	3	0.007	0.428	0.004	0.645	38.11	0.714	37.78	1.345
	4	0.028	1.022	0.023	1.143	41.46	1.916	41.91	1.824
	5	0.289	0.180	0.279	0.186	44.02	0.485	44.19	0.447
	6	0.047	0.827	0.047	0.832	46.82	1.899	46.88	1.880
	7	0.034	0.864	0.038	0.778	48.76	1.666	49.25	1.931
	8	0.049	0.630	0.058	0.532	49.36	1.335	49.93	1.447
	9	0.004	2.300	0.005	1.923	50.39	3.887	50.96	3.908
	10	0.002	2.050	0.004	1.623	52.40	4.075	52.84	3.083
	11	---	---	---	---	---	---	---	---
	12	0.000	1.000	0.002	0.407	56.00	---	56.00	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 9A. --Catch statistics in the Eureka region (EUR) in 1986.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.086	0.645	0.056	0.475	37.18	1.414	35.84	1.815
	3	0.045	1.448	0.138	0.629	39.20	3.933	40.65	0.602
	4	0.012	4.053	0.007	4.464	41.56	8.236	42.21	8.398
	5	0.904	0.437	0.309	0.618	41.96	0.461	42.66	0.536
	6	6.163	0.088	4.695	0.069	43.71	0.135	44.35	0.119
	7	0.680	0.564	0.433	0.539	43.14	0.597	45.57	0.641
	8	0.151	0.669	0.133	0.604	47.75	1.892	48.77	1.951
	9	0.552	0.385	0.123	0.513	47.25	0.812	50.52	2.071
	10	0.009	1.871	0.010	1.335	51.17	4.379	52.71	4.111
	11	0.032	0.431	0.036	0.430	52.28	0.847	54.97	1.248
	12	0.002	3.219	0.006	0.618	52.52	5.339	60.27	4.614
	13	0.014	0.719	0.015	0.542	53.61	1.291	56.11	1.885
	14	0.001	2.741	0.005	1.341	54.29	8.528	56.21	2.054
	15	---	---	0.002	0.577	---	---	66.00	---
Middle period	1	---	---	---	---	---	---	---	---
	2	4.110	0.062	4.761	0.051	34.93	0.107	35.25	0.117
	3	1.580	0.233	1.186	0.204	38.18	0.784	36.80	0.499
	4	0.200	0.597	0.232	0.423	39.21	1.260	41.35	1.512
	5	1.333	0.350	0.828	0.354	42.66	0.424	44.00	0.457
	6	17.454	0.046	11.306	0.046	43.24	0.077	43.89	0.075
	7	1.553	0.293	1.553	0.250	44.34	0.497	44.13	0.295
	8	1.323	0.330	0.446	0.449	44.70	0.446	46.04	0.794
	9	0.756	0.297	0.651	0.277	47.30	0.522	48.02	0.939
	10	0.060	0.587	0.010	1.085	50.29	0.825	54.27	4.228
	11	0.036	0.750	0.022	0.569	50.65	0.689	55.23	1.890
	12	0.022	0.793	0.040	0.399	51.04	0.134	53.52	0.612
	13	0.014	0.733	0.027	0.590	53.17	0.956	53.38	1.868
	14	0.001	2.503	0.003	1.458	54.82	8.768	58.84	8.076
	15	---	---	0.032	0.609	---	---	52.81	1.057
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 9B. --Catch statistics in the South Columbia region (SCOL) in 1986.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.776	0.146	1.063	0.112	33.25	0.368	33.04	0.319
	3	0.263	0.419	0.379	0.311	33.42	1.079	35.72	1.119
	4	0.008	3.069	0.074	0.934	40.21	7.671	42.82	0.724
	5	0.379	0.483	0.601	0.310	44.02	0.519	42.93	0.547
	6	9.111	0.037	7.882	0.047	43.99	0.078	44.85	0.134
	7	1.080	0.217	1.543	0.203	46.00	0.541	46.02	0.448
	8	0.615	0.256	0.295	0.328	47.76	0.603	49.89	0.727
	9	0.712	0.172	0.695	0.206	49.73	0.486	50.21	0.601
	10	0.061	0.619	0.140	0.398	50.85	1.245	53.45	1.326
	11	0.015	0.669	0.100	0.283	56.14	2.662	56.46	0.833
	12	0.012	0.770	0.047	0.396	55.41	1.571	57.75	0.934
	13	0.023	0.701	0.080	0.319	53.25	1.012	57.81	1.364
	14	0.027	0.728	0.014	0.659	52.28	1.164	57.17	1.837
	15	---	---	0.001	0.818	---	---	69.82	2.015
Middle period	1	---	---	---	---	---	---	---	---
	2	5.243	0.063	5.683	0.062	35.33	0.166	34.92	0.138
	3	0.849	0.345	1.579	0.241	36.36	0.894	37.47	0.456
	4	0.017	2.962	0.280	0.551	40.01	8.756	40.71	0.834
	5	0.968	0.425	0.501	0.552	42.30	0.794	43.50	0.948
	6	21.331	0.036	15.179	0.047	43.51	0.073	44.08	0.120
	7	2.063	0.272	1.316	0.338	43.62	0.547	45.18	0.525
	8	0.647	0.486	1.369	0.312	45.79	1.202	45.19	0.622
	9	1.250	0.228	0.976	0.272	48.45	0.382	48.47	0.589
	10	0.222	0.652	0.136	0.602	48.88	0.755	51.84	0.896
	11	0.138	0.658	0.147	0.622	50.60	1.122	51.52	1.564
	12	0.005	2.489	0.015	1.425	54.13	6.695	57.51	8.031
	13	0.019	1.404	0.070	0.661	53.93	2.897	54.94	1.780
	14	0.014	0.761	0.006	2.308	56.37	2.794	54.73	7.862
	15	---	---	0.001	1.000	---	---	66.00	---
Late period	1	---	---	---	---	---	---	---	---
	2	16.925	0.041	17.888	0.050	36.11	0.068	36.26	0.066
	3	2.565	0.264	2.974	0.288	37.45	0.560	37.29	0.341
	4	0.191	0.913	0.345	0.693	44.16	2.513	38.36	0.460
	5	0.346	0.618	0.059	1.524	43.79	1.461	41.22	3.938
	6	9.243	0.052	7.190	0.048	43.77	0.133	44.66	0.157
	7	0.590	0.406	0.824	0.290	44.95	1.003	45.85	0.759
	8	0.502	0.347	0.383	0.429	48.08	0.699	47.52	0.927
	9	0.834	0.250	0.451	0.220	48.60	0.741	50.89	0.569
	10	0.059	0.644	0.062	0.539	51.72	0.987	53.50	1.466
	11	0.008	1.925	0.067	0.365	53.28	5.338	56.68	1.891
	12	0.004	1.552	0.048	0.520	57.17	7.605	55.19	1.213
	13	0.057	0.562	0.059	0.486	51.53	0.600	54.79	1.359
	14	0.004	1.594	0.004	1.527	55.54	4.166	55.76	3.593
	15	---	---	0.004	0.500	---	---	66.00	---

