

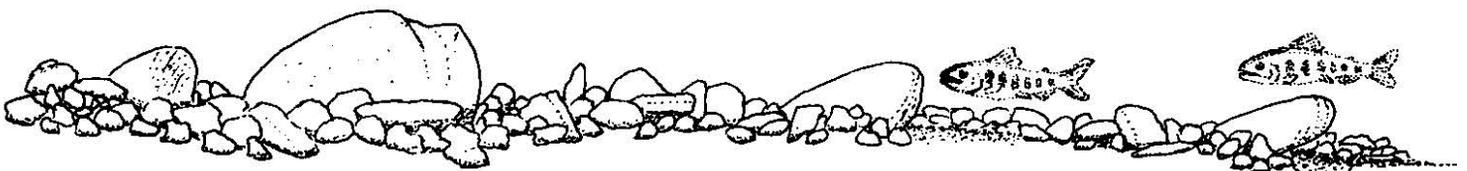
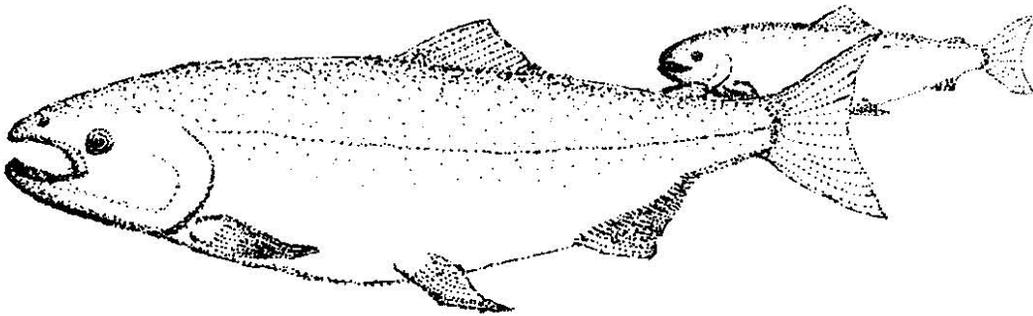


Fisheries Assistance Office
Olympia, Washington

Quinault National Fish Hatchery Salmon and Steelhead Coded Wire Tagging Results:

Fall Chinook Brood Year 1973
Coho Brood Years 1973 to 1975
Chum Brood Years 1974 to 1976
Steelhead Brood Years 1973-74 to 1975-76

REVISED MAY 1984



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Steelhead Brood Years 1973-74 to 1975-76

by

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Purpose of revision

This revision is to correct the data for 1978 recoveries of coho at Quinalt National Fish Hatchery. Tag codes 14-3-12 and 14-3-12 were incorrectly reported. The pages which were changed are 7,31,32,33,37,49,and III-2 of the appendix.

May 1984, M.L.Paiya

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INTRODUCTION

The Quinault National Fish Hatchery (QNFH) is located on Cook Creek, a tributary of the Quinault River (Figure 1). The hatchery was built to restore the depleted salmon and steelhead runs of north coastal Washington. The hatchery produces fall-run chinook, chum and coho salmon, and winter-run steelhead trout.

The hatchery began operation in 1969 and has been releasing coded wire tagged (CWT) salmon and steelhead since 1974. Coded wire tagging allows identification of fish by inserting numerically coded wire tags into the snout of the fish prior to release.

Various agencies recover tagged adults by sampling the commercial and sport catches, the hatchery returns, and spawning grounds in some cases. These agencies have now completed recovery of marked fish from the hatchery's earliest tagging years. This report will present information on various parameters of the marked groups, such as:

1. survival from hatchery release to capture, either in the fishery or at the hatchery.
2. the ratio of fishery catch to hatchery returns and the contribution to the various fisheries.
3. age composition and mean fork length.
4. timing of entry into the terminal area fishery.
5. how the stock origin and the time, size and location at release might affect the above characteristics.

This report presents information on salmon and steelhead groups reared entirely at the hatchery for which complete mark recovery information was available by March 31, 1982. The results of the CWT program at Quinault during this initial time period should not be considered as an evaluation of the success of the facility since much of the effort was intended to evaluate the success of various nonindigenous stocks. Even where the program was relatively stable using only a single brood source (i.e., steelhead), the culture methods, release strategies, and design of the experiments have changed in the intervening years to the extent that the results should not be considered to represent the current program.

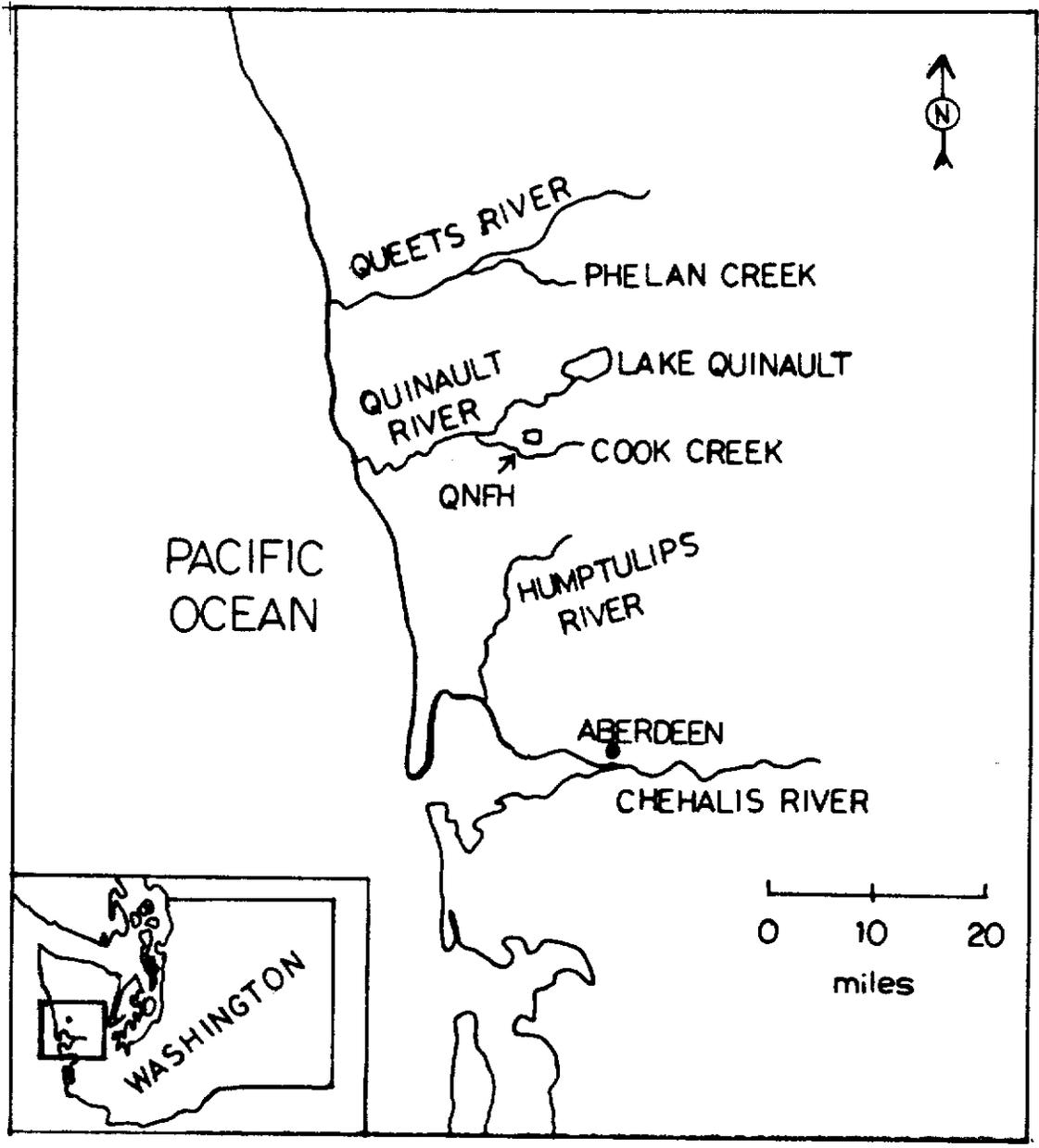


Figure 1. Quinault National Fish Hatchery (QNFH) and vicinity.

METHODS

Tagging

Prior to 1976 the study fish were tagged in the hatchery building, but since 1976, a trailer especially designed for tagging was used. During the early years of tagging at Quinault, only normal, healthy fish were tagged. All very large, very small, blind, deformed, pinheaded, or sick fish were returned to the raceway unmarked. The study fish were adipose fin clipped so they could be identified by sight upon recapture. Usually, no record was kept of the proportion of fish with naturally missing adipose fins. Such fish were simply tagged with the others.

The fish were implanted with the Bergman-Jefferts coded wire tag described by King (1978).

Tag loss

The tags had been magnetized when implanted, so the tag could be easily found when passed through a magnetic field detector. If no magnetization was detected, the fish was considered to have no tag. Usually 100 fish from each study group were tested. Tag loss was usually evaluated about a week after tagging.

