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# South Unimak and Shumagin Islands Commercial Salmon Fishing Gear Study, 1984

By

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## ABSTRACT

During the 1984 South Unimak and Shumagin Islands June salmon fishery, a total of 104 drift gillnet and 143 purse seine vessels harvested 27% and 72% of the incidental catch of 245,528 chum salmon. This gear study interviewed and measured the gear of 70% of the fleet. The majority of the gillnet gear used was 120 meshes deep, and most of the purse seine gear was 4 1/2 strips deep. Purse seine gear was divided into three depth categories; the shallowest, less than 3 1/2 strips, harvested 7.0 sockeye:chum salmon; medium gear, 3 3/4 to 4 1/2 strips, caught 4.0 sockeye:chum; the deepest gear, greater than 4 1/2 strips, resulted in 3.8 sockeye:chum. There was no evidence of differential selectivity by depth of drift gillnet gear. No evidence was found in the catch data indicating a differential harvest of chum salmon by time or statistical area.



KEY WORDS: South Unimak, Shumagin Islands, salmon, *Oncorhynchus*, catch, fishing gear

## INTRODUCTION

The objective of this publication is to document a 1984 report to the Alaska Board of Fisheries (ABOF) in the format of a Regional Information Report. This ABOF report was subsequently revised in October, 1985 with additional statistical analysis (ADF&G 1985). Contact the Alaska Department of Fish and Game (ADF&G) Chief Fisheries Scientist's office in Juneau for that informal report.

Controversy developed in the early 1980's over the potential interception of western Alaska chum salmon by the South Unimak and Shumagin Islands June fisheries (Figure 1). Of particular concern were the 1982 and 1983 record catches of 1.1 and 0.8 million chum salmon. The large returns of sockeye to Bristol Bay during those years provided for increased fishing time and harvest of sockeye (South Unimak and Shumagin Islands June Salmon Management plan, ADF&G, 1984). The increased time resulted in an increased incidental harvest of chum salmon.

During 1979-1984, sockeye salmon catches in the June fisheries averaged 1.6 million fish. Concurrent with the increased sockeye salmon harvest was an increase in the harvest of chum salmon. From 1979-1984, chum salmon catches in the June fisheries averaged 0.6 million fish compared to an average catch of 0.3 million fish in 1960-1978 (A. Shaul, ADF&G, Cold Bay, personal communication).

In response to potential problems of increased interception of western Alaska chum salmon stocks, the Alaska Board of Fisheries directed the Alaska Department of Fish and Game to continue studies of the South Unimak and Shumagin Islands fisheries during the 1984 season. The study was to include: (1) analysis of the origin of chum salmon stocks in the June fishery; (2) determination of the standard units of fishing gear utilized by the respective fleets; and (3) investigate the potential of time, area, and gear restrictions to achieve a reduced harvest of chum salmon without a corresponding reduction in the harvest of the target species, sockeye salmon. This study addresses the second and third parts of the overall study. The first component, a stock separation study, was addressed in an 1984 ABOF report by Robert Conrad (unpublished).

### *Description of the Fisheries*

The present June fishery occurs in two locations: 1) south of Unimak Island and 2) in the Shumagin Islands (Figure 1). The South Unimak fishery is further divided into the Cape Lutke and Ikatan Peninsula areas. The Shumagin Islands fishery is restricted to set gillnet and purse seine gear. The Ikatan Peninsula fishery includes set gillnet, drift gillnet, and purse seine gear. The more exposed waters of Cape Lutke had traditionally been fished with purse seine and some drift gillnet gear.

Testimony during previous Alaska Board of Fisheries meeting indicated that chum salmon had a broader range of swimming depths than sockeye salmon. This observation was supported in papers by Manzer (1964) and Machidori (1966). These observations led the Department to investigate differential catch by depth of fishing gear.

Since this study was initially presented in 1984, fishing gear has been reduced and time and area closures have been implemented by the ABOF. Fishing gear depth limits for the Unimak and Shumagin Island fisheries were implemented in 1990. Previously gear depths had been unlimited. Purse seine nets were reduced to a maximum depth of 375 meshes, of which the first 25 meshes above the lead line is considered chaffing webbing. Purse seine leads were limited to no less than 50 fathoms nor more than 150 fathoms in length. Drift and set gillnets, in both fisheries were limited to 90 meshes in depth with no minimum mesh size during June. Beginning in 1990 fishing time and/or area closures as based on fleet performance and test fishery data, have been implemented to reduce chum salmon harvest (ADF&G 1990). A complete description of recent fishery restrictions is provided in Shaul (1995).

## METHODS

### *Catch by Time and Area*

Catch data presented in this report were compiled by the Division of Commercial Fisheries, Alaska Department of Fish and Game, Kodiak. Data was compiled by *statistical week* from individual fish ticket sales receipts for fish sold to the processors; a statistical week begins at 0000 hours each Sunday and ends at 2400 hours on Saturday; weeks were numbered sequentially from the first Sunday of the year. Data were edited for misreported landings, multiple landings, incorrect gear cards, and late landings during closed periods.

Harvest information was examined for trends in chum harvest by time and area. Data in this report may differ slightly from the previous publications because of recent editing.

### *Gear Study*

During 1984, two ADF&G staff conducted interviews and measured gear from approximately 70% of the fleet. The study focused on purse seine and drift gillnet gear as these gear types account for nearly the entire chum salmon harvest. The majority of the gear depth measurements and vessel operator interviews were conducted at Sand Point, King Cove, and Port Moller prior to the June fisheries while fishermen were repairing and loading their nets. Additional information was obtained between fishing periods at False Pass and King Cove. Staff was also involved with catch sampling for the stock identification project at King Cove, Sand Point, and Dutch Harbor. The harvest was monitored on the grounds by the ADF&G vessel MV Puffin.

Depth of gear was determined by three methods:

1. Interviews of the vessel operator when the gear was not accessible or the operator did not have time to lay the gear out for inspection.

2. Measurement of a specific portion of a net (usually one strip of seine) and calculating the depth of the seine based on the number of strips in the seine. This method was used when there was insufficient time to measure the entire net.

3. Measurement of the depth of the entire net. The net was stretched by hand along a line of selvage; the number of meshes were counted while the depth of the gear was measured. This was the only feasible method to measure gear on the back of a boat. "Stretch by weight" technique was not used because it was cumbersome and time consuming.

Stretch depth (depth of net when net is hung in the air) and estimated fishing depth (depth of a net while fishing) were estimated based on interviews with six of the major net manufactures of salmon gear for Alaska. The net loft supervisors for these companies estimated fishing depth with an average "take up" factor of 20% for gillnets and 30% for purse seines; this factor was applied to the calculated stretch depth of the net.

The length and use of purse seine leads were determined by interview as it was not logistically possible to measure gear length.

Data recorded in the interview included: vessel ADF&G number, gear type, skipper's experience (years) in the fishery, if the net was measured, depth of gear, number of meshes, mesh size, net material, length of net, number of strips (seine).

To examine the possible effects of gear depth on the catch rates of sockeye and chum salmon, the various depths of nets were pooled based on observed groupings of gear relative to their contribution of the interviewed fleet (Figure 2). Gillnet depths were pooled into two categories: (1) gillnets less than 120 meshes in depth; and (2) gillnets greater than 121 meshes in depth. Purse seine depths were also pooled: (1) seines less than 3.5 strips in depth; (2) seines between 3.75 and 4.5 strips; and (3) seines greater than 4.5 strips (Figure 3).

Statistical tests were conducted for each gear type to determine if the mean catch of vessels that were interviewed for net depth was different from those whose gear was actually measured. The hypothesis was tested that that there was no difference. The results of the Student's t-test showed no difference at $\alpha$=0.01 (Zar, 1974). The relationship of the actual stretch measure of net depth to the number of meshes was also evaluated. A simple linear regression with an "r" value of 0.91 correlation allowed the use the number of meshes (or strips of seine) as the measurement of depth (Zar, 1974). Based on these tests catch data from vessels whose skippers who gave verbal information (nets not measured) were included with that of vessels whose nets were measured, increasing the number of data points.

A computer simulation designed by Doug McBride, ADF&G, Anchorage, modeled the potential results of restricting purse seines to 3.5 strips. The model compared sockeye and chum catch rates of drift gillnet and purse seine gear from 1979 to 1984. This model estimated deviations from historical catches by gear type and year while projecting additional fishing days to meet the sockeye allocation. Details on this model may be obtained from Mr. McBride.