Appendix Table 9C. --Catch statistics in the Vancouver/North Columbia region (VNC) in 1986.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.237	0.158	0.407	0.099	34.87	0.381	34.78	0.255
	3	0.043	0.869	0.056	0.725	36.48	2.862	36.97	2.472
	4	0.202	0.607	0.149	0.746	42.51	0.477	44.08	0.885
	5	0.848	0.293	0.608	0.360	43.33	0.442	44.47	0.472
	6	13.557	0.031	13.436	0.029	44.24	0.059	45.03	0.058
	7	1.724	0.183	1.605	0.176	46.32	0.363	46.16	0.424
	8	0.818	0.189	0.740	0.234	48.70	0.404	48.51	0.593
	9	0.759	0.172	0.626	0.168	49.72	0.460	50.55	0.410
	10	0.112	0.384	0.183	0.277	51.95	0.801	52.15	0.608
	11	0.012	1.069	0.126	0.305	55.77	2.817	54.23	1.274
	12	0.004	2.621	0.059	0.448	54.22	3.591	53.42	0.653
	13	0.010	1.393	0.057	0.374	54.35	1.926	55.49	0.904
	14	0.005	1.403	0.004	1.529	56.02	2.669	56.17	3.038
	15	---	---	0.000	1.414	---	---	66.00	---
Middle period	1	---	---	---	---	---	---	---	---
	2	0.499	0.073	0.548	0.087	34.60	0.175	34.79	0.167
	3	0.106	0.450	0.072	0.668	37.87	1.817	36.45	2.350
	4	0.006	4.823	0.030	1.104	42.38	9.552	41.16	2.409
	5	0.281	0.674	0.301	0.502	42.76	0.536	42.35	0.639
	6	10.539	0.055	10.789	0.052	44.11	0.095	44.97	0.097
	7	1.837	0.256	2.073	0.231	45.83	0.439	46.12	0.393
	8	1.166	0.267	1.000	0.299	47.38	0.529	47.89	0.619
	9	1.493	0.165	0.978	0.184	48.98	0.414	50.89	0.511
	10	0.073	0.409	0.056	0.497	53.18	0.943	54.72	1.958
	11	0.015	0.705	0.153	0.489	57.27	4.023	52.09	1.862
	12	0.026	0.847	0.045	0.559	52.00	0.971	54.58	1.027
	13	0.077	0.416	0.141	0.306	52.90	0.637	54.69	0.957
	14	0.007	1.476	0.010	0.876	55.81	2.376	56.39	2.586
	15	0.001	1.000	0.003	0.408	66.00	---	66.00	---
Late period	1	---	---	---	---	---	---	---	---
	2	1.013	0.203	1.442	0.190	36.31	0.298	36.59	0.227
	3	0.195	0.971	0.475	0.553	37.14	1.393	37.01	0.681
	4	0.023	2.969	0.022	2.930	38.90	6.746	39.07	7.476
	5	0.310	0.599	0.565	0.483	43.88	1.185	46.25	1.203
	6	5.528	0.066	5.097	0.095	44.34	0.204	45.18	0.286
	7	1.071	0.285	1.137	0.344	47.39	0.839	46.17	0.851
	8	0.541	0.422	0.388	0.638	48.35	0.740	50.75	1.475
	9	0.549	0.366	0.729	0.398	50.24	0.721	51.43	0.940
	10	0.061	1.250	0.229	0.665	52.58	2.855	51.90	1.335
	11	0.033	1.419	0.086	0.883	54.68	5.126	57.03	5.325
	12	0.010	2.430	0.028	1.436	54.57	7.865	57.32	6.740
	13	0.035	1.565	0.071	0.826	53.11	2.026	55.97	2.718
	14	0.009	2.052	0.032	1.357	54.90	7.001	55.87	3.108
	15	---	---	0.002	0.447	---	---	66.00	---