Release Information

The time, number, and size of fish released were obtained from records maintained by Fisheries Assistance Office (FAO) in Olympia, Washington. The number of tagged fish released was usually calculated by subtracting the number of pre-release mortalities from the number of fish originally tagged and multiplied by the tag retention rate.

Bird predation was a serious problem for all groups, but was not directly estimated.

Hatchery personnel estimated fish size by counting and weighing a sample of each group just before release.

Tag Recovery in the Fisheries

Fishery recovery data was obtained from the Quinault Tribe's Department of Natural Resources (QDNR) and the Washington Department of Fisheries (WDF). Fin-clipped fish were recovered from catch samples in 14 fisheries from Alaska to California. The snout was removed from all fish that were missing the adipose fin. Year and date of recovery were noted to determine age composition and timing of the tag group. Fork length was recorded in the marine catch. Coded wire tags were removed from the snouts and decoded by the recovery agency. Recoveries of tags originating from QNFH were sent to the FWS Regional Tag Coordinator, who verified the tag code readings.

Generally, the recovery agency estimated the number of coded wire tagged fish recovered in a fishery by the formula

$$E = OC/S$$

where: E = expanded recovery of the tag group in a fishery
O = number of tags observed in the sample
S = number of fish sampled
C = total catch in the fishery

Prior to 1978, sampling rates were highly variable and ranged from 5% to 100% of the catch. From 1979 to the present, the rate has been more consistent at about 20%. WDF and QDNR data conflicted regarding the terminal area recovery of several coho groups. We used whichever data showed more observed recoveries. The river sport catch, the spawning grounds below the hatchery, and the off-station planting sites were not sampled.

Tag Recovery at Quinault National Fish Hatchery

Hatchery records suggest that all fish returning were examined for fin clips except for 1977 coho returns, when only 8.4% were sampled, and 1976-77 and 1978-79 steelhead returns, when no escapement records were available.

Year, date, fork length, and sex were recorded from each adipose clipped fish and the snout was removed. The Quinault Tribe dissected and read tags through 1978. FAO-Olympia has dissected and read tags from 1979 to the present.

RESULTS

Chinook

Data for five groups of tagged chinook released at QNFH were available for analysis. All were from the 1973 brood. Recovery and timing data are in Appendices I and II.

Tag group 5-2-10 consisted of Willapa River stock. Estimated survival was 1.34% (Table 1). The catch-to-escapement ratio was about 26 to 1. A large share of the catch went to the terminal fishery but Alaskan and Canadian interception was significant (Tables 6 and 7). Age-IV fish were the most abundant age group in the catch (Table 1), and averaged 80cm fork length. Fish returned to the terminal area fishery from the end of July to late October.

Tag group 5-3-10 consisted of Nemah River stock. Estimated survival was 1.00% (Table 2). Catch-to-escapement ratio was 29 to 1. The terminal area catch was about 15% of the recoveries, but the marine catch, especially by Canada, was significant (Table 6). Age-IV fish were slightly more abundant than age-III in the recoveries (Table 2). Age-III fish averaged 60cm and age IV, 80cm. This tag group was caught in the terminal area from the end of July to mid-October.

Tag group 5-4-10 consisted of the offspring of Finch Creek (Hood Canal) females crossed with Cook Creek males. Estimated survival was 0.21% (Table 3). The catch-to-escapement ratio was 28 to 1. The terminal catch was a very small part of the total; Canada harvested a very large share (Table 6). The recoveries were mainly ages III and IV in about equal numbers (Table 3). This is the only tag group with a non-coastal component.

Tag group 5-5-10 consisted of the offspring of Hoh River females crossed with Cook Creek males. Estimated survival was 1.42% (Table 4). Catch-to-escapement was about 26 to 1. Terminal catch was about 14% of the total recovery (Table 6). The Canadian fleet accounted for the largest share of the marine catch. Age-III fish were more abundant than age-IV in the total recoveries.

Tag group 5-6-10 consisted of Willapa River stock. Survival was 2.65% (Table 5). Catch was about 28 times escapement. Terminal catch was a substantial part of the total (Table 6). The Canadian fleet harvested the largest part of the marine catch.

Overall age composition for all groups was 36% age-III, 50% age-IV, and 11% age-V (Table 8). Jacks, or age-II fish, made up 3% of the recoveries.

Age-III fish averaged 62cm fork length and age-IV fish, 80cm (Table 9). Fish lengths were fairly similar in all tag groups except 5-4-10 (Finch x Cook) age-IV fish, which were considerably smaller, and 5-5-10 (Hoh x Cook) age-IV fish, which were somewhat larger than average. These two exceptions did not, however, make up a large part of the catch.

The run entered the terminal fishery from early July to mid-November. Median entry time was mid-September (Figure 2), but the 1978 run seemed considerably earlier than the 1977 run, based on the limited data.

Coho

Seven groups of tagged coho reared at QNFH were available for analysis; one from the 1973 brood and three each from the 1974 and 1975 broods. Recovery and timing data are in Appendices III and IV.

Tag group 14-15-1 consisted of 1973 brood Cook Creek stock released from the hatchery in 1975 to evaluate hatchery production. At least 2.05% survived to adult (Table 10). The catch-to-escapement ratio was about 14 to 1. All fish caught were in the marine fisheries, especially the Washington troll; the terminal fishery caught none (Tables 13 and 14). Marine recoveries averaged 62cm fork length.

Tag group 14-2-10 consisted of 1974 brood Willapa River stock released into the Humptulips River in 1976 to evaluate the stock and release site. The estimated catch was 0.65% of total release (Table 11). The terminal fishery accounted for 10% of the catch (Table 13). The marine fisheries in Washington had the highest catch, with more caught by sport than commercial gear.

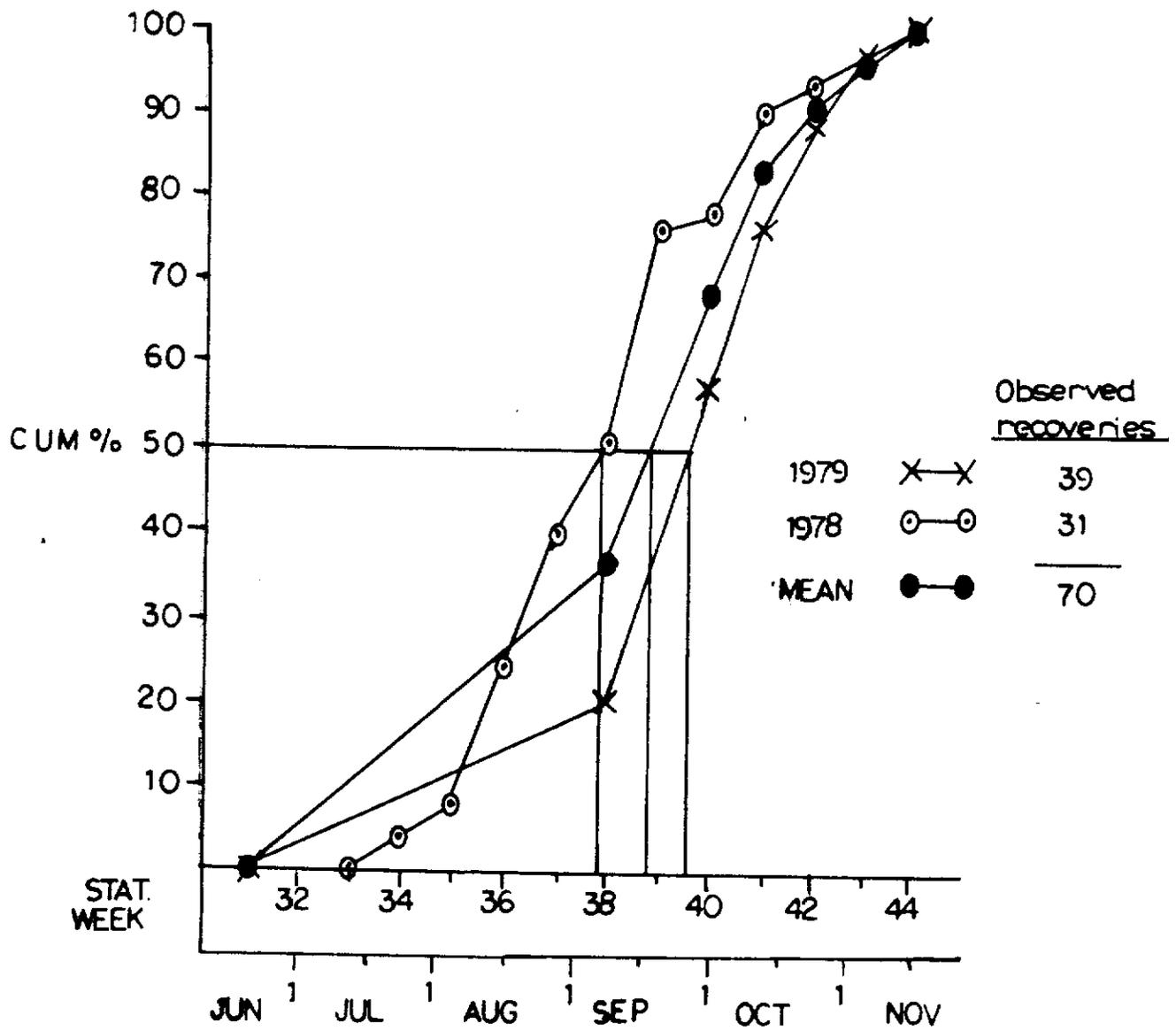


Figure 2. Timing of chinook return to Quinault River net fishery, all tag groups combined.