## RESULTS AND DISCUSSION

### *Chum Salmon Harvest Trends*

The 1979 to 1984 catch of chum salmon by gear type and fishery area is presented in Table 1, Appendices A and B, and Figure 4. Historically, drift gillnet and purse seine gear have accounted for most of the chum harvest; less than 1% of the chum catch has been taken with set gillnets. During the period 1969-1979, drift gillnet gear harvested the majority of both sockeye (74%) and chum (69%) salmon in the South Unimak fishery (Table 2). Between 1980 and 1984, drift gillnet gear caught an average of 39% of the South Unimak chum catch. The number of gillnet vessels increased by 32 between 1978 and 1984 (Table 2), while their overall percentage of the chum catch at South Unimak declined from 90% to 40% in 1984. During this period, newer gillnet vessels added to the fleet were generally larger and capable of fishing in rougher weather conditions.

Beginning in 1979, the purse seine fleet began to harvest a much greater portion of the sockeye and chum salmon catch in the June fishery (Tables 2, 3). In 1984, the seine fleet landed approximately 245,000 chum salmon, 73% of the total June harvest. From 1978 to 1984 the purse seine fleet increased from 22 to 102 vessels. The majority of these new boats were modern, highly efficient "cape seiners" capable of fishing under more severe weather conditions than the fleet of the early 1970's.

There were no long term trends of increased selectivity in chum salmon harvest by time (Appendices A and B) or fishing area (Shumagin Islands, Ikatan Peninsula, or Cape Lutke) from 1979-1984 (Table 1). During 1983 and 1984, however, the largest catches of both sockeye and chum salmon came from the Cape Lutke area.

### *Description of Gear in the Fishery*

Cooperation from Alaska Peninsula salmon fishermen was excellent; none refused an interview. Approximately 70% of the estimated 243 vessels were either interviewed or had their gear measured (Table 4). Gear depth measurements were obtained from 29% of the purse seine fleet and 45% of the drift gillnet fleet. Interviews were obtained from an additional 36% of the seine and 28% of the gillnet fleets. The gear depth composition of the drift gillnet and purse seine fleets, are presented in Figures 2 and 3.

The presence of the Alaska Department of Public Safety personnel during the fishery assured compliance on length regulations for both purse seine and gillnet gear.

Drift gillnet gear used in the fishery were 200 fathoms in length. Three different mesh sizes were used: 5-1/8, 5-1/4, and 5-1/2 inch stretched mesh (Table 5). The majority of the interviewed vessels (78%) used 5 1/4 in mesh gillnet.

A trend toward the greater use of "center core" multiple-strand monofilament gillnet was noted during 1983 and 1984. This new gillnet material was reported to fish better than the older style

of multiple nylon thread net. Preliminary results of recent ADF&G studies in Bristol Bay have shown the "center core" type of gear consistently catches more salmon than the "supercrystal" nylon mesh nets; no differential species selectivity was observed (Fried, et al., 1984). Neither type of gillnet was differentially selective for chum salmon in the South Unimak and Shumagin Islands fisheries.

The depth of gillnet used in the South Unimak fishery ranged from 90 meshes (approximately 42 ft stretch measure, 31.5 ft fishing depth) to 180 meshes (approximately 78 ft stretch measure, 63 ft fishing depth). The predominant gear depth was 120 meshes (approximately 66 ft stretch, 51 ft fishing depth); it was used by 52% of the vessels interviewed.

Most (45%) of the interviewed purse seine boats used 3-1/2 in web, with a range of 3-1/8 in to 4.0 in web (Table 6). All seines were reported to be 250 fathoms in length. The depth of the seines varied from 2-1/2 strips (73 ft stretch measure, 56 ft fishing depth) to 5-3/4 strips (182 ft stretch measure, 125 ft fishing depth). The most common depth of seine was 4-1/2 strips (128 ft stretch measure, 97 ft estimated fishing depth).

Nearly 67% of the purse seine operators interviewed used a "lead" (a section of larger mesh net used on the shoreward end of the net) (Table 7). The majority of those not using leads were smaller seiners. The most frequently used leads were near 200 fathoms in length. Several of the purse seine operators indicated that they were using shorter leads than in the past.

### *Analysis of Catch by Depth of Gear*

Sockeye and chum catches, by depth of gear and gear type, are presented in Table 8.

Gillnet depths were pooled into two categories to examine the possible effects of gear depth on the catch rates of sockeye and chum salmon (Figure 2). Deeper (>120-180 mesh) gillnet gear did not catch chum salmon at significantly different rates than shallow gear (<120 mesh). Sockeye/chum ratios were 4.7:1 for 90-120 mesh gear and 4.2:1 for greater than 120 mesh gear (Table 9).

Purse seine depths were pooled into three categories: (1) seines less than 3.5 strips in depth; (2) seines between 3.75 and 4.5 strips; and (3) seines greater than 4.5 strips (Figure 3). The smallest seines (less than 3.5 strips) caught chum salmon at a significantly lesser rate than did the other two categories of seines (Table 10). The sockeye/chum ratio (S/C) for the smallest seines (7.1:1) was significantly different ($\alpha$=0.05) from the ratios of the medium and large seines (4.1:1 and 3.8:1 respectively). In other words, the shallowest depth category of seines caught approximately one chum for every seven sockeye salmon. This rate was significantly less than the 3.75-4.50 strip and >4.5 strip seines which caught approximately one chum salmon for every four sockeye salmon.

A computer simulation was designed by Doug McBride, ADF&G-Stock Biology Group, to estimate the potential results of limiting the depth of seine gear from 1979 to 1984 (Table 11). In theory reducing the depths of purse seines to 3.5 strips could have reduced the total chum catch in each of the years tested. The total seine catch of both chum and sockeye salmon would

also be reduced. The reduction would reallocate more sockeye and chum salmon to the drift gillnet fleet while reducing the overall chum catch. During most years additional harvest time would be required to reach the sockeye allocation.

Caution is suggested before concluding that depth of the seine gear is the factor affecting the different catch rates of chum salmon. For instance, similar cases could be made for the length and use of leads. Because the smallest seines use the shortest leads, one could also argue that high sockeye/chum ratios are associated with short leads. Another possible variable that could affect the sockeye/chum ratio is the location fished. Larger vessels fish deeper seines (>3.75 strips) and generally fish in more exposed offshore areas than the smaller seines.

Although the project had no means to actually test which, if any, of the above explanations represents the crucial variable, comparison of the gillnet and purse seine data indicate that depth of gear may be the major factor. This conclusion was based on the observations that drift gillnets: (1) catch sockeye and chum salmon in the same relative ratio as the medium and large purse seines; (2) do not use leads; and (3) are fished in different areas than the medium and large seines. Also, the smaller purse seines probably have a shallower effective fishing depth than either the larger seines or most of the gillnet fleet. The majority of the gillnets have an effective fishing depth of 50 to 60 feet (Table 5). Shallow seines, <3.5 strips, have an estimated fishing depth of 56 to 76 ft; Medium seines, 3.75-4.5 strips, have an estimated fishing depth of 82-97 ft; Deep seines, >4.5 strips, have a fishing depth of 102-125 ft.

### *Application*

The problem was to determine if the differential chum catch rate could be effectively reduced by applying a gear restriction regulation. Although it was likely that reduction of seine depth below 3.5 strips would result in a substantial savings of chum salmon, several important factors needed to be addressed to fully evaluate the utility of this option. First, regulating the medium and large seines out of the fishery would require approximately 75% of the fleet to re-gear. Second, it is questionable whether the largest seine boats could effectively fish shallower gear. Third, gear limitations would considerably restrict available fishing area. Finally, a reduction in the efficiency of the seine fleet could result in a substantial re-allocation of catch by gear type within the fishery. It is obvious that the costs of implementing this strategy may be high.

## CONCLUSIONS

The following conclusions were based on the continuation of the current management guidelines for harvesting a predetermined quota of sockeye salmon by the June fisheries.

1. No evidence was found that chum and sockeye salmon were differentially harvested by time or area in the June fishery. Therefore, time/area restrictions during the June fishery would probably not be effective in reducing the catch of chum salmon relative to the sockeye salmon catch.