Appendix Table 10A. --Catch statistics in the Eureka region (EUR) in 1987.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.124	0.119	0.113	0.093	39.12	0.207	39.78	0.184
	4	0.005	2.005	0.002	2.043	38.65	2.305	39.40	3.185
	5	0.000	5.220	0.000	5.753	42.42	10.944	41.64	8.709
	6	0.001	3.161	0.001	3.360	41.86	8.041	41.27	5.196
	7	0.048	0.234	0.025	0.347	43.87	0.721	43.21	0.705
	8	0.001	2.163	0.001	1.027	45.35	3.198	46.16	1.890
	9	0.000	6.362	0.000	5.674	45.55	3.859	46.05	4.778
	10	0.001	1.552	0.000	2.063	47.37	3.531	46.21	3.918
	11	0.000	11.265	0.000	14.238	48.00	---	48.00	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	0.000	7.195	0.000	13.270	47.96	9.849	46.00	---
	15	---	---	---	---	---	---	---	---
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 10B.--Catch statistics in the South Columbia region (SCOL) in 1987.

	Age	No. of males	CV	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	7.070	0.059	7.679	0.073	37.73	0.110	37.77	0.158
	4	0.609	0.605	0.881	0.518	37.64	0.463	39.62	0.992
	5	0.006	5.076	0.006	4.998	43.23	9.975	42.67	9.979
	6	0.025	2.568	0.030	3.017	43.66	8.241	42.76	8.830
	7	5.196	0.052	5.381	0.077	45.03	0.160	45.32	0.322
	8	0.177	0.795	0.050	1.494	46.25	1.145	47.40	4.038
	9	0.020	2.247	0.016	2.206	49.34	6.888	49.33	5.866
	10	0.404	0.305	0.300	0.397	50.07	0.809	51.87	1.360
	11	0.010	2.014	0.019	1.661	53.33	5.834	53.83	4.565
	12	---	---	---	---	---	---	---	---
	13	0.004	1.106	0.013	1.038	56.00	---	56.00	---
	14	0.019	1.743	0.064	0.618	51.59	4.141	54.85	2.320
	15	---	---	---	---	---	---	---	---
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	25.476	0.035	28.409	0.026	39.64	0.077	39.97	0.054
	4	1.384	0.285	0.859	0.347	39.93	0.732	41.86	0.784
	5	0.007	5.072	0.370	0.489	42.42	11.594	42.59	1.399
	6	0.618	0.482	0.177	0.739	40.70	0.931	44.97	2.577
	7	24.143	0.040	17.297	0.048	44.42	0.119	45.12	0.155
	8	1.113	0.318	1.004	0.331	45.32	0.453	45.89	0.644
	9	0.168	0.910	0.118	0.877	45.54	1.221	47.03	1.436
	10	2.338	0.182	2.019	0.186	48.00	0.445	48.28	0.428
	11	0.228	0.478	0.129	0.592	50.39	0.886	52.91	1.222
	12	---	---	0.083	0.869	---	---	51.00	---
	13	0.003	1.287	0.010	1.246	56.00	---	56.00	---
	14	0.109	0.818	0.133	0.463	49.97	0.996	54.14	1.144
	15	---	---	---	---	---	---	---	---
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	17.651	0.057	20.574	0.039	39.61	0.082	40.29	0.065
	4	0.550	0.555	0.776	0.426	39.97	1.064	40.01	0.715
	5	0.564	0.592	0.220	0.690	42.29	1.355	43.86	0.805
	6	0.024	2.643	0.329	0.626	43.10	8.244	45.84	0.705
	7	18.282	0.058	9.721	0.084	43.58	0.176	44.53	0.277
	8	0.466	0.518	0.724	0.384	44.98	0.804	46.15	1.117
	9	0.138	0.524	0.783	0.416	50.36	0.909	44.93	1.282
	10	1.641	0.212	1.344	0.190	48.06	0.588	49.73	0.637
	11	0.010	2.248	0.016	1.489	53.62	11.316	54.42	5.434
	12	---	---	---	---	---	---	---	---
	13	0.007	1.044	0.015	0.891	56.00	---	59.50	3.306
	14	0.182	0.632	0.176	0.425	48.06	1.338	53.73	1.196
	15	---	---	---	---	---	---	---	---