Tag group 14-13-9 consisted of 1974 brood Cook Creek stock released at the hatchery to evaluate production practices. An estimated 0.51% survived to adults (Table 11). The escapement was slightly greater than the catch, most of which occurred off Washington (Table 13). Marked fish were recovered in the terminal fishery from mid-September to mid-November (Table 11).

Tag group 14-15-9 consisted of 1974 brood offspring of Willapa River females crossed with Quinault River males. The group was released into Phelan Creek, a tributary of the Queets River, in 1976 to evaluate the stock and release site. Survival to recovery was estimated to be 0.37% (Table 11). The terminal fishery made up about 84% of the catch (Table 13).

Tag group 14-3-12 consisted of 1975 brood offspring of Skagit River females crossed with Cook Creek males. The group was released at the hatchery to evaluate the stock. Estimated survival to recovery was 0.95% (Table 12). About 8 fish were caught for every hatchery return. The terminal catch accounted for about 16% of the returns. Strays into the Queets River made up 12% of the terminal harvest (Table 15). In the marine catch, the greatest share went to the British Columbia troll fishery (Table 13). Mean fork length of recoveries was 59cm. The group entered the terminal fishery between late August and mid-October, with the greatest catch in the third week of September (Table 12).

Tag group 14-4-12 consisted of 1975 brood Cook Creek stock released at the hatchery to evaluate survival and contribution. Estimated survival to recovery was 1.00% (Table 12). About 9 fish were caught in the fishery for every return to the hatchery. The terminal fishery captured about 16% of the total recoveries. Strays into the Queets River made up 15% of the expanded terminal catch (Table 15). In the marine catch, the greatest share went to the British Columbia troll fishery (Table 13). Mean length of recoveries was 58cm. The group entered the terminal fishery between late August and mid-November, with the highest catch during the third week of September (Table 12).

Tag group 14-5-12 consisted of 1975 brood offspring of Green River females and Cook Creek males. The group was released at Phelan Creek to evaluate the stock and the release site. Estimated survival to recovery was 0.81% (Table 12). The terminal fishery caught about 12% of the recoveries. Eighteen percent of the catch was in the Quinault River (Table 15). In the marine catch the greatest share went to the British Columbia troll fishery. The group entered the terminal area fishery between mid-September and mid-November, with the highest catch in early October.

In all groups virtually all returns were age-III, with an average mean length of 60cm (Table 17). Only the 1975 brood returned in sufficient numbers to calculate mean return timing for the year. Recovery in the Quinault River fishery occurred from late August to mid-November with median entry in the third week of September (Figure 3). Most were Cook Creek releases (Table 16). Median entry on the Queets was the first week in October, and was made up of Quinault and Queets releases in about equal numbers.

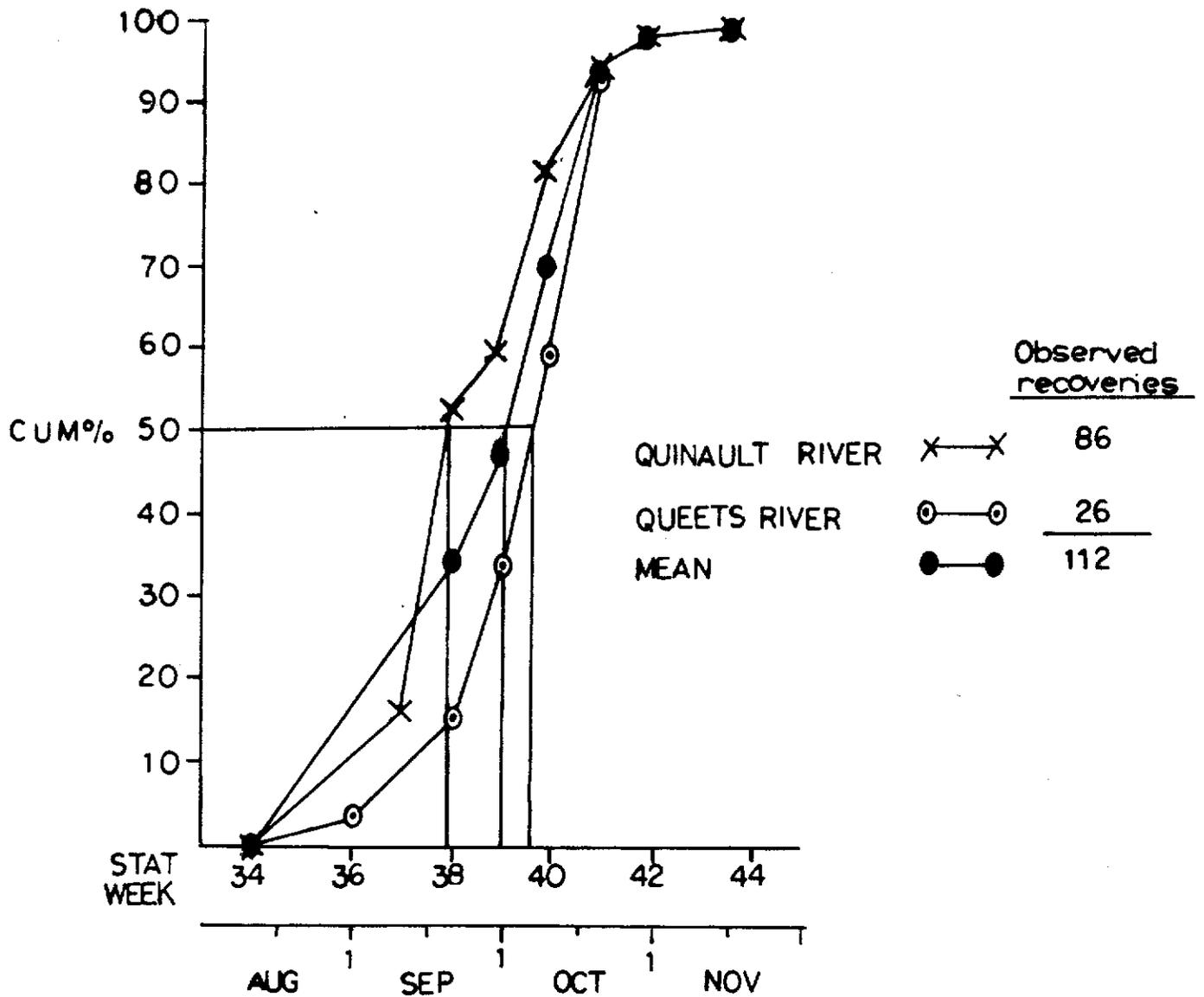


Figure 3. Timing of coho return to terminal area fisheries, 1978, tag groups 14-3-12, 14-4-12, and 14-5-12 combined.

The proportion of jacks in the hatchery return varied greatly between tag groups (Table 19). It appeared unusually low in tag group 14-13-9 and unusually high in group 14-3-12.

The marine contribution pattern of all stocks appeared to vary between the 1974 and 1975 brood years (Table 14). All the 1973 and 1974 brood groups, regardless of stock or location of release, contributed heavily to the Washington and Oregon marine fisheries but relatively little to the British Columbia fisheries. The reverse occurred with all 1975 brood groups.

There was some straying between terminal areas. Some fish planted at Cook Creek strayed to the Queets and about the same proportion of Queets releases strayed to the Quinalt (Table 15).

Chum

Data for seven groups of tagged chum reared at QNFH were available for analysis — two from the 1974 brood, three from the 1975 brood, and two from the 1976 brood. Recovery and timing data are in Appendices V and VI.

Tag group 14-2-2 consisted of 1974 brood Cook Creek stock released from the hatchery to evaluate production practices and to determine timing in the fishery. The total survival from smolt to adult recovery was 0.34% (Table 19). Catch-to-escapement was about 7 to 1. Most (86%) of the fish returned as age-IV.

Tag group 14-3-2 consisted of 1974 brood Cook Creek stock released from the hatchery to evaluate survival and contribution and to determine timing in the fishery. The total survival from smolt to adult recovery was 1.01% (Table 19). Catch to escapement was about 7 to 1. Most (93%) of the fish returned as age-IV. This age group entered the fishery only in late November.