2. No evidence was found that chum and sockeye salmon were differentially selected by depth of drift gillnet gear. Therefore, gear restrictions on drift gillnet gear would probably not be effective in reducing the catch of chum salmon relative to the sockeye salmon catch.

3. There was evidence that chum and sockeye salmon were differentially selected by depth of purse seine gear. Significant differences were found between the ratio of sockeye-to-chum catches for seines less than 3.5 strips in depth and seines of greater depth. Currently, only 25% of the seine fleet utilizes this depth of gear. This segment of the fleet fishes in shallower more restricted area than the majority of the fleet. All of the ramifications of utilizing a major gear restriction to reduce the incidence of chum salmon harvests have not been evaluated.

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Table 1. South Unimak and Shumagin Islands fisheries catch by species, by fishing area, 1979-1984.

| Year | Fishing Area | Catch | | % of Total Chum Catch by Gear | Percent Total Chum by Area |
|---|---|---|---|---|---|
| | | Sockeye | Chum | | |
| 1979 | Shumagins | | | | |
| | Set Gillnet | 13,446 | 1,698 | 1.6 | 39 |
| | Purse Seine | 176,682 | 39,196 | 37.0 | |
| | Ikatan | | | | |
| | Set Gillnet | 1,349 | 92 | .1 | 45 |
| | Drift Gillnet | 185,898 | 42,099 | 40.0 | |
| | Purse Seine | 23,010 | 4,740 | 5.0 | |
| | Cape Lutke | | | | |
| | Drift Gillnet | 11,588 | 2,039 | 1.0 | 16 |
| | Purse Seine | 461,628 | 15,174 | 15.0 | |
| | Total | | | | |
| | Set Gillnet | 14,795 | 1,790 | 2.0 | |
| | Drift Gillnet | 197,486 | 44,138 | 42.0 | |
| | Purse Seine | | | | |
| 1980 | Shumagins | | | | |
| | Set Gillnet | 20,792 | 2,298 | .4 | 13 |
| | Purse Seine | 551,280 | 69,014 | 13.0 | |
| | Ikatan | | | | |
| | Set Gillnet | 13,135 | 239 | .05 | 22 |
| | Drift Gillnet | 623,079 | 92,508 | 18.0 | |
| | Purse Seine | 143,720 | 21,407 | 4.0 | |
| | Cape Lutke | | | | |
| | Drift Gillnet | 8,896 | 2,392 | .5 | 65 |
| | Purse Seine | 1,942,318 | 340,079 | 64.0 | |
| | Total | | | | |
| | Set Gillnet | 33,927 | 2,537 | .5 | |
| | Drift Gillnet | 631,975 | 94,900 | 18.0 | |
| | Purse Seine | 2,637,318 | 430,500 | 82.0 | |
| 1981 | Shumagins | | | | |
| | Set Gillnet | 18,272 | 720 | .1 | 9 |
| | Purse Seine | 332,300 | 53,351 | 10.0 | |
| | Ikatan | | | | |
| | Set Gillnet | 31,480 | 1,473 | .3 | 46 |
| | Drift Gillnet | 691.866 | 183,491 | 33.0 | |
| | Purse Seine | 319,568 | 72,898 | 13.0 | |
| | Cape Lutke | | | | |
| | Set Gillnet | 1,300 | 1,095 | .2 | 45 |
| | Purse Seine | 319,568 | 72,898 | 13.0 | |
| | Total | | | | |
| | Set Gillnet | 49,752 | 2,193 | .4 | |
| | Drift Gillnet | 1,118,045 | 184,586 | 33.0 | |
| | Purse Seine | 1,078,047 | 377,168 | 67.0 | |

-Continued-

Table 1. (page 2 of 2)

| Year | Fishing Area | Catch Sockeye | Catch Chum | % of Total Chum Catch by Gear | Percent Total Chum by Area |
|---|---|---|---|---|---|
| 1982 | Shumagins | | | | |
| | Set Gillnet | 12,128 | 1,798 | .2 | 15 |
| | Purse Seine | 438,420 | 159,518 | 15.0 | |
| | Ikatan | | | | |
| | Set Gillnet | 19,663 | 1,785 | .2 | |
| | Drift Gillnet | 740,673 | 497,655 | 46.0 | |
| | Purse Seine | 263,749 | 118,704 | 11.0 | |
| | Cape Lutke | | | | |
| | Drift Gillnet | 4,228 | 3,557 | .3 | 29 |
| | Purse Seine | 639,050 | 311,957 | 29.0 | |
| | Total | | | | |
| | Set Gillnet | 31,791 | 3,583 | .3 | |
| | Drift Gillnet | 1,379,723 | 501,212 | 46.0 | |
| | Purse Seine | 1,341,216 | 590,179 | | |
| 1983 | Shumagins | | | | |
| | Set Gillnet | 10,662 | 659 | .1 | 21 |
| | Purse Seine | 405,822 | 168,618 | 21.0 | |
| | Ikatan | | | | |
| | Set Gillnet | 10,980 | 851 | .1 | 33 |
| | Drift Gillnet | | | | |
| | Cape Lutke | | | | |
| | Drift Gillnet | 27,951 | 10,755 | 1.0 | 46 |
| | Purse Seine | 746,099 | 351,752 | 45.0 | |
| | Total | | | | |
| | Set Gillnet | 21,642 | 1,510 | .2 | |
| | Drift Gillnet | 602,228 | 212,515 | 27.0 | |
| | Purse Seine | 1,340,145 | 574,300 | 73.0 | |
| 1984 | Shumagins | | | | |
| | Set Gillnet | 13,592 | 711 | .2 | 32 |
| | Purse Seine | 244,615 | 32 | | |
| | Ikatan | | | | |
| | Set Gillnet | 11,098 | 305 | .01 | 28 |
| | Drift Gillnet | 352,556 | 79,448 | 24.0 | |
| | Purse Seine | 130,379 | 123,085 | 36.0 | |
| | Cape Lutke | | | | |
| | Drift Gillnet | 51,853 | 12,571 | 4.0 | 40 |
| | Purse Seine | 588,174 | 122,443 | 36.0 | |
| | Total | | | | |
| | Set Gillnet | 24,690 | 1,016 | .03 | |
| | Drift Gillnet | 404,409 | 92,019 | 27.0 | |
| | Purse Seine | 963,168 | 245,528 | 72.0 | |

Table 2. Peak estimates of the number of units of gear operating in the South Unimak[a] and Shumagin Islands June fisheries, 1976-1984[b].

| Year | Purse Seine | Drift Gillnet | Set Gillnet |
|---|---|---|---|
| 1976 | 25 | 94 | 16 |
| 1977[c] | 15 | 98 | 16 |
| 1978 | 22 | 106 | 17 |
| 1979 | 33 | 100 | 22 |
| 1980 | 51 | 123 | 24 |
| 1981 | 74 | 126 | 32 |
| 1982 | 85 | 126 | 33 |
| 1983 | 92 | 139 | 41 |
| 1984 | 104 | 143 | 52 |
| Additional Units Since 1978 | 80 | 32 | 35 |

[a] Includes South Unimak and Shumagin Islands fisheries.
[b] The number of units of gear reflect the maximum number during the peak of the fishery.
[c] Implementation of management plan for June fishery.

Table 3. Percent composition of chum and sockeye catches in the South Unimak[a] June fishery by gear type, 1969-1984.

| Year | Sockeye | | Chum | |
|---|---|---|---|---|
| | Seine | Gillnet | Seine | Gillnet |
| 1969 | 24 | 76 | 20 | 80 |
| 1970 | 48 | 52 | 31 | 69 |
| 1971 | 25 | 75 | 19 | 81 |
| 1972 | 12 | 88 | 9 | 91 |
| 1973 | 9 | 91 | 6 | 94 |
| 1974 | | NO FISHERY | | |
| 1975 | 23 | 77 | 29 | 71 |
| 1976 | 18 | 82 | 13 | 87 |
| 1977 | 15 | 85 | 10 | 90 |
| 1978 | 18 | 82 | 10 | 90 |
| 1979 | 71 | 29 | 31 | 69 |
| 1969-79 Average | 26 | 74 | 18 | 82 |
| 1980 | 76 | 24 | 79 | 21 |
| 1981 | 51 | 49 | 64 | 36 |
| 1982 | 54 | 46 | 46 | 54 |
| 1983 | 60 | 40 | 66 | 34 |
| 1980-83 Average | 61 | 39 | 63 | 37 |
| 1984 | 63 | 36 | 59 | 40 |

[a] Includes Cape Lutke and Ikatan fisheries.