Appendix Table 10C. --Catch statistics in the Vancouver/North Columbia region (VNC) in 1987.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	2.390	0.057	3.178	0.059	39.66	0.153	40.37	0.166
	4	0.085	0.647	0.232	0.414	40.32	1.134	42.16	0.943
	5	0.069	0.971	0.089	0.708	45.92	0.454	43.23	0.693
	6	0.176	0.564	0.087	0.704	42.94	0.689	45.88	1.876
	7	15.904	0.023	15.135	0.022	45.35	0.060	46.07	0.059
	8	0.886	0.250	0.556	0.282	45.51	0.433	47.01	0.733
	9	0.153	0.585	0.296	0.407	46.62	0.940	48.24	0.639
	10	1.706	0.125	1.486	0.126	49.11	0.290	50.62	0.325
	11	0.059	0.633	0.023	0.462	51.28	0.684	57.63	3.106
	12	---	---	---	---	---	---	---	---
	13	0.011	1.026	0.014	1.003	56.00	---	57.46	1.660
	14	0.149	0.432	0.093	0.386	52.55	0.516	55.97	1.108
	15	---	---	---	---	---	---	---	---
Middle period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	2.476	0.055	3.347	0.071	39.33	0.121	40.40	0.190
	4	0.212	0.545	0.619	0.309	42.34	0.633	42.32	0.767
	5	0.078	0.950	0.111	0.709	42.06	0.595	44.39	2.213
	6	0.245	0.571	0.009	2.565	44.90	1.238	43.75	7.309
	7	13.150	0.026	9.835	0.040	45.07	0.067	45.94	0.097
	8	0.481	0.375	0.624	0.332	47.24	0.720	46.15	0.486
	9	0.090	0.633	0.461	0.387	50.40	0.949	46.58	0.568
	10	1.053	0.180	0.872	0.205	49.49	0.439	49.99	0.594
	11	0.010	1.378	0.026	0.575	54.70	5.284	57.79	3.745
	12	---	---	0.062	0.712	---	---	53.00	---
	13	0.014	0.451	0.034	0.687	56.00	---	55.33	0.325
	14	0.049	0.819	0.161	0.446	50.60	1.098	53.45	0.891
	15	---	---	---	---	---	---	---	---
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	0.895	0.256	1.805	0.179	40.58	0.693	42.18	0.408
	4	0.194	0.597	0.024	1.969	40.94	0.836	39.82	4.435
	5	0.006	5.332	0.107	0.916	43.90	9.083	42.01	0.550
	6	0.583	0.403	0.334	0.545	44.74	0.742	45.32	0.840
	7	7.045	0.077	5.438	0.079	45.13	0.151	45.62	0.232
	8	0.957	0.375	0.605	0.335	46.02	0.415	45.89	0.797
	9	0.428	0.582	0.322	0.456	47.03	0.602	48.71	0.988
	10	0.565	0.374	0.668	0.293	48.45	1.459	48.77	0.765
	11	0.013	1.945	0.014	1.791	53.07	3.429	53.44	5.644
	12	---	---	---	---	---	---	---	---
	13	0.006	1.051	0.012	1.027	56.00	---	56.00	---
	14	0.018	1.577	0.060	0.632	52.82	6.849	53.56	1.488
	15	---	---	---	---	---	---	---	---

Appendix Table 11A. --Catch statistics in the Eureka region (EUR) in 1988.

	Age	No. of males	CV	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---
Middle period	1	0.003	0.577	---	---	26.00	---	---	---
	2	0.583	0.456	0.250	0.450	36.45	0.366	36.34	0.880
	3	0.244	0.546	0.306	0.518	38.63	0.307	37.96	1.017
	4	17.347	0.037	15.693	0.031	41.28	0.079	41.61	0.077
	5	0.826	0.371	0.461	0.402	39.97	0.897	41.41	0.938
	6	0.002	6.508	0.205	0.595	44.32	7.665	43.25	1.222
	7	0.160	0.462	0.064	0.903	46.54	0.672	45.20	1.001
	8	8.463	0.065	6.245	0.069	44.47	0.153	45.23	0.162
	9	0.330	0.467	0.108	0.597	44.54	1.045	47.97	1.550
	10	0.025	0.845	0.067	0.823	49.39	0.756	46.23	1.337
	11	0.748	0.221	0.527	0.252	47.20	0.691	48.73	1.056
	12	0.000	6.340	0.012	0.997	50.00	---	52.74	1.523
	13	0.000	15.748	0.001	2.000	58.00	---	58.00	---
	14	---	---	---	---	---	---	---	---
	15	0.024	0.590	0.079	0.355	52.58	0.658	53.34	1.127
Late period	1	---	---	---	---	---	---	---	---
	2	---	---	---	---	---	---	---	---
	3	---	---	---	---	---	---	---	---
	4	---	---	---	---	---	---	---	---
	5	---	---	---	---	---	---	---	---
	6	---	---	---	---	---	---	---	---
	7	---	---	---	---	---	---	---	---
	8	---	---	---	---	---	---	---	---
	9	---	---	---	---	---	---	---	---
	10	---	---	---	---	---	---	---	---
	11	---	---	---	---	---	---	---	---
	12	---	---	---	---	---	---	---	---
	13	---	---	---	---	---	---	---	---
	14	---	---	---	---	---	---	---	---
	15	---	---	---	---	---	---	---	---