Tag group 14-9-10 consisted of 1975 brood Cook Creek stock released from the hatchery to evaluate production practices and the timing in the 1978 and 1979 fisheries. The total estimated survival was 0.09% (Table 20). The catch-to-escapement ratio was 2.2 to 1. Most returned at age-IV, but significant numbers returned at ages-III and V. Age-III fish entered the fishery from late October to the first of November.

Tag group 14-10-10 consisted of 1975 brood offspring of Walcott Slough females crossed with Cook Creek males and released at the hatchery to evaluate the stock and its timing in the 1978 and 1979 fisheries. The total estimated survival was 0.14% (Table 20). The catch-to-escapement ratio was about 6 to 1. Age-III fish made up about two-thirds of the run and age-IV, one-third. Age-III fish entered from late October to the end of December. Age-IV fish entered from late October to late November.

Tag group 14-14-9 consisted of 1975 brood Walcott Slough stock released at the hatchery to evaluate the stock and its timing in the 1978 and 1979 fisheries. The total estimated survival was 0.05% (Table 20). None of these fish returned to the hatchery in either year. Fishery recoveries were all age-III; these entered from the third week of October to the third week of November.

Tag group 5-32-1 consisted of 1976 brood offspring of Walcott Slough females crossed with Cook Creek males. The group was released into Cook Creek to evaluate the stock and its timing in the 1979 and 1980 fisheries. Survival was estimated at 0.23% (Table 21). Catch-to-escapement was about 3.6 to 1. About 43% returned as age-III and 57% as age-IV. The age-III fish entered from the third week of October to the third week of November. The age-IV fish entered from early October to mid-November.

Tag group 5-37-1 consisted of 1976 brood Cook Creek stock released at the hatchery to evaluate production practices and timing in the fishery. Survival was 0.14% (Table 21). The catch-to-escapement ratio was about 3 to 1. About two-thirds returned as age-III and one-third as age-IV. The age-III fish entered the fishery from the third week of October to the third week of November. The age-IV fish were recovered in the first three weeks of November.

Average age composition of chum tag groups appeared to shift between years. Age-IV chum were more abundant than age-III in 1978, but the reverse was true in 1979 (Table 22).

Overall, entry into the fishery began in September and usually lasted until late November (Figure 4). Median entry was consistently at the beginning of November in all three years studied.

Steelhead

Data from four tag groups were available for analysis. Each group represented a successive brood year from 1973-74 to 1976-77. Recovery and timing data are in Appendices VII and VIII. Survival estimates for the first three brood years were based on incomplete hatchery escapement data.

Tag group 14-1-2 represented the 1973-74 brood. Approximately 0.79% of the releases survived to recovery in the fishery (Table 23). About 19% were recovered as age-III and 81% as age-IV. The age-IV fish's median entry week was January 8-14, with a range of mid-December through late March.

Tag group 14-12-9 represented the 1974-75 brood. Approximately 0.80% survived to recovery (Table 24). About five fish were caught for every hatchery return in 1977-78. About 78% of the total were recovered as age-III and 22% as age-IV. Median entry week in 1977-78 was December 11-17 but fish were present from the third week of November to the end of January. In 1978-79 tags were recovered from early November to the second week in December.

Tag group 14-2-12 represented the 1975-76 brood. Approximately 1.43% survived to recovery (Table 25). About eight fish were caught per hatchery return in 1979-80. About 71% of the total was recovered as age-III, and 29% as age-IV. The age-III fish were recovered principally in the first two weeks of December but ranged from early November to the second week in February.

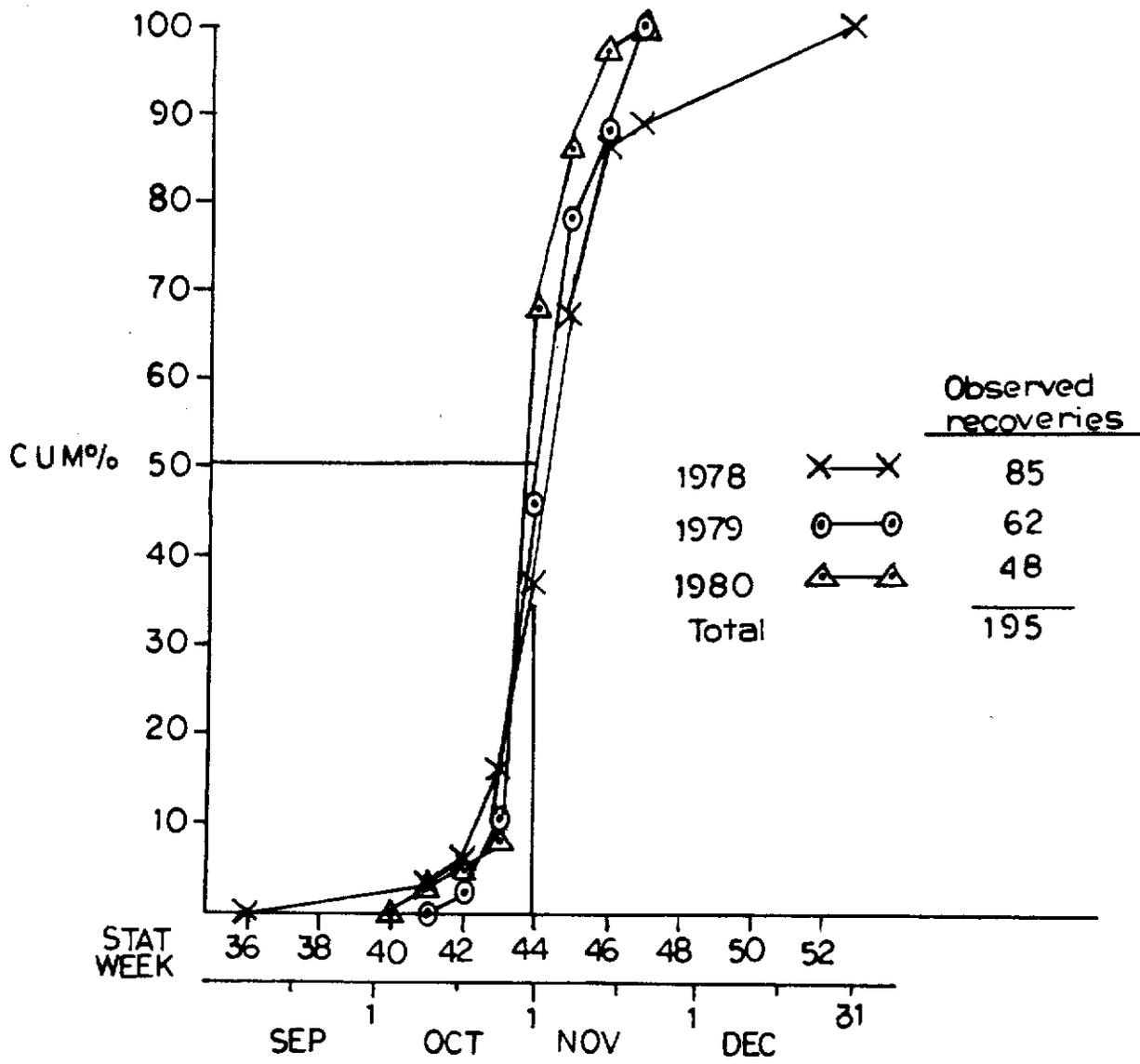


Figure 4. Timing of chum return to Quinault River net fishery, all tag groups combined.

Tag group 5-23-4 represented the 1976-77 brood. Survival was estimated to be 1.39% (Table 26). About 1.6 fish were caught per hatchery return in 1979-80 and about 8.6 in 1980-81. Age-III fish made up about 76% of the total recoveries and age-IV, 24%. The median return time for age-III fish was the first week of January but entry ranged from early November to early February.

In general, tagged steelhead did not stray significantly to other watersheds (Table 27). An exception was that about 30% of the four-year-old 1976-77 brood were caught in the Queets.

Tagged steelhead entered the terminal area fisheries from early November to the third week in March (Figure 5). Median entry time varied from the first week of December in 1978-79 to the first week of January in 1979-80. Timing also varied up to a month between age groups from the same brood year. Either age-III or age-IV fish entered first, depending on the brood year.