Table 4. Summary of 1984 gear study interview data.

| Gear Type | Estimated Fleet Size | No. Interviewed but not Measured | Percent of Fleet | Numbered Units Measured | Percent of Fleet | No. Measured and Interviewed | Percent of Fleet |
|---|---|---|---|---|---|---|---|
| Purse Seine | 104 | 37 | 36% | 30 | 29% | 67 | 64% |
| Drift Gillnet | 143 | 39 | 27% | 62 | 44% | 101[a] | 71% |
| Total | 243 | 76 | 31% | 92 | 38% | 168 | 69% |

[a] Three vessels not analyzed.

Table 5. Drift gillnet gear used in the June South Unimak Fishery, 1984.

| Number Meshes Deep | Total Interviewed and Measured | Number Units Interviewed | Number Units Measured | Avg. Stretch Depth[a] | Est. Maximum Fishing Depth[b] | | | Number of Units by Mesh Size | | | Type of Net Material | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 5 1/8 | 5 1/4 | 5 1/2 | 5 1/8 | 5 1/4 | 5 1/2 | # Units Super Crystal | # Units Multiple Monofil. | # Units Mixed Material |
| 90 | 2 | 1 | 1 | 42 | | | 33 | | | 1 | 1 | | |
| 120 | 32 | 12 | 10 | 51 | 41 | 42 | 44 | 2 | 24 | 1 | 14 | 13 | 3 |
| 140 | 3 | 1 | 2 | 59 | 48 | 49 | | 2 | 1 | | 1 | 1 | |
| 145 | 2 | 1 | 1 | 59 | | 51 | | | 1 | | | 1 | |
| 150 | 16 | 7 | 9 | 62 | 51 | 53 | | 1 | 11 | | 4 | 8 | 1 |
| 160 | 2 | 1 | | | | | 59 | | | 1 | | 1 | |
| 180 | 2 | 1 | | | | 63 | | | 1 | | | 1 | |
| Total | 61 | 23 | 33 | | | | | 6 | 47 | 7 | 20 | 25 | 4 |

a Depth determined by stretching the net tight, by hand, along a line of selvage.

b Assumes fishing depth in feet of = (# meshes x mesh size) (.8) / 12. Based on the average "take up" factor of .8 used by six net manufacturers. Actual depth might vary depending on the technique by which the nets were hung.

Table 6. Purse Seine gear used in the South Unimak and Shumagin Islands June fisheries, 1984.

| Total Strips Deep[a] | Total Interviewed and Measured | Number Units Interviewed | Number Units Measured | Number of Units by Mesh Size[b] | | | | | Size Not Known | Average Stretch Depth[c] | Estimated Fishing Depth[d] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 3 1/8 | 3 1/4 | 3 1/2 | 3 7/8 | 4.0 | | | |
| 2 1/2 | 2 | 1 | 1 | | | 2 | | | | 73 | 56 |
| 2 3/4 | 1 | 1 | | | | | 1 | | | | 61 |
| 3 | 2 | 2 | 1 | | | 1 | | | | | 71 |
| 3 1/4 | 1 | | 1 | | | 1 | | | | 96 | 71 |
| 3 1/2 | 10 | 8 | 2 | | | 5 | | 1 | 4 | 102 | 76 |
| 3 3/4 | 2 | | 2 | | | 1 | 1 | | | 103 | 82 |
| 4 | 5 | 2 | 3 | | | 3 | | | 2 | 113 | 87 |
| 4 1/4 | 1 | | 1 | | | 1 | | | | 120 | 92 |
| 4 1/2 | 30 | 15 | 15 | | | 18 | 1 | 1 | 10 | 128 | 97 |
| 4 3/4 | 2 | 2 | | | | 2 | | | | | 102 |
| 5 | 2 | | 2 | | | 2 | | | | 135 | 107 |
| 5 1/4 | 1 | | 1 | | | | | | | | 112 |
| 5 1/2 | 3 | 2 | 1 | | 1 | 1 | | | 1 | 148[e] | 117 |
| MIXED MESH SIZES (3 1/2" + 4" combined) | | | | | | | | | | | |
| 4 1/2 | 1 | 1 | | | | | | | | | |
| 5 1/4 | 1 | 1 | 1 | | | | | | | 178 | 110 |
| 5 1/2 | 2 | 1 | 1 | | | | | | | 119 | 119 |
| 5 3/4 | 1 | | 1 | | | | | | | 182 | 125 |
| TOTAL | 67 | 35 | 32 | | | | | | | | |

[a] Total # strips usually contains 1/4 strip of corkline chafing (same size as body web),body web and 1/4 strip of 5" poly for leadline chafing. One strip of seine = 100 meshes.

[b] Based on interviews.

[c] Depth in feet determined by stretching net tight by hand, vertically for corkline to lead lines.

[d] Estimated fishing (hanging) depth in feet = [(# meshes of seine/strip) x (strips) x (mesh size/12")] x .7 + depth of chafing strip. Formula based on interviews of 6 net manufacturers. Actual depth may vary according to the method of hanging web used.

[e] 3 1/4 " mesh.

Table 7. Purse seine leads used in the South Unimak and Shumagin Islands June fisheries, 1984.

| Depth in Strips | Number Vessels Interviewed | Number Unknown Use | Number Not Using Leads | Lead Use Number Using Leads | Length in Fathoms[a] Range Low | Range High | Avg. |
|---|---|---|---|---|---|---|---|
| 2-1/2 | 2 | - | 2 | - | - | - | - |
| 2-3/4 | 1 | - | 1 | - | - | - | - |
| 3 | 2 | 1 | 1 | - | - | - | - |
| 3-1/4 | 1 | - | - | 1 | 70 | 70 | 70 |
| 3-1/2 | 10 | - | 7 | 3 | 100 | 150 | 116 |
| 3-3/4 | 2 | 1 | 1 | - | - | - | - |
| 4 | 5 | - | 1 | 4 | 100 | 180 | 138 |
| 4-1/4 | 1 | - | 1 | - | - | - | - |
| 4-1/2 | 31 | 1 | 6 | 24 | 94 | 350 | 174 |
| 4-3/4 | 2 | - | - | 2 | 150 | 150 | 150 |
| 5 | 2 | - | - | 2 | 170 | 200 | 185 |
| 5-1/4 | 2 | - | - | 2 | 230 | 380 | 305 |
| 5-1/2 | 5 | 3 | - | 2 | 200 | 204 | 202 |
| 5-3/4 | 1 | 6 | - | 1 | 150 | 150 | 150 |
| Total | 67 | 6 | 20 | 41 | 70 | 380 | 181[b] |

[a] Length of leads determined from interviews.
[b] Average of all length data.

Table 8. Catch of sockeye and chum salmon by depth of gear, 1984.

| Number Strips | Number Meshes | Mean Catch | | % Chum | Number Landings |
|---|---|---|---|---|---|
| | | Number Sockeye | Number Chum | | |
| | | Purse Seine | | | |
| 2-1/2 | 250 | 1510 | 105 | 7 | 8 |
| 2-3/4 | 275 | 1579 | 69 | 4 | 6 |
| 3 | 300 | 1485 | 42 | 3 | 3 |
| 3-1/2 | 350 | 1724 | 285 | 17 | 57 |
| 3-3/4 | 375 | 1350 | 225 | 17 | 2 |
| 4 | 400 | 2602 | 418 | 16 | 26 |
| 4-1/4 | 425 | 856 | 171 | 20 | 6 |
| 4-1/2 | 450 | 2335 | 623 | 21 | 130 |
| 4-3/4 | 475 | 2429 | 585 | 24 | 12 |
| 4-7/8 | 495 | 4443 | 1352 | 30 | 5 |
| 5 | 500 | 2476 | 606 | 24 | 9 |
| 5-1/4 | 525 | 4074 | 248 | 6 | 5 |
| 5-1/2 | 550 | 2556 | 763 | 30 | 28 |
| 5-3/4 | 575 | 1598 | 295 | 18 | 2 |
| 6 | 600 | 4599 | 1827 | 40 | 3 |
| | | Gillnet | | | |
| | 90 | 504 | 91 | 18 | 9 |
| | 120 | 717 | 150 | 21 | 235 |
| | 140 | 1007 | 158 | 16 | 8 |
| | 145 | 629 | 104 | 17 | 5 |
| | 150 | 808 | 194 | 24 | 103 |
| | 160 | 864 | 273 | 32 | 8 |
| | 180 | 889 | 274 | 31 | 5 |