Appendix Table 11B. --Catch statistics in the South Columbia region (SCOL) in 1988.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.033	1.887	0.027	0.974	35.32	1.292	35.56	1.580
	3	0.137	0.686	0.082	0.951	38.60	0.442	39.93	0.436
	4	15.667	0.036	14.872	0.034	41.04	0.070	41.56	0.075
	5	0.944	0.347	0.768	0.355	42.10	0.516	42.70	0.546
	6	0.079	0.968	0.254	0.611	44.98	0.245	42.30	1.079
	7	0.488	0.426	0.013	2.204	43.66	1.100	46.47	6.439
	8	5.960	0.084	4.208	0.099	44.86	0.193	45.30	0.224
	9	0.718	0.296	0.101	0.757	45.59	0.465	48.03	1.445
	10	0.007	1.991	0.079	0.849	50.73	2.737	48.26	0.493
	11	0.338	0.369	0.587	0.293	47.57	1.066	47.32	0.951
	12	0.001	6.323	0.001	6.327	50.00	---	50.00	---
	13	0.000	2.236	0.002	1.819	58.00	---	58.00	---
	14	---	---	---	---	---	---	---	---
	15	0.028	0.499	0.019	0.816	52.89	1.013	55.24	3.293
Middle period	1	---	---	---	---	---	---	---	---
	2	0.030	1.322	0.047	1.172	35.45	1.758	35.73	1.865
	3	0.005	4.117	0.010	3.652	39.37	8.013	38.79	5.747
	4	14.167	0.045	13.091	0.045	41.75	0.093	42.27	0.087
	5	0.418	0.504	0.633	0.422	39.65	0.774	42.48	0.958
	6	0.084	0.972	0.003	6.258	45.94	0.510	44.47	7.484
	7	0.054	0.999	0.016	2.385	47.27	2.616	45.94	5.765
	8	7.941	0.077	5.975	0.093	45.20	0.167	45.74	0.257
	9	0.382	0.546	0.131	0.550	45.01	0.526	48.54	1.653
	10	0.005	2.112	0.097	0.904	50.59	2.836	46.44	0.843
	11	0.711	0.284	0.416	0.276	47.71	1.116	50.52	0.982
	12	0.001	6.327	0.001	6.328	50.00	---	50.00	---
	13	0.001	2.082	0.001	2.016	58.00	---	58.00	---
	14	---	---	---	---	---	---	---	---
	15	0.067	0.544	0.038	0.523	50.76	0.999	56.33	2.116
Late period	1	---	---	---	---	---	---	---	---
	2	0.007	2.911	0.004	2.814	37.49	1.463	37.01	2.690
	3	0.006	3.899	0.004	3.760	38.83	7.018	39.07	7.218
	4	7.838	0.077	8.035	0.061	42.12	0.152	43.16	0.126
	5	0.346	0.612	0.160	0.884	42.39	0.992	42.83	0.460
	6	0.173	0.958	0.131	0.700	43.04	0.282	47.68	0.799
	7	0.154	0.887	0.083	0.896	46.05	0.743	47.64	1.564
	8	9.282	0.070	5.006	0.100	45.17	0.139	46.24	0.222
	9	0.328	0.498	0.281	0.449	47.91	1.053	48.61	0.971
	10	0.124	0.526	0.011	1.840	50.12	0.628	51.12	2.423
	11	0.578	0.323	0.552	0.234	48.67	0.765	50.73	0.610
	12	0.028	0.932	0.001	6.321	50.00	---	50.00	---
	13	0.001	2.097	0.002	1.922	58.00	---	58.00	---
	14	---	---	---	---	---	---	---	---
	15	0.026	0.753	0.105	0.372	54.39	2.256	54.68	0.956

Appendix Table 11C. --Catch statistics in the Vancouver/North Columbia region (VNC) in 1988.

	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
Early period	1	---	---	---	---	---	---	---	---
	2	0.032	1.976	0.022	1.504	35.59	1.769	36.06	1.519
	3	0.003	3.728	0.003	3.722	39.05	6.803	39.07	6.283
	4	12.510	0.028	12.218	0.026	41.13	0.066	41.79	0.062
	5	0.412	0.423	0.697	0.293	41.95	0.714	41.18	0.572
	6	0.001	6.149	0.136	0.709	44.57	7.076	42.80	0.670
	7	0.276	0.428	0.141	0.492	44.76	0.713	46.25	0.634
	8	5.848	0.057	3.729	0.068	45.24	0.116	46.23	0.155
	9	0.382	0.335	0.232	0.420	45.50	0.445	45.43	0.611
	10	0.023	0.603	0.034	0.867	51.83	0.606	48.93	1.524
	11	0.324	0.303	0.538	0.199	48.03	0.828	49.01	0.604
	12	0.000	6.334	0.003	1.263	50.00	---	57.56	7.714
	13	0.000	3.187	0.003	1.799	58.00	---	58.00	---
	14	---	---	---	---	---	---	---	---
	15	0.010	1.011	0.047	0.553	54.08	2.647	55.06	1.331
Middle period	1	---	---	---	---	---	---	---	---
	2	0.064	1.484	0.055	1.268	35.65	1.957	35.37	3.155
	3	0.016	3.796	0.243	0.875	39.04	7.385	39.88	0.563
	4	9.956	0.099	12.503	0.069	41.50	0.206	42.29	0.151
	5	1.358	0.608	0.588	0.658	43.03	0.706	43.93	1.806
	6	0.009	6.145	0.010	6.315	44.58	7.478	44.57	8.448
	7	0.830	0.527	0.060	2.371	46.08	0.592	46.70	5.727
	8	9.833	0.116	7.477	0.115	45.48	0.216	46.69	0.300
	9	1.274	0.449	0.542	0.563	45.01	1.099	47.47	1.079
	10	0.121	0.638	0.077	0.840	50.59	0.526	50.18	0.560
	11	0.680	0.352	0.876	0.374	49.34	0.984	49.80	1.633
	12	0.002	6.314	0.098	0.927	50.00	---	49.02	0.098
	13	0.004	0.669	0.210	0.889	58.00	---	48.28	0.566
	14	---	---	---	---	---	---	---	---
	15	0.016	1.249	0.097	0.455	53.18	3.360	55.80	1.326
Late period	1	---	---	---	---	---	---	---	---
	2	0.002	3.092	0.002	1.992	37.60	1.318	36.60	2.524
	3	0.187	0.916	0.003	4.445	41.92	0.328	39.53	7.649
	4	5.408	0.118	5.492	0.079	42.98	0.213	43.24	0.171
	5	0.030	2.266	0.022	2.490	41.87	3.906	42.27	3.577
	6	0.190	0.941	0.065	0.919	44.99	0.178	50.54	2.689
	7	0.028	2.203	0.124	0.857	46.49	5.217	48.52	1.604
	8	7.110	0.092	5.798	0.083	45.54	0.193	46.69	0.208
	9	0.103	0.908	0.074	1.210	48.72	3.213	49.24	4.493
	10	0.010	1.918	0.023	1.809	50.87	2.630	51.25	2.305
	11	0.701	0.267	0.522	0.395	49.50	0.608	49.94	1.398
	12	0.001	6.319	0.001	6.319	50.00	---	50.00	---
	13	0.001	2.236	0.005	1.771	58.00	---	58.00	---
	14	---	---	---	---	---	---	---	---
	15	0.021	0.886	0.063	0.804	54.19	2.417	54.46	2.020