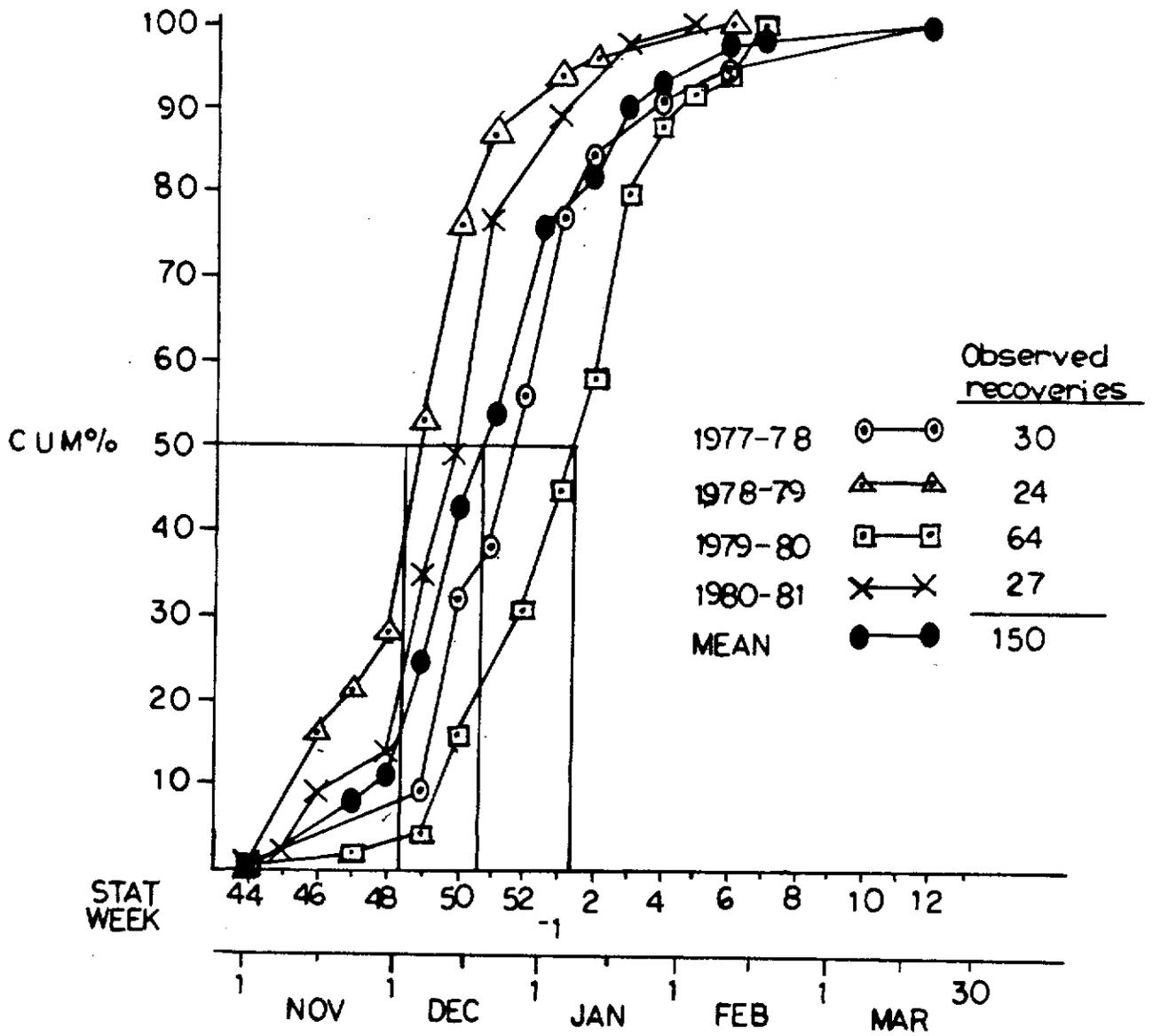


Figure 5. Timing of steelhead returns to Quinault River net fishery.

DISCUSSION

The available data indicate that the early CWT release groups from QNFH had highly variable survival and contribution rates. The results, however, should not be considered typical of current production since the hatchery and its operations have since improved. The results may not even represent actual production when the releases were made, since the CWT study methods have improved during the past several years.

The data had many sources of error, which tended to either underestimate or overestimate survival of the release groups, or add unpredictable variation. Survival could have been underestimated because:

- a. Tag loss was usually tested about one week after tagging. This was too early because significant losses can occur up to a month after tagging. Thus the actual release may have been overestimated, and survival underestimated.
- b. Pre-release mortality was not recorded for all tag groups. This would overestimate the actual release and thus underestimate survival.
- c. Not all possible areas were sampled for CWT fish. The river sport fisheries and the spawning grounds were not sampled at all. The Chehalis, Humptulips, Hoh, and Quillayute commercial fisheries were not sampled in all years. Bias was most severe with hatchery outplants, since no escapement was estimated.
- d. Actual rack sampling rate was uncertain. Some individual fish may not have been sampled even though records were presented as a 100% sample in most cases.

Survival could have been overestimated because:

- a. Abnormal fish were usually culled out before tagging. The remaining group may survive better than untagged releases of the same stock.
- b. Tag loss studies treated fish with naturally missing adipose fins as previously tagged fish which had lost their tags. This procedure overestimated survival.
- c. For tag loss sampling, fish that appeared to have lost their tag, were not remagnetized and tested again (sometimes a tag may lose its magnetic field).

Unpredictable variability in survival between tag groups could have occurred because:

- a. Fish tagged were usually taken from one raceway, which may not have represented the stock being examined.
- b. Many tag groups consisted of about 10,000 fish. Recent studies generally suggest larger groups for more uniform and reliable results.
- c. Details of tagging procedures were not standardized.
- d. The usual tag loss sample of 100 fish may not have been large enough to give uniform results.
- e. Information on disease and rearing practices for specific tag groups was difficult to obtain or nonexistent.
- f. Low fishery sampling rates could lessen the reliability of estimated survival and distribution of catch.

Despite these numerous problems, certain tentative interpretations of the data are suggested.

Chinook

The 1973 brood chinook tag groups' average survival rate of 1.33% is considered good for non-yearling releases (R. Antipa, WDF, personal communication).

Coastal stocks, with survival rates of 1.00 to 2.65%, appeared to survive better than the non-coastal stock, which had only 0.21% survival. October releases, with an average survival of 2.04%, appeared more successful than June releases, which averaged 0.85%. The difference could be due to either time or size at release. The June releases averaged 50/lb. while the October releases averaged 20/lb.

The Canadian fisheries consistently caught the highest portion (51.2% mean) of each group. This is similar to WDF chinook contribution from 1971 and 1972 broods (Bagatell et al. 1981, Fuss et al. 1981).

The mean catch-to-escapement ratio of 27 to 1 was high, reflecting the large catch by Canada and Washington and the resulting low escapement.

Coho

Survival of coho released into Cook Creek appeared low compared to CWT from other coastal hatcheries (Table 28). Furunculosis is endemic at Cook Creek (G. Taylor, Olympia Fish Health Laboratory, personal communication) and may have contributed to the problem, but records do not show whether the tag groups were seriously affected. In addition, tagging methods were not exactly comparable. For example, tag group 14-13-9 was treated differently than the other groups. The proportion of naturally missing adipose fins was noted, thus avoiding one cause of overestimating survival. Tag loss was checked the same day as tagging, however, thus permitting an underestimate in survival in comparison to the other groups.

Hybrids, exotic stock, and outplants had relatively poor contribution to the total catch (Table 29). This is normal for Washington coho (Bagatell *et al.* 1980). These same groups apparently had a higher contribution to the terminal catch than did Cook Creek fish; however, this observation should be used cautiously until more tagging study results become available.

Time at release appeared to affect survival of Cook Creek stock. The 1973 brood year was released May 5 and had the highest survival. The 1974 brood year was last released on April 13 and had lowest survival. The 1975 brood year was released April 28 and had intermediate survival, although these fish were slightly smaller than previous releases.

Catch per escapement was probably acceptable because rack returns have generally provided adequate broodstock for hatchery production goals. Most stocks were fished quite heavily in marine and terminal areas. An exception was the recovery of Cook Creek stock in 1977, when the escapement was greater than the catch.

The number of Cook Creek releases straying into the Queets River was large enough to be significant in management. The straying of Queets releases into the Quinault may likewise be significant but data is less reliable. Some Queets releases also entered the Quillayute.

The timing difference between the Queets and Quinault recoveries may also be of concern to management. The Queets catch peaked about three weeks later than the Quinault even though roughly half the Queets recoveries were strays from the Quinault.

The apparent shift in marine distribution between the 1974 and 1975 brood year recoveries could be due to (1) a change in migration routes, (2) changes in fishing pressure, or (3) uneven sampling effort, especially in the British Columbia troll fishery (Appendix III).

Mean fork lengths of Cook Creek stock were relatively short compared to other coastal coho, especially for the 1975 brood year. Skagit River-Cook Creek hybrid returns were also small-sized in that year.

In 1977 the QNFH sampled only 8.4% of the coho returns, thus casting some doubt on the escapement numbers of tagged 1975 brood jacks and 1974 brood adults. If the sampling rate was not even throughout the run and if different tag groups had different timing, then a certain group might be over-represented in the sample. This may explain the extremely high proportion of jack returns from tag group 14-3-12. Time at release did not account for this variation. The group was released at the same time as another group that had only a moderate number of jack returns (Table 30). The exact release time of the other tag groups could not be determined.

Size at release did not explain the results. High jack returns have been noted from groups of unusually large smolts. In this case, however, the smolt group yielding the most jacks was released at a smaller size than the others. The group with the lowest rate of jack returns was released at a rather large size, and other groups of moderate-to-large sized fish had an average proportion of jacks returning.