Table 9. Catch by species for two drift gillnet gear depth groups, 1994.

| Number Meshes | Number Boats | Total Sockeye | Catch Chum | Boats By % | Catch Sockeye | By % Chum | Catch per Boat | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sockeye | Chum | S/C |
| 90 - 120 | 66 | 172,920 | 36,696 | 67.3 | 62.0 | 59.1 | 2620.0 | 556.0 | 4.7 |
| >120 | 32 | 105,760 | 25,344 | 32.7 | 38.0 | 40.9 | 3305.0 | 792.0 | 4.2 |
| Total | 98 | 278,680 | 62,040 | 100.0 | 100.0 | 100.0 | | | |

Table 10. Catch by species for three purse seine gear depth groups, 1994.

| Number Strips | Number Boats | Total Sockeye | Catch Chum | % of Boats | Catch Sockeye | % of Chum | Catch per Boat | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Sockeye | Chum | S/C |
| 2.50-3.50 | 16 | 124,256 | 17,617 | 25.4 | 18.1 | 11.1 | 7,309.2 | 1,036.3 | 7.1 |
| 3.75-4.50 | 39 | 379,084 | 93,284 | 52.2 | 55.3 | 58.7 | 10,831.0 | 2,665.3 | 4.1 |
| >4.5 | 12 | 182,589 | 47,905 | 22.4 | 26.6 | 30.2 | 12,172.6 | 3,193.7 | 3.8 |
| Total | 67 | 685,929 | 158,806 | 100.00 | 100.00 | 100.00 | | | |

Table 11. Simulated effects of limiting purse seines to a maximum of depth of 3.5 strips of net during 1979-1984.

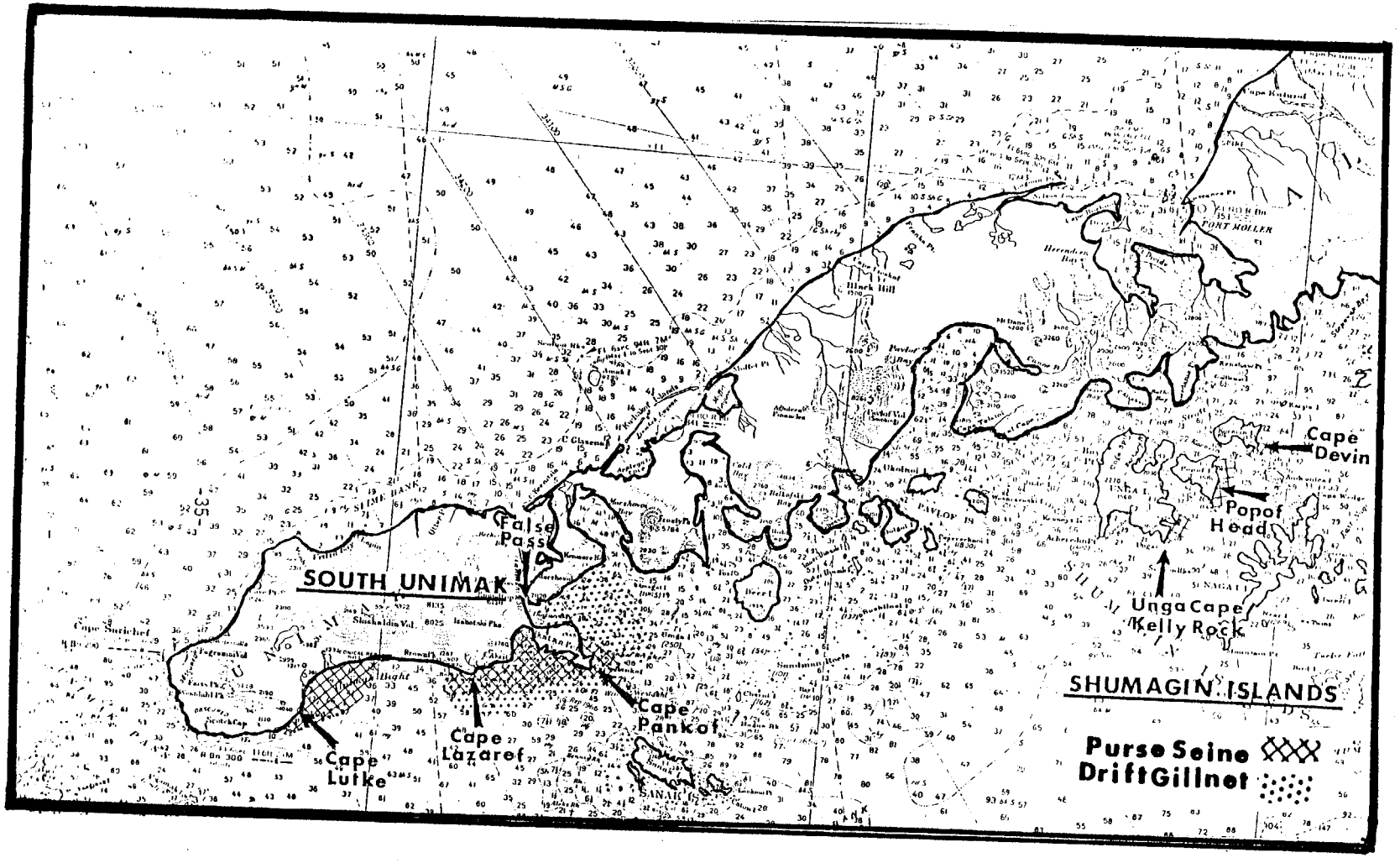
Unregulated Fishery
Catches (thousands of fish)

| Year | Purse Seine | | Drift Gillnet | | Total | |
|---|---|---|---|---|---|---|
| | Sockeye | Chum | Sockeye | Chum | Sockeye | Chum |
| 1979 | 663.4 | 59.1 | 197.5 | 44.1 | 860.8 | 103.3 |
| 1980 | 2637.3 | 430.5 | 632.0 | 94.8 | 3269.4 | 525.3 |
| 1981 | 1078.0 | 377.2 | 693.0 | 185.0 | 1771.0 | 562.2 |
| 1982 | 1341.4 | 590.2 | 745.0 | 501.0 | 2086.4 | 1091.2 |
| 1983 | 1339.9 | 574.4 | 602.2 | 212.5 | 1942.1 | 786.9 |
| 1984 | 963.3 | 245.5 | 404.4 | 92.0 | 1367.7 | 334.5 |

Regulated Fishery

| Year | Deviations from Historical Catches (thousands of fish)[a] | | | | | | Deviations from Historical Catches (percent of historical catch)[a] | | | | | | Days Additional |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Purse Seine | | Drift Gillnet | | Total Change | | Purse Seine | | Drift Gillnet | | Total Change | | |
| | Sockeye | Chum | Sockeye | Chum | Sockeye | Chum | Sockeye | Chum | Sockeye | Chum | Sockeye | Chum | Fishing Required to Harvest Sockeye |
| 1979 | -35.6 | -21.8 | 35.6 | 8.0 | 0 | -13.9 | -5% | -37% | +18% | +18% | 0 | -13% | +4.3 |
| 1980 | -152.0 | -187.7 | 152.0 | 22.8 | 0 | -164.9 | -6% | -44% | +24% | +24% | 0 | -31% | +4.1 |
| 1981 | -86.4 | -175.6 | 86.4 | 23.1 | 0 | -152.5 | -8% | -47% | +12% | +12% | 0 | -27% | +3.0 |
| 1982 | -84.1 | -258.7 | 84.1 | 56.6 | 0 | -203.1 | -6% | -44% | +11% | +11% | 0 | -19% | +3.3 |
| 1983 | -110.2 | -253.6 | 110.2 | 38.9 | 0 | -214.7 | -8% | -44% | +18% | +18% | 0 | -27% | +2.0 |
| 1984 | -109.8 | -113.5 | 109.8 | 25.0 | 0 | -88.5 | -11% | -46% | +27% | +27% | 0 | -26% | +1.1 |