Appendix Table 12. --Annual catch statistics for Pacific whiting in the U.S. zone (1977-88).

Year	Age	No. of males	cv	No. of females	c v	Length of males	SD	Length of females	SD
1978	1	0.010	0.323	0.007	0.367	25.28	0.408	26.81	---
	2	0.026	0.237	0.017	0.292	28.71	1.253	27.76	1.894
	3	2.368	0.093	2.158	0.090	42.42	0.178	42.93	0.169
	4	4.624	0.095	3.875	0.086	44.42	0.191	44.73	0.158
	5	24.972	0.037	26.475	0.029	46.17	0.074	46.88	0.065
	6	4.864	0.104	4.549	0.096	46.60	0.204	47.87	0.182
	7	13.636	0.059	6.570	0.078	48.85	0.114	49.48	0.137
	8	18.937	0.043	19.404	0.036	49.50	0.076	50.53	0.080
	9	3.185	0.111	2.514	0.098	51.19	0.269	52.71	0.283
	10	1.073	0.168	1.391	0.111	51.55	0.469	54.14	0.337
	11	0.258	0.212	1.014	0.117	53.54	0.342	54.65	0.359
	12	0.108	0.325	0.408	0.173	53.92	0.544	55.72	0.571
	13	0.002	0.996	0.191	0.211	58.00	0.000	56.61	0.825
	14	0.001	0.986	0.044	0.268	60.00	---	58.92	0.738
	15	0.000	---	0.008	0.505	---	---	63.33	---
1979	1	0.000	---	0.000	---	---	---	---	---
	2	1.890	0.104	2.410	0.091	32.76	0.222	33.07	0.199
	3	4.549	0.057	4.213	0.062	34.78	0.227	34.61	0.208
	4	9.632	0.112	7.675	0.078	44.31	0.278	44.63	0.287
	5	4.965	0.189	5.142	0.115	46.14	0.256	46.97	0.226
	6	24.379	0.064	23.359	0.046	47.24	0.121	48.51	0.098
	7	8.624	0.118	6.703	0.106	49.27	0.226	50.79	0.211
	8	17.612	0.069	11.626	0.073	50.05	0.157	51.14	0.168
	9	9.562	0.099	11.063	0.074	50.94	0.190	52.35	0.194
	10	2.313	0.230	1.899	0.160	51.81	0.486	54.87	0.512
	11	0.630	0.266	1.048	0.200	54.31	0.439	55.38	0.770
	12	0.097	0.598	0.402	0.243	53.96	1.936	56.78	0.798
	13	0.000	---	0.217	0.302	---	---	57.76	0.739
	14	0.029	0.877	0.024	0.564	56.00	0.000	61.16	3.939
	15	0.000	---	0.027	0.555	---	---	60.66	1.850
1980	1	0.001	0.961	0.001	1.000	24.00	0.000	21.50	0.433
	2	0.065	0.748	0.062	0.489	39.75	1.847	37.53	0.798
	3	11.810	0.022	12.071	0.018	40.70	0.123	41.25	0.043
	4	1.007	0.122	1.058	0.123	43.07	0.401	43.08	0.385
	5	3.381	0.097	3.321	0.087	47.23	0.231	47.65	0.266
	6	3.485	0.116	3.459	0.092	47.88	0.265	49.03	0.187
	7	10.551	0.062	9.115	0.050	49.21	0.119	50.15	0.111
	8	4.972	0.089	4.498	0.084	50.26	0.175	51.41	0.179
	9	5.829	0.080	6.104	0.068	50.31	0.157	52.04	0.137
	10	5.373	0.106	4.576	0.076	50.87	0.186	53.18	0.199
	11	0.606	0.195	1.188	0.129	52.61	0.460	54.30	0.411
	12	0.460	0.338	0.925	0.190	52.61	0.758	54.35	0.615
	13	0.539	0.339	0.524	0.223	52.09	0.567	55.48	0.569
	14	0.341	0.495	0.245	0.355	51.63	0.678	52.80	1.189
	15	0.035	0.618	0.108	0.425	53.74	0.896	55.63	1.202

Appendix Table 12. Continued.