Chum

Tagged fish did not survive as well as normally expected for hatchery fish. This may be because the 1974 to 1976 brood groups were released later and at larger size than is currently recommended for best survival. No CWT studies of routine hatchery production elsewhere are available for comparison.

Stock selection appeared to affect the catch-to-escapement ratio. The Cook Creek stock had the lowest ratio, ranging from 2.15 to 7.0. The hybrid group had ratios from 6.5 to 20.5, and the Walcott Slough stock had no escapement at all, but an estimated catch of 79 fish. Poor escapement of Walcott stock can probably be related to the distance of native spawning grounds from salt water. The Walcott Slough stock normally spawns very near salt water whereas the Cook Creek stock spawns many miles upstream. One would expect the hybrid to be intermediate in run behavior, as it apparently was.

Steelhead

Survival was low compared to other west coast hatcheries (Tables 31 and 32) but this comparison should be taken cautiously because the data for comparison were mainly from catch records and trap counts. Both of these methods have several sources of error. Moreover, the survival for our 1973-74, 1974-75, and 1975-76 brood groups may have been underestimated because of the lack of 1976-77 and 1978-79 hatchery escapement data. Estimated survival of the 1976-77 brood group is more reliable than that of previous groups because (1) all fish were tagged regardless of condition, (2) tag loss was checked five months after tagging, and (3) hatchery escapement was recorded for both return years.

Time and size at release had no apparent effect on survival, even though some groups were released after April 20, or around 6/lb., or both, as recommended by Royal (1973). Rearing density, water quality, feeding, or diseases could have negated the potential benefit of a larger, later release. Rearing conditions, however, were not recorded for individual release groups. In any case, four tag groups are not enough for firm conclusions, particularly since data on an important component of the survival, the return to the rack, was usually incomplete.

Age composition of returns was typical of enhancement programs, about 75% age-III and 25% age-IV. An exception was the 1973-74 brood year, when the proportion was reversed. No reason was apparent.

Run timing was highly variable and should be used very carefully in management. Actual entry may differ from calculated timing because the rivers were not always low enough to be fished and because the number of actual recoveries was not very large.

Timing had no apparent relationship to age. Age-III fish returned either before or after age-IV fish, depending on the year.

Catch per escapement was usually within an acceptable range. An exception was the age-IV return of the 1973-74 brood year, of which apparently no tagged fish reached the hatchery (Table 23).

The straying of age-IV steelhead of the 1976-77 brood from the Quinault to the Queets was unusual and is not easily explainable. The high Queets catch of this group was probably not due to an unusually heavy fishery there. Only 1% of the three-year-old 1977-78 brood Lake Quinault steelhead were caught there in the same year (QDNR unpublished data).

CONCLUSIONS

The results of these early studies must be used cautiously because study procedures were not well-refined; however, the following points are worthy of mention.

Chinook

1. The 1973 brood tag groups' average survival appeared good for non-yearling release, assuming WDF had comparable tagging methods.
2. Coastal stocks appeared to survive considerably better than the non-coastal stocks.
3. October releases at 20/lb. survived better than June releases at 50/lb.
4. The Canadian fisheries consistently caught the highest proportion of each group. The mean catch-to-escapement ratio was very high, reflecting high overall catch and low escapement.
5. Age composition of the recoveries from the 1973 brood year was 3% age-II, 36% age-III, 50% age-IV, and 11% age-V.

Coho

1. Survival of all stocks appeared low compared to CWT groups from other coastal hatcheries, assuming tagging methods were comparable.
2. Hybrids, exotic stocks, and outplants generally exhibited poorer survival than on-station releases of pure Cook Creek stock.

3. May releases appeared to have better survival than April releases.
4. Catch per escapement was high but hatchery returns were still adequate for the program.
5. Marine distribution was variable, with Washington or British Columbia catch predominating, depending on the year.
6. About 15% of the 1975 brood Cook Creek releases that were recovered from the terminal area fisheries, had strayed into the Queets River.
7. Median entry timing of 1975 brood coho into the Quinault River was mid-September.

Chum

1. Survival was not as high as normally expected, possibly because of unusually large size and late timing at release.
2. Cook Creek stock was more successful in ascending the Quinault River to the hatchery than was Walcott Slough stock, even though both contributed to the fishery.
3. Median entry into the fishery was consistently around November 1.

Steelhead

1. Survival was low compared to other coastal hatcheries; however, an important component of the survival, the rack return, was not completely enumerated. Moreover, other studies were not exactly comparable.
2. Catch per escapement was usually high but adequate escapement occurred for hatchery needs.
3. Straying between the terminal area rivers was usually insignificant.
4. Run timing was highly variable, with median entry from early December to early January, depending on the year.

Table 1. Release and recovery summary for 1973 brood chinook, tag code 5-2-10. Sources: ODNR and WDF unpublished data and FWS CWT release and rack recovery files.

Tag code	5-2-10
<u>Release Summary</u>	
Stock	Willapa River
Study purpose	Stock assessment
Tagged releases	41,996
Size	50.1/lb.
Release site	Cook Creek
Release date	06-25-74
<u>Recovery Summary</u>	
Total observed recoveries	147
Total expanded recoveries	562
Expanded catch	541
Escapement	21
% survival	1.34
Survival/lb. released	0.67
Age composition (% of total recovery)	
III	14.6
IV	64.2
V	21.2
Catch/escapement	
1976 (age-III)	19.5
1977 (age-IV)	23.1
1978 (age-V)	58.5
Total	25.8
Timing of terminal catch (range)	
1977 (age-IV)	July 31 - Oct. 29
1978 (age-V)	Sept. 3 - Oct. 21

Table 2. Release and recovery summary for 1973 brood chinook, tag code 5-3-10. Source: QDNR and WDF unpublished data and FWS CWT release and rack recovery files.

Tag code	5-3-10
<u>Release summary</u>	
Stock	Nemah River -
Study purpose	Stock assessment
Tagged releases	60,424
Size	49.0/lb.
Release site	Cook Creek
Release date	06-26-74
<u>Recovery summary</u>	
Total observed recoveries	157
Total expanded recoveries	606
Expanded catch	586
Escapement	20
% survival	1.00
Survival/lb. released	0.49
Age composition (% of total recovery)	
II	2.0
III	39.3
IV	48.5
V	10.2
Catch/escapement	
1976 (age-III)	16.0
1977 (age-IV)	57.8
1978 (age-V)	a
Total	29.3
Timing of terminal catch (range)	
1977 (age-IV)	July 31-Oct. 15
1978 (age-V)	Sept. 3-Oct. 14

a. No escapement. catch = 62

Table 3. Release and recovery summary for 1973 brood chinook, tag code 5-4-10. Sources: OONR and WDF unpublished data and FWS CWT release and rack recovery files.

Tag code	5-4-10
<u>Release summary</u>	
Stock	Finch Creek X Cook Creek
Study purpose	Stock assessment
Tagged releases	40,040
Size	54/lb.
Release site	Cook Creek
Release date	06-27-74
<u>Recovery summary</u>	
Total observed recoveries	24
Total expanded recoveries	85
Expanded catch	82
Escapement	3
% survival	0.21
Survival/lb. released	0.11
Age composition (% of total recovery)	
II	10.6
III	43.5
IV	45.9
Catch/escapement	
1976 (age-III)	17.5
1977 (age-IV)	39.1
Total	28.3

Table 4. Release and recovery summary for 1973 brood chinook, tag code 5-5-10. Source: QDNR and WDF unpublished data and FWS CWT release area rack recovery files.

Tag code	5-5-10
<u>Release summary</u>	
Stock	Hoh River X Cook Creek
Study purpose	Stock assessment
Tagged releases	7,480
Size	14.0/lb.
Release site	Cook Creek
Release date	10-03-74
<u>Recovery summary</u>	
Total observed recoveries	30
Total expanded recoveries	106
Expanded catch	102
Escapement	4
% survival	1.42
Survival/lb. released	0.20
Age composition (% of total recovery)	
III	50.9
IV	37.7
V	11.4
Catch/escapement	
1976 (age-III)	26.0
1977 (age-IV)	19.0
1978 (age-V)	a
Total	25.5

a. No escapement.

Table 5. Release and recovery summary for 1973 brood chinook, tag code 5-6-10. Sources: QDNR and WDF unpublished data and FWS CWT release and rack recovery files.

Tag code	5-6-10
<u>Release summary</u>	
Stock	Willapa River
Study purpose	Hatchery contribution and stock assessment
Tagged releases	19,747
Size	13.5
Release site	Cook Creek
Release date	10-01-74
<u>Recovery summary</u>	
Total observed recoveries	154
Total expanded recoveries	524
Expanded catch	506
Escapement	18
% survival	2.65
Survival/lb. released	0.36
Age composition (% of total recovery)	
II	2.9
III	30.5
IV	54.0
V	12.6
Catch/escapement	
1976 (age-III)	16.8
1977 (age-IV)	34.4
1978 (age-V)	65.0
Total	28.1
Timing of terminal catch (range)	
1977 (age-IV)	Sept. 18-Oct. 22
1978 (age-V)	Aug. 20-Oct. 4

Table 6. Distribution of catch (% of total recoveries) for the 1973 brood chinook tag groups. Sources: WDF and QDNR unpublished data and QNFH rack recovery files.