[a]Legend: (+) are GAINS, (-) are LOSSES


False Pass
SOUTH UNIMAK
Cape Lutke
Cape Lazaref
Cape Pankof
Cape Devin
Popof Head
Unga Cape
Kelly Rock
SHUMAGIN ISLANDS
Purse Seine
Drift Gillnet

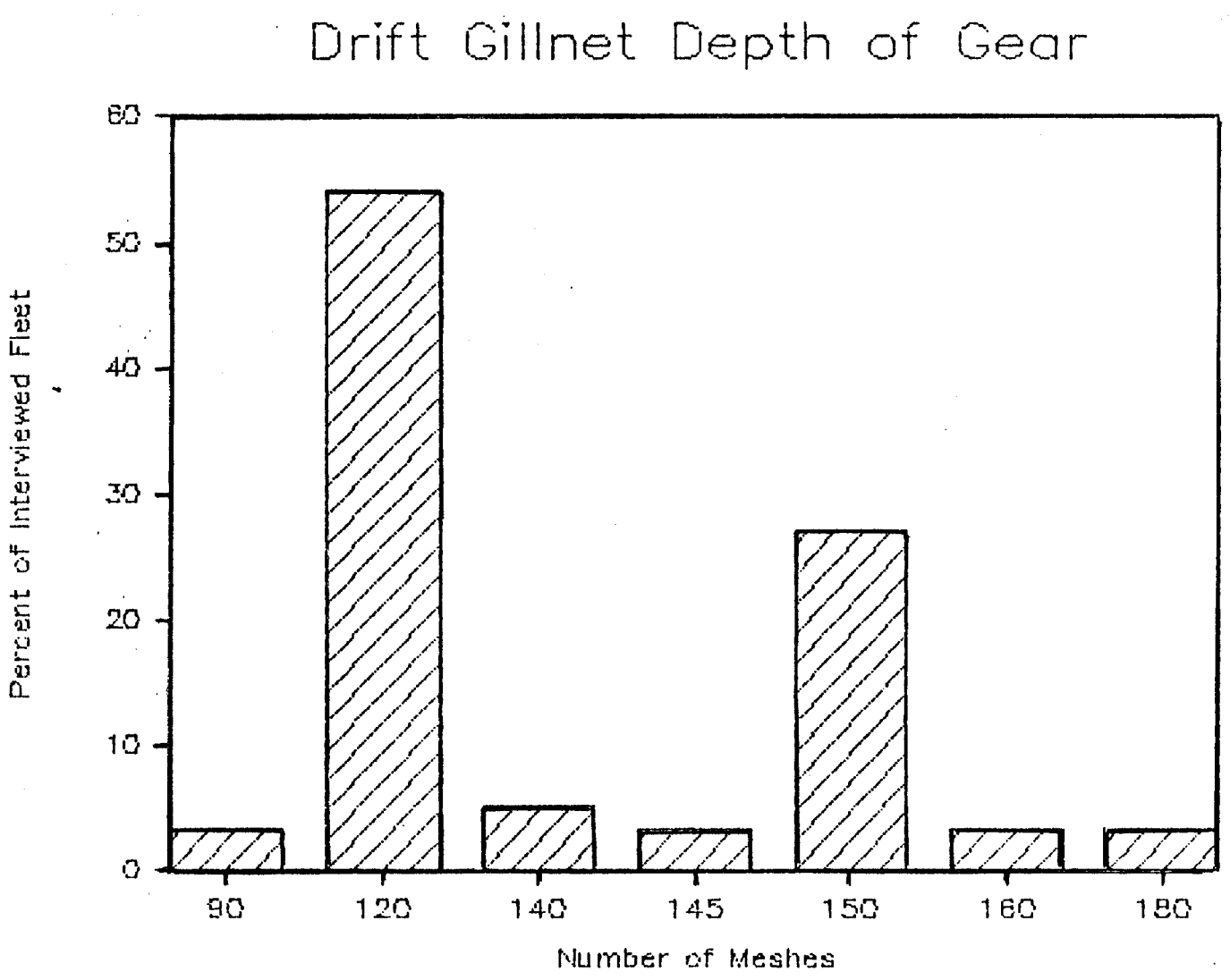



Figure 2. Composition of drift gillnet fleet by depth of gear, 1984.

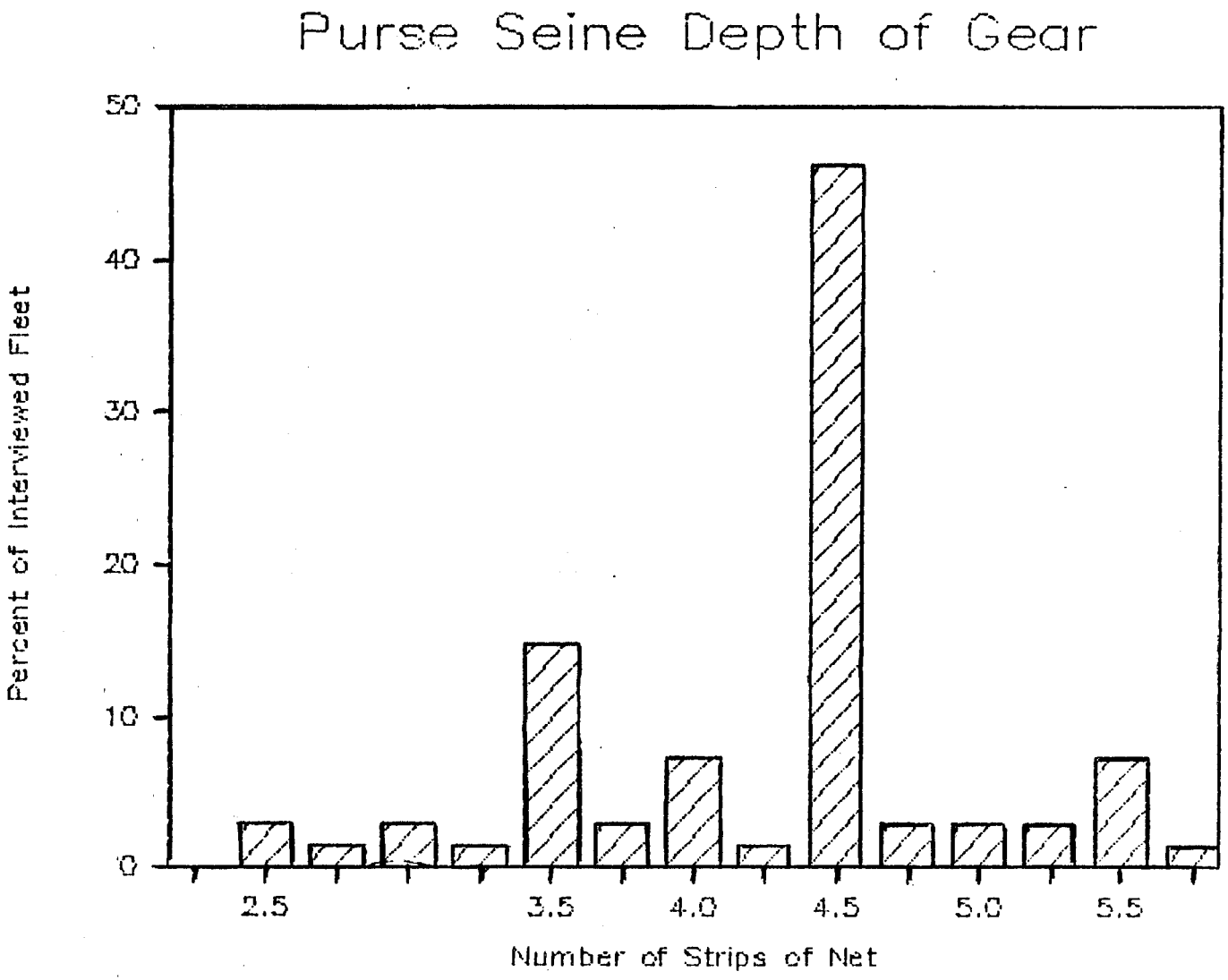



Figure 3. Percent composition of purse seine fleet by depth of gear, 1984.