Year	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
1981	1	6.457	0.021	6.694	0.020	26.15	0.043	26.33	0.049
	2	0.625	0.166	0.602	0.159	30.66	0.877	30.95	0.958
	3	1.259	0.194	1.013	0.195	39.65	0.537	40.34	0.489
	4	50.096	0.018	47.192	0.017	43.22	0.041	43.85	0.041
	5	3.812	0.156	3.063	0.152	45.54	0.316	45.99	0.338
	6	5.860	0.114	3.740	0.120	47.14	0.284	49.31	0.340
	7	3.881	0.126	2.838	0.139	49.26	0.288	49.69	0.478
	8	12.200	0.055	10.870	0.061	49.79	0.150	50.80	0.197
	9	2.971	0.120	3.203	0.101	50.31	0.249	51.82	0.273
	10	3.696	0.112	3.445	0.113	50.58	0.248	51.61	0.379
	11	3.074	0.109	3.854	0.082	51.65	0.265	53.81	0.264
	12	0.338	0.287	0.587	0.187	53.04	0.500	56.31	0.668
	13	0.136	0.491	0.326	0.244	52.20	1.610	57.16	0.933
	14	0.045	0.574	0.076	0.362	53.74	0.609	58.38	1.624
	15	0.006	0.925	0.122	0.323	56.00	---	58.63	0.588
1982	1	0.000	---	0.000	---	---	---	---	---
	2	13.428	0.012	13.550	0.011	33.44	0.034	33.62	0.033
	3	1.081	0.134	0.817	0.178	39.04	0.497	40.00	0.634
	4	0.919	0.196	0.623	0.220	42.83	0.406	43.55	0.547
	5	28.246	0.019	28.830	0.020	45.31	0.048	46.18	0.055
	6	2.489	0.134	2.460	0.139	47.21	0.322	47.97	0.314
	7	2.461	0.122	3.248	0.109	49.60	0.343	50.50	0.329
	8	2.155	0.116	2.813	0.115	50.49	0.246	51.07	0.341
	9	5.421	0.069	6.404	0.062	50.54	0.177	52.57	0.232
	10	1.004	0.193	1.398	0.152	50.67	0.512	52.81	0.458
	11	1.250	0.179	1.261	0.130	51.32	0.444	54.42	0.365
	12	1.579	0.136	3.003	0.077	52.02	0.302	55.08	0.278
	13	0.069	0.412	0.269	0.241	54.63	1.102	57.41	1.151
	14	0.043	0.396	0.088	0.418	57.01	1.340	60.17	1.227
	15	0.017	0.746	0.012	0.971	56.30	1.084	60.31	5.004
1983	1	0.000	---	0.000	---	---	---	---	---
	2	0.000	---	0.000	---	---	---	---	---
	3	39.239	0.016	46.113	0.014	37.77	0.047	38.35	0.049
	4	3.553	0.142	3.567	0.153	39.91	0.398	40.73	0.569
	5	1.790	0.182	1.789	0.184	42.99	0.633	45.17	0.713
	6	19.011	0.030	17.246	0.034	46.60	0.096	47.53	0.102
	7	2.249	0.134	2.359	0.137	48.53	0.298	49.33	0.401
	8	1.815	0.143	1.852	0.145	49.63	0.337	51.70	0.472
	9	1.748	0.133	1.527	0.141	50.59	0.378	52.29	0.399
	10	2.006	0.122	3.159	0.089	51.14	0.381	52.64	0.338
	11	0.717	0.214	0.882	0.150	50.82	0.581	54.56	0.542
	12	0.398	0.250	0.589	0.177	52.00	0.571	55.37	0.677
	13	0.453	0.286	0.535	0.189	50.78	0.637	54.86	0.771
	14	0.020	0.853	0.142	0.358	52.14	1.325	55.80	1.680
	15	0.035	0.885	0.101	0.388	51.00	0.000	56.59	0.922

Appendix Table 12. Continued.