Tag code	Alaska	Canada	WA-ORE	Terminal	Escapement	Total
5-2-10	20.6	34.3	5.0	36.3	3.7	99.9
5-3-10	11.7	47.2	19.0	18.8	3.3	100.0
5-4-10	4.7	77.7	10.6	3.5	3.5	100.0
5-5-10	5.7	51.9	24.5	14.2	3.8	100.1
5-6-10	13.0	44.9	14.3	24.4	3.4	100.0
Mean	11.1	51.2	14.7	19.4	3.5	99.9

Table 7. Contribution of 1973 brood chinook tag groups. (Number of recoveries by fishery per fish released). Sources: WDF and ODNR unpublished data and ONFH rack recovery files.

Tag code	Alaska	Canada	Wa-Ore	Terminal	Escapement	Total
5-2-10	0.0028	0.0046	0.0007	0.0049	0.0005	0.0134
5-3-10	0.0012	0.0047	0.0019	0.0019	0.0003	0.0100
5-4-10	0.0001	0.0016	0.0002	0.0001	0.0001	0.0021
5-5-10	0.0008	0.0074	0.0035	0.0020	0.0005	0.0142
5-6-10	0.0034	0.0119	0.0038	0.0065	0.0009	0.0265
Mean	0.0017	0.0064	0.0020	0.0031	0.0005	0.0133

Table 8. Age composition of 1973 brood chinook.

Tag code	<u>Percent (a)</u>			
	age-II	age-III	age-IV	age-V
5-2-10	0.0	14.6	64.2	21.2
5-3-10	2.0	39.3	48.5	10.2
5-4-10	10.6	43.5	45.9	0.0
5-5-10	0.0	50.9	37.7	11.4
5-6-10	2.9	30.5	54.0	12.6
Unweighted Mean	3.15	35.8	50.0	11.1

a. Percent of total recoveries occurring at a certain age.

Table 9. Mean forklength (cm) of 1973 brood chinook.

Tag group	<u>Length (sample size)</u>				Weighted Mean
	Age-II	Age-III	Age-IV	Age-V	
5-2-10	—	63 (25)	80 (89)	89 (41)	81 (154)
5-3-10	57 (1)	60 (55)	80 (65)	87 (14)	72 (136)
5-4-10	51 (1)	62 (10)	76 (8)	—	68 (19)
5-5-10	—	60 (13)	85 (11)	99 (1)	73 (25)
5-6-10	42 (2)	63 (42)	80 (73)	88 (12)	75 (129)
Unweighted mean	50	62	80	91	74

Table 10. Release and recovery summary for 1973 brood coho, tag code 14-15-1. Sources: QDNR and WDF unpublished data and FWS CWT release and rack recovery files.

Tag code	14-15-9
<u>Release summary</u>	
Stock	Cook Creek
Study purpose	Contribution
Tagged releases	50,253
Size	13.6/lb.
Release site	Cook Creek
Release date	03-14 to 05-05-75
<u>Return summary, 1976 returns (age-III)</u>	
Total observed recoveries	249
Expanded recoveries	1,031
Expanded catch	963
Estimated escapement	68 (a)
% survival	2.05+
Survival/lb. released	0.28
Catch/escapement	14.16
Mean fork length	62cm

a. Escapement assumed to be sampled at 100%. Actual escapement could be greater.

Table 11. Release and recovery summary for 1974 brood coho. Sources: OONR and WDF unpublished data and FWS CWT release and rack recovery files.

Tag code	14-2-10	14-13-9	14-15-9
<u>Release summary</u>			
Stock Purpose	Willapa River Stock assessment	Cook Creek Hatchery contribution	Willapa X Quinault Stock assessment
Tagged releases	15,461	125,005 (a)	9,929
Size	14.5/lb.	14.2/lb.	17.0/lb.
Release site	Humtulpis River	Cook Creek	Phelan Creek
Release date	04-26,04-28-76	03-22 to 04-13-76	04-26,04-27-76
<u>Recovery summary (Age-III)</u>			
Total observed recoveries	20	89	5
Total expanded recoveries	101	638	37
Expanded catch	101	305	37
Escapement	(b)	333(c)	(b)
% survival	0.65	0.51+	0.37
Survival/lb. released	0.09	0.07+	0.06
Catch/ escapement	(b)	0.92	(b)
Timing of terminal catch, 1977 (age-III)			
Range	(d)	Sept. 18-Nov. 19	(d)

-
- a. Retention determined same day as tagging. Actual survival is probably greater than the estimate given.
 - b. Outplant. Escapement not applicable.
 - c. Escapement sampled at 8.4%.
 - d. Insufficient information to determine terminal timing.

Table 12. Release and recovery summary for 1975 brood coho. Sources: QDNR and WDF unpublished data and FWS CWF release and rack recovery files.

Tag code	14-3-12	14-4-12	14-5-12
<u>Release summary</u>			
Stock	Skagit River X Cook Creek	Cook Creek	Green River X Cook Creek
Study purpose	Stock assessment	Hatchery contribution	Stock assessment
Tagged releases	70,057	75,328	40,586
Size	23.2/lb.	17.0/lb.	24.8/lb.
Release site	Cook Creek	Cook Creek	Phelan Creek
Release date	04-27-77	04-28-77	04-27,04-28-77
<u>Recovery summary</u>			
Total observed recoveries	219	240	63
Total expanded recoveries	663	757	327
Expanded catch	591	679	324
Escapement	72	78	3
% survival	0.95	1.00	0.81
Survival/lb. released	0.22	0.17	0.20
Catch/escapement	8.21	8.71	(a)
Timing of terminal catch, 1977 (age-III)			
Median	Sept. 17-23	Sept. 17-23	Oct. 1-7
Range	Aug. 27-Oct. 14	Aug. 27-Nov. 18	Sept. 10-Nov. 18
Mean forklngth	59cm	58cm	(b)

a. Outplant. Escapement not applicable. Strays to the hatchery accounted for 0.9% of the recoveries.

b. Insufficient sample to determine mean fork length.

Table 12. Release and recovery summary for 1975 brood coho. Sources: ODNR and WDF unpublished data and FWS CWT release and rack recovery files.

Tag Code	14-3-12	14-4-12	14-5-12
<u>Release summary</u>			
Stock	Skagit River X Cook Creek	Cook Creek	Green River X Cook Creek
Study purpose	Stock assessment	Hatchery contribution	Stock assessment
Tagged releases	70,057	75,328	40,586
Size	23.2/lb.	17.0/lb.	24.8/lb.
Release site	Cook Creek	Cook Creek	Phelan Creek
Release date	04-27-77	04-28-77	04-27,04-28-77
<u>Recovery summary</u>			
Total observed recoveries	198	214	63
Total expanded recoveries	642	731	327
Expanded catch	591	679	324
Escapement	51	52	3
% survival	0.92	0.97	0.81
Survival/lb. released	0.20	0.15	0.20
Catch/escapement	11.36	13.06	(a)
Timing of terminal catch, 1977 (age-III)			
Median	Sept. 17-23	Sept. 17-23	Oct. 1-7
Range	Aug. 27-Oct. 14	Aug. 27-Nov. 18	Sept. 10-Nov. 18
Mean forklength	59cm	58cm	(b)

a. Outplant. Escapement not applicable. Strays to the hatchery accounted for 0.9% of the recoveries.

b. Insufficient sample to determine mean fork length.

Table 13. Distribution of catch (% of total recoveries) for coho tag groups. Sources: WDF and QNR unpublished data and QNFH rack recovery files.

Brood Year	Tag code	Alaska and BC		Washington		Oregon and California		Terminal Escapement	Observed Recoveries	
		BC		Ocean Sport Troll	Puget Sound net	California				
1973	14-15-1	24.5		14.6	34.3	0	19.9	0	6.6(a)	249
1974	14-2-10	13.9		34.6	18.8	0	22.8	10.0(b)	(c)	20
1974	14-13-9	7.6		13.1	15.3	0.4	8.2	3.1	52.2	89
1974	14-15-9	0		0	0	0	16.2	83.8	(c)	5
1975	14-3-12	41.3		4.1	24.3	0.4	3.0	16.0	10.9	219
1975	14-4-12	48.4		7.3	16.4	0.4	1.6	15.6	10.3	240
1975	14-5-12	57.2		10.0	20.2	0	0	12.5	(c)	63
1975	mean(d)	46.4		5.9	21.1	0.4	2.4	16.3	7.6	
Overall	mean(d)	31.2		9.9	22.9	0.3	8.2	8.9	18.5	

a. Escapement assumed to be sampled at 100% actual escapement could be higher.

b. Source: WDF

c. Outplant. Hatchery escapement not applicable.

d. Includes on-station releases only.

Table 13. Distribution of catch (% of total recoveries) for coho tag groups. Sources: WDF and QNR unpublished data and QNFH rack recovery files.