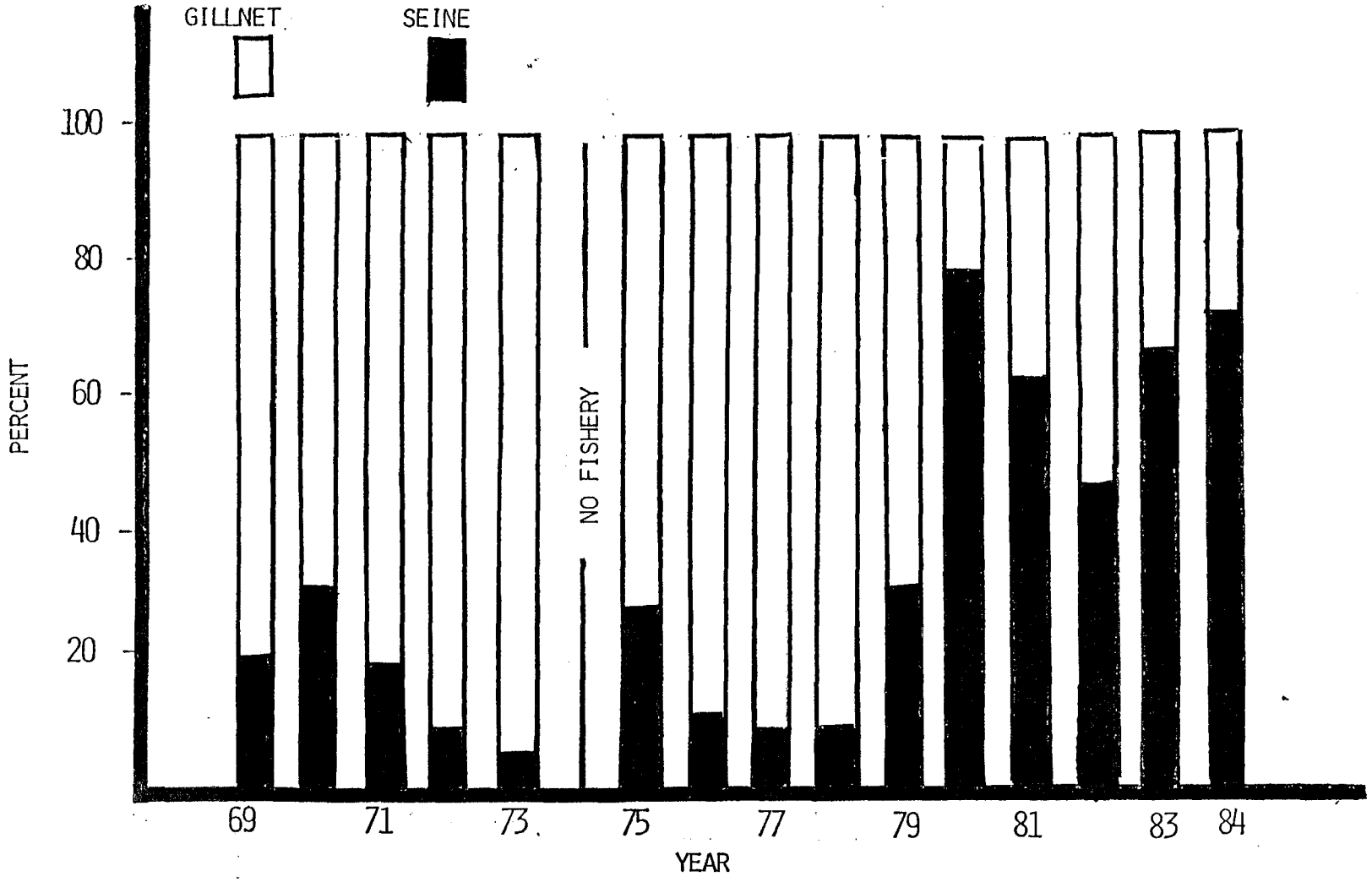



FIG. 4. SOUTH UNIMAK CHUM SALMON CATCH BY GEAR TYPE

# APPENDIX

Appendix A.1. South Unimak June fishery, daily sockeye catch, 1975-1984 year (in thousands of fish).

| Date | | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| June | 1 | | | | | | 0.3 | 0.1 | | 0.5 | |
| | 2 | | | | | | | 0.3 | 0.9 | 3.7 | |
| | 3 | | 0.1 | | | | | 0.3 | 0.2 | 7.1 | 25.3 |
| | 4 | | | | | | | 0.6 | 1.6 | 9.7 | 49.5 |
| | 5 | | | | 0.3 | 0.5 | | | 1.3 | 39.6 | |
| | 6 | | | | 0.1 | 1.6 | | 0.6 | 3.6 | 80.8 | |
| | 7 | | 1.0 | | 0.4 | 0.9 | | | 2.4 | | |
| | 8 | | 1.4 | 0.3 | 0.1 | 1.5 | 4.1 | 1.9 | 3.1 | | |
| | 9 | | | 0.4 | 0.4 | 2.5 | 5.0 | 6.4 | 1.6 | | |
| | 10 | 1.4 | 1.3 | 2.3 | 0.3 | 1.7 | 3.2 | 6.6 | 7.2 | | |
| | 11 | | 5.1 | | | 3.7 | | 47.6 | 12.7 | | |
| | 12 | 8.9 | | | 5.2 | 1.6 | | 73.6 | 13.7 | 200.7 | 468.2 |
| | 13 | | | 2.7 | 5.4 | 18.3 | | 144.1 | 6.0 | 290.5 | 122.6 |
| | 14 | | 4.8 | | 16.5 | 24.2 | | 119.7 | 3.3 | 301.1 | |
| | 15 | | 10.8 | 4.0 | 21.3 | 14.3 | 53.7 | 71.8 | 119.0 | | |
| | 16 | 15.8 | | 24.3 | 6.0 | 29.0 | 250.2 | 21.0 | 143.4 | | |
| | 17 | | 15.6 | 26.6 | 4.4 | 33.1 | 267.2 | | 156.7 | | |
| | 18 | 38.5 | 26.9 | 29.8 | 37.0 | 92.1 | 313.4 | | 105.5 | | |
| | 19 | | | | 46.2 | 71.7 | 187.8 | 202.4 | 131.3 | 420.3 | 466.5 |
| | 20 | 10.1 | | 68.0 | 38.8 | 118.8 | 198.7 | 226.3 | 22.9 | | |
| | 21 | | 38.9 | | 38.5 | 96.1 | 397.0 | 218.9 | 111.5 | 191.0 | |
| | 22 | | 1.3 | | 17.8 | 20.8 | 234.9 | 138.1 | 120.8 | | |
| | 23 | 40.1 | 44.0 | | 54.3 | 22.9 | 107.2 | | 155.5 | | |
| | 24 | 42.9 | | 8.9 | 29.0 | 32.6 | 256.9 | | 170.0 | | |
| | 25 | 33.0 | 14.9 | 28.0 | | 27.3 | 146.5 | | 9.3 | | |
| | 26 | | 51.0 | | 47.3 | 21.9 | 114.5 | 99.7 | 124.1 | | |
| | 27 | | | | 49.5 | 20.0 | 79.6 | 51.9 | 75.7 | | |
| | 28 | | 3.5 | | | 14.8 | 82.6 | 24.4 | 23.7 | | |
| | 29 | | 4.5 | | | | 25.1 | | 81.4 | | |
| | 30 | | 6.5 | | | | 3.4 | 18.0 | 61.4 | | |
| July | 1 | | 4.1 | | | 1.1 | | | | | |
| | 2 | | | | | 0.5 | | | | | |
| | 3 | | | | | 9.6 | | | | | |

Appendix A.2. Shumagin Islands June fishery, daily sockeye catch, 1975-1984 (in thousands of fish).