Year	Age	No. of males	cv	No. of females	CV	Length of males	SD	Length of females	SD
1984	1	0.000	---	0.000	---	---	---	---	---
	2	0.000	---	0.000	---	---	---	---	---
	3	1.719	0.361	0.807	0.414	39.00	0.503	39.32	0.824
	4	81.414	0.012	78.941	0.009	40.37	0.028	40.87	0.027
	5	3.406	0.168	3.571	0.138	42.05	0.303	43.12	0.316
	6	3.095	0.127	1.932	0.177	45.79	0.377	46.67	0.495
	7	10.050	0.051	6.974	0.059	47.31	0.142	48.17	0.191
	8	1.011	0.190	1.090	0.141	49.52	0.484	50.99	0.409
	9	0.599	0.228	0.606	0.199	50.97	0.542	52.35	0.537
	10	0.385	0.261	0.411	0.245	50.56	0.678	52.77	0.898
	11	0.483	0.228	0.820	0.166	51.52	0.448	52.96	0.584
	12	0.062	0.592	0.145	0.393	51.81	0.851	55.50	0.768
	13	0.067	0.575	0.124	0.356	51.90	1.355	53.82	1.114
	14	0.139	0.410	0.165	0.313	51.35	1.312	55.26	1.307
	15	0.000	---	0.028	0.660	---	---	55.41	1.287
1985	1	1.086	0.151	1.081	0.129	30.32	0.102	30.63	0.281
	2	0.377	0.441	0.148	0.583	36.37	1.606	34.41	2.068
	3	0.988	0.156	0.269	0.251	37.63	0.418	37.33	0.604
	4	7.762	0.107	4.007	0.140	41.72	0.151	42.31	0.224
	5	59.437	0.017	48.567	0.016	42.98	0.036	43.68	0.038
	6	5.589	0.106	3.685	0.133	45.24	0.283	45.15	0.342
	7	2.325	0.135	1.775	0.143	48.30	0.342	49.11	0.338
	8	3.170	0.096	3.240	0.086	49.40	0.231	50.35	0.234
	9	0.266	0.316	0.312	0.300	51.08	0.764	53.51	0.766
	10	0.111	0.420	0.215	0.403	52.30	0.693	53.01	0.599
	11	0.000	---	0.228	0.330	---	---	53.60	0.547
	12	0.051	0.145	0.296	0.264	56.00	0.000	53.93	0.674
	13	0.000	---	0.001	1.886	---	---	68.00	---
	14	0.000	---	0.000	---	---	---	---	---
	15	0.000	---	0.000	---	---	---	---	---
1986	1	0.000	---	0.000	---	---	---	---	---
	2	28.889	0.029	31.848	0.033	35.70	0.057	35.73	0.055
	3	5.646	0.152	6.858	0.148	37.31	0.388	37.20	0.225
	4	0.658	0.403	1.138	0.296	41.75	1.261	40.70	0.762
	5	5.370	0.162	3.772	0.165	42.83	0.263	43.89	0.354
	6	92.926	0.017	75.574	0.018	43.77	0.034	44.57	0.044
	7	10.598	0.103	10.484	0.096	45.22	0.247	45.66	0.196
	8	5.763	0.126	4.755	0.140	46.98	0.316	47.39	0.409
	9	6.905	0.086	5.230	0.098	48.78	0.209	50.02	0.290
	10	0.657	0.281	0.825	0.235	50.82	0.665	52.56	0.543
	11	0.289	0.380	0.737	0.206	52.18	1.126	54.16	0.988
	12	0.085	0.495	0.288	0.236	53.02	1.382	55.34	0.939
	13	0.247	0.323	0.521	0.190	52.84	0.515	55.45	0.616
	14	0.068	0.470	0.078	0.623	54.35	1.449	56.23	1.590
	15	0.001	1.206	0.045	0.443	66.00	44.547	56.59	1.399

Appendix Table 12. Continued.

Year	Age	No. of males	CV	No. of females	CV	Length of males	SD	Length of females	SD
1987	1	0.000	---	0.000	---	---	---	---	---
	2	0.000	---	0.000	---	---	---	---	---
	3	56.081	0.026	65.106	0.020	39.39	0.050	39.92	0.046
	4	3.039	0.212	3.393	0.199	39.72	0.490	40.94	0.460
	5	0.729	0.484	0.904	0.306	42.63	1.117	43.12	0.714
	6	1.672	0.255	0.967	0.336	43.04	0.713	45.39	0.741
	7	83.768	0.020	62.832	0.022	44.61	0.058	45.44	0.074
	8	4.081	0.158	3.565	0.154	45.75	0.246	46.18	0.359
	9	0.998	0.323	1.995	0.216	47.52	0.602	46.57	0.651
	10	7.709	0.086	6.689	0.085	48.60	0.240	49.52	0.250
	11	0.330	0.371	0.227	0.402	50.98	0.858	54.17	1.207
	12	0.000	---	0.145	0.583	---	---	51.85	0.535
	13	0.046	0.382	0.098	0.383	56.00	---	56.50	0.779
	14	0.525	0.323	0.686	0.200	50.26	0.838	54.14	0.542
	15	0.000	---	0.000	---	---	---	---	---
1988	1	0.003	0.577	0.000	---	26.00	0.000	---	---
	2	0.752	0.398	0.407	0.369	36.27	0.381	36.08	0.754
	3	0.599	0.412	0.651	0.429	39.67	0.767	38.96	0.784
	4	82.894	0.021	81.904	0.018	41.51	0.045	42.10	0.040
	5	4.334	0.232	3.330	0.189	41.76	0.442	42.38	0.475
	6	0.538	0.509	0.804	0.317	44.50	0.563	44.20	0.934
	7	1.991	0.265	0.502	0.435	45.37	0.475	46.96	0.993
	8	54.437	0.033	38.437	0.036	45.14	0.068	46.05	0.094
	9	3.516	0.199	1.468	0.256	45.52	0.480	47.63	0.583
	10	0.315	0.341	0.387	0.386	50.42	0.367	48.15	0.802
	11	4.080	0.115	4.017	0.122	48.35	0.355	49.41	0.486
	12	0.033	0.920	0.117	0.795	50.00	0.000	49.64	0.673
	13	0.006	0.633	0.223	0.840	58.00	0.000	48.84	0.845
	14	0.000	---	0.000	---	---	---	---	---
	15	0.191	0.284	0.448	0.201	52.54	0.776	54.86	0.594