| Date | | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| June | 1 | | | | | | | | | | |
| | 2 | | | | | | | | | 2.0 | 6.4 |
| | 3 | | 0.2 | | | | | | | 1.0 | 16.5 |
| | 4 | | 0.1 | | | | | | | 7.8 | |
| | 5 | | | | | | | | | 13.0 | |
| | 6 | | | | | | | | | 7.9 | |
| | 7 | | 0.3 | | | | | | | | |
| | 8 | | 0.1 | 0.1 | | | | 2.3 | | | |
| | 9 | | | 3.4 | | | | | 0.3 | | |
| | 10 | | 0.5 | 3.7 | | | | 1.6 | 1.5 | | |
| | 11 | 2.8 | 1.0 | | 0.4 | | | 26.7 | 0.9 | | |
| | 12 | | | | 3.7 | | | 22.3 | | 90.8 | 76.7 |
| | 13 | 2.3 | | 12.1 | 3.6 | 6.2 | | 32.7 | | 87.1 | 39.9 |
| | 14 | | 1.1 | | 0.1 | 12.7 | | 37.0 | 1.6 | 78.6 | |
| | 15 | | 4.5 | | 9.1 | 12.4 | 58.1 | 20.3 | 14.9 | | |
| | 16 | 5.7 | | | 4.4 | 4.9 | 55.4 | 40.3 | 25.8 | | |
| | 17 | | 5.5 | | 0.2 | 7.8 | 31.1 | | 40.7 | | |
| | 18 | 23.9 | 12.5 | | 5.0 | 8.6 | 34.4 | | 23.4 | | |
| | 19 | | | | 5.7 | 16.8 | 10.1 | 24.3 | 42.8 | 127.7 | 76.3 |
| | 20 | 20.2 | | 26.5 | 2.6 | 13.6 | 20.6 | 54.2 | 23.5 | | |
| | 21 | | 26.7 | | 2.3 | 21.3 | 32.7 | 43.4 | 63.8 | | |
| | 22 | | | | 0.1 | 7.1 | 17.4 | 36.4 | 98.0 | | |
| | 23 | | 19.7 | | 3.3 | 8.0 | 13.4 | | 65.9 | | |
| | 24 | | | | 4.8 | 4.1 | 6.3 | | | | |
| | 25 | | | | | 17.8 | 13.0 | | | | |
| | 26 | | | | 10.1 | 18.5 | 73.6 | | 47.7 | | 42.5 |
| | 27 | | | | 7.1 | 10.7 | 47.1 | | | | |
| | 28 | | | | 5.4 | 8.7 | 45.2 | | | | |
| | 29 | | | | | | 10.7 | | | | |
| | 30 | | | | | | 6.0 | | | | |
| July | 1 | | | | | | 13.5 | | | | |
| | 2 | | | | | | 29.9 | | | | |
| | 3 | | | | | | 15.6 | | | | |
| | 4 | | | | | | 38.0 | | | | |

Appendix B.1. South Unimak Island June Fishery Daily Chum Catch, 1975-1984 (in thousands of fish)

| Date | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|---|---|---|---|---|
| June 1 | | | | | | | 0.2 | | 0.8 | |
| 2 | | | | 1.0 | | | 0.5 | 3.6 | 5.6 | |
| 3 | | 0.3 | | | | | 0.6 | 1.0 | 7.3 | 14.4 |
| 4 | | | | | | | 1.2 | 2.7 | 13.0 | 32.5 |
| 5 | | | | 0.1 | 0.4 | | | 3.0 | 17.3 | |
| 6 | | | | 0.1 | 2.6 | | 1.2 | 9.2 | 31.2 | |
| 7 | | 3.6 | 0.2 | 0.4 | 0.7 | | | 10.2 | | |
| 8 | | 8.6 | 0.4 | 0.1 | 1.9 | 0.3 | 1.8 | 13.3 | | |
| 9 | | | 0.9 | 0.2 | 1.3 | 0.4 | 10.9 | 4.2 | | |
| 10 | 2.1 | 13.9 | 4.2 | 1.1 | 1.5 | 1.6 | 4.8 | 10.4 | | |
| 11 | | 55.4 | | | 3.4 | | 24.0 | 19.8 | | |
| 12 | 7.0 | | | 2.9 | 0.7 | | 36.0 | 35.8 | 88.5 | 90.8 |
| 13 | | | 2.0 | 1.9 | 3.9 | | 48.2 | 13.5 | 109.0 | 23.5 |
| 14 | | 14.9 | | 4.3 | 7.1 | | 24.1 | 7.0 | 99.3 | |
| 15 | | 32.8 | 2.2 | 5.4 | 1.9 | 8.3 | 10.4 | 98.2 | | |
| 16 | 13.4 | | 18.7 | 2.6 | 0.7 | 36.7 | 7.5 | 105.0 | | |
| 17 | | 31.7 | 12.5 | 1.6 | 1.1 | 41.3 | | 92.0 | | |
| 18 | 8.9 | 52.0 | 12.0 | 7.2 | 2.2 | 58.2 | | 57.9 | | |
| 19 | | | | 7.7 | 2.7 | 34.0 | 45.6 | 66.6 | 169.6 | 68.4 |
| 20 | 3.3 | | 21.6 | 3.7 | 6.8 | 27.4 | 39.7 | 6.4 | | |
| 21 | | 23.4 | | 11.0 | 7.5 | 51.9 | 37.9 | 52.2 | 73.3 | |
| 22 | | | | 2.0 | 3.3 | 44.0 | 26.9 | 43.4 | | |
| 23 | 0.4 | 30.7 | | 10.6 | 3.1 | 24.1 | | 55.8 | | |
| 24 | 21.2 | | 6.2 | 9.3 | 2.7 | 52.7 | | 50.6 | | |
| 25 | | 14.6 | 13.4 | | 1.6 | 24.5 | | 2.3 | | |
| 26 | | 44.1 | | 12.8 | 2.4 | 18.3 | 47.3 | 43.7 | | |
| 27 | | | | 17.4 | 2.9 | 18.5 | 75.1 | 42.7 | | |
| 28 | | 2.5 | | | 0.7 | 11.4 | 42.8 | 7.9 | | |
| 29 | | 3.4 | | | | 2.1 | | 45.3 | | |
| 30 | | 4.5 | | | | 1.3 | 34.5 | 30.6 | | |

Appendix B.2. Shumagin Islands June fishery, daily chum catch, 1975-1984 (in thousands of fish).

| Date | | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| June | 1 | | 0.1 | | | | | | | | |
| | 2 | | | | | | | | | 4.6 | |
| | 3 | | 2.3 | | | | | | | 6.8 | 2.3 |
| | 4 | | 0.8 | | | | | | | 6.4 | 11.8 |
| | 5 | | | | | | | | | 14.0 | |
| | 6 | | | | | | | | | 5.4 | |
| | 7 | | 0.8 | | | | | | | | |
| | 8 | | 0.1 | 0.2 | | | | 3.3 | | | |
| | 9 | 0.2 | | 5.5 | | | | | 1.2 | | |
| | 10 | | 5.4 | 3.5 | | | | 1.5 | 3.2 | | |
| | 11 | 5.2 | 6.3 | | | | | 8.1 | 1.6 | | |
| | 12 | | | | 1.6 | | | 5.9 | | 34.1 | 26.8 |
| | 13 | 1.6 | | 8.4 | 1.9 | 1.8 | | 4.3 | | 40.3 | 13.1 |
| | 14 | | 1.3 | | | 4.7 | | 3.0 | 6.2 | 23.3 | |
| | 15 | | 7.5 | | 1.8 | 2.1 | 5.9 | 1.4 | 12.9 | | |
| | 16 | 5.3 | | | 1.1 | 1.4 | 3.3 | 3.8 | 12.7 | | |
| | 17 | | 9.9 | | | 2.2 | 6.0 | | 16.2 | | |
| | 18 | 12.6 | 12.6 | | 0.8 | 2.6 | 2.9 | | 6.8 | | |
| | 19 | | | | 0.9 | 4.1 | 1.5 | 4.4 | 9.0 | 34.3 | 16.6 |
| | 20 | 10.6 | | 4.4 | 0.6 | 2.7 | 1.2 | 6.2 | 9.7 | | |
| | 21 | | 15.5 | | 0.7 | 3.4 | 2.2 | 5.6 | 17.5 | | |
| | 22 | | | | | 1.1 | 1.1 | 6.8 | 30.4 | | |
| | 23 | | 10.9 | | 1.9 | 1.1 | 1.2 | | 17.3 | | |
| | 24 | | | | 2.3 | 0.4 | 0.9 | | | | |
| | 25 | | | | | 3.5 | 1.6 | | | | |
| | 26 | | | | 2.9 | 3.6 | 7.2 | | 15.6 | | 36.7 |
| | 27 | | | | 1.1 | 3.9 | 4.9 | | | | |
| | 28 | | | | 0.8 | 2.2 | 5.8 | | | | |
| | 29 | | | | | | 2.5 | | | | |
| | 30 | | | | | | 2.1 | | | | |