Brood Year	Tag code	Alaska and BC		Washington		Oregon and California		Terminal Escapement	Observed Recoveries	
		BC	and	Ocean Sport	Troll	Puget Sound net	and California			
1973	14-15-1	24.5		14.6	34.3	0	19.9	0	6.6(a)	249
1974	14-2-10	13.9		34.6	18.8	0	22.8	10.0(b)	(c)	20
1974	14-13-9	7.6		13.1	15.3	0.4	8.2	3.1	52.2	89
1974	14-15-9	0		0	0	0	16.2	83.8	(c)	5
1975	14-3-12	42.6		4.2	25.1	0.4	3.2	16.4	8.1	198
1975	14-4-12	50.2		7.5	17.0	0.4	1.6	16.2	7.1	214
1975	14-5-12	57.2		10.0	20.2	0	0	12.5	(c)	63
1975	mean(d)	46.4		5.9	21.1	0.4	2.4	16.3	7.6	
Overall	mean(d)	31.2		9.9	22.9	0.3	8.2	8.9	18.5	

a. Escapement assumed to be sampled at 100% actual escapement could be higher.

b. Source: WDF

c. Outplant. Hatchery escapement not applicable.

d. Includes on-station releases only.

Table 14. Contribution of coho tag groups (number of recoveries by fishery per fish released).
 Sources: WDF and QDNR unpublished data and QNFH rack recovery files.

Brood Year	Tag code	Alaska and BC		Washington		Oregon and California		Terminal Escapement	Total	
		BC	and	Ocean Sport Troll	Puget Sound net	and	California			
1973	14-15-1	.00503		.0030	.00704	0	.00408	0	.00135(a)	.02053
1974	14-2-10	.00091		.00226	.00123	0	.00149	.00065(b)	(c)	.00653
1974	14-13-9	.00039		.00067	.00078	.00002	.00042	.00016	.00266	.00510
1974	14-15-9	0		0	0	0	.00060	.00310	(c)	.00370
1974	Mean	.00043		.00098	.00067	.00001	.00084	.00040	.00089	.00421
1975	14-3-12	.00391		.00039	.00230	.00004	.00029	.00151	.00106	.00950
1975	14-4-12	.00487		.00073	.00165	.00004	.00016	.00157	.00100	.01000
1975	14-5-12	.00461		.00081	.00163	0	0	.00010	(c)	.00806
1975	Mean	.00446		.00064	.00186	.00003	.00015	.00136	.00047	.00897
Overall Mean		.00282		.00012	.00209	.00001	.00101	.00114	.00078	.00897

a. Escapement assumed to be sampled at 100% actual escapement could be higher.

b. Source: WDF

c. Outplant. Hatchery escapement not applicable.

d. Includes on-station releases only.

Table 14. Contribution of coho tag groups (number of recoveries by fishery per fish released).
 Sources: WDF and ODNR unpublished data and ONFH rack recovery files.

Brood Year	Tag code	Alaska and BC		Washington		Oregon and California		Terminal Escapement	Total	
				Ocean Sport Troll	Puget Sound net					
1973	14-15-1	.00503		.0030	.00704	0	.00408	0	.00135 (a)	.02053
1974	14-2-10	.00091		.00226	.00123	0	.00149	.00065 (b)	(c)	.00653
1974	14-13-9	.00039		.00067	.00078	.00002	.00042	.00016	.00266	.00510
1974	14-15-9	0		0	0	0	.00060	.00310	(c)	.00370
1974	Mean	.00043		.00098	.00067	.00001	.00084	.00040	.00089	.00421
1975	14-3-12	.00391		.00039	.00230	.00004	.00029	.00151	.00074	.00918
1975	14-4-12	.00487		.00073	.00165	.00004	.00016	.00157	.00069	.00970
1975	14-4-12	.00461		.00081	.00163	0	0	.00010	(c)	.00806
1975	Mean	.00446		.00064	.00186	.00003	.00015	.00136	.00047	.00897
Overall Mean		.00282		.00012	.00709	.00001	.00101	.00114	.00078	.00897

a. Escapement assumed to be sampled at 100% actual escapement could be higher.

b. Source: WDF

c. Outplant. Hatchery escapement not applicable.

d. Includes on-station releases only.

Table 15. Distribution of terminal catch (percentage of recoveries) for coho tag groups.

Brood Year	Tag code	Release site	Quinalt	Fishery Area					Recoveries	
				Queets	Humptulips	Quillayute	Observed	Expanded		
1974	14-2-10	Humptulips River	0.0	0.0	100.0	(a)	2	10		
1974	14-13-9	Cook Creek	70.0	30.0	0.0	(a)	10	20		
1975	14-3-12	Cook Creek	87.7	12.3	0.0	0.0	46	106		
1975	14-4-12	Cook Creek	84.7	15.3	0.0	0.0	52	118		
1975	14-5-12	Phelan Creek	18.4	73.7	0.0	7.9	14-17 (b)	38		
Mean	---	Cook Creek	84.8	15.2	0.0	0.0	108			

(a). Not sampled.

(b). Observed Quillayute recovery not available. Expanded recovery = 3.

Table 16. Stock composition of 1978 terminal area CWT coho catch.

Stock	Quinault		Queets	
	Expanded tags	%	Expanded tags	%
Skagit River X Cook Creek (Cook Creek release)	93	46.5	13	22.0
Cook Creek (Cook Creek release)	100	50.0	18	30.5
Green River X Cook Creek (Phelan Creek release)	7	3.5	28	47.5
Total	200	100.0	59	100.0

Table 17. Mean fork length (cm) of coho. Sources: WDF and QNFH unpublished data.

<u>Tag code</u>	<u>Recovery year</u>	<u>Length(cm)</u>	<u>No. Sampled</u>
14-15-1	1976	62	209
14-13-9	1977	65	82
14-3-12	1978	59	135
14-4-12	1978	56	138
14-5-12	1978	59	50
Unweighted mean		60	

Table 18. Occurrence of tagged coho jacks in QNFH escapement. Sources: FAO and QNFH unpublished data

Brood Year	Tag Code	Return Year	Jacks			ADULTS			% of group
			Observed recoveries	Expanded recoveries	% of group	Return Year	Observed recoveries	Expanded recoveries	
73	14-15-1	75	37	37(a)	35.2	76	68	68(a)	64.8
74	14-13-9	76	26	26(a)	7.2(c)	77	20	333(b)	92.8(c)
75	14-3-12	77	34	405(b)	84.9(c)	78	72	72	15.1(c)
75	14-4-12	77	3	36(b)	31.6	78	78	78	68.4

a. Escapement assumed to be sampled at 100%. Actual tag group escapement could be higher.

b. Escapement sampled at 8.4%. May not be random over time.

c. May have been affected by low sampling rate.

Table 18. Occurrence of tagged coho tacks in ONFH escapement. Sources: FAO and ONFH unpublished data.

Brood year	Tag code	Return year	Jacks			Adults			% of group
			Return year	Observed recoveries	Expanded recoveries	% of group	Return year	Observed recoveries	
73	14-15-1	75	37	37 (a)	35.2	76	68	68 (a)	64.8
74	14-13-9	76	26	26 (a)	7.2 (c)	77	28	333 (b)	92.8 (c)
75	14-3-12	77	34	405 (b)	88.6 (c)	78	52	52	11.4 (c)
75	14-2-12	77	3	36 (b)	40.9	78	52	52	59.1

- a. Escapement assumed to be sampled at 100%. Actual tag group escapement could be higher.
- b. Escapement sampled at 8.4%. May not be random over time.
- c. May have been affected by low sampling rate.

Table 19. Release and recovery summary for 1974 brood chum. Source: ODNR and WDF unpublished data and FWS CWT release and recovery files.

Tag code	14-2-2	14-3-2
<u>Release summary</u>		
Stock	Willapa River X Cook Creek	Cook Creek
Study purpose	Hatchery contribution and stock assessment	Hatchery contribution
Tagged releases	100,951	20,494
Size	146/lb.	144/lb.
Release site	Cook Creek	Cook Creek
Release date	06-12-75	06-03-75
<u>Recovery summary</u>		
Total observed recoveries	52	51
Total expanded recoveries	340	208
Expanded catch	324	182
Escapement	16	26
% survival	0.34	1.01
Survival/lb. released	0.49	1.46
Age composition (% of total recovery)		
III	12.7	2.9
IV	86.5	93.3
V	0.8	3.8
Catch/escapement		
1977 (age-III)	20.5	0.5
1978 (age-IV)	21.6	8.7
1979 (age-V)	2.0	3.0
Total	20.2	7.0
Timing of terminal catch		
1977 (age-III)	Nov. 6-Dec. 31	Oct. 23-Nov. 5
1978 (age-IV)	Nov. 5-Dec. 31	Nov. 26-Nov. 31
1979 (age-V)	Nov. 11-Nov. 18	Oct. 14-Oct. 27

Table 20. Release and recovery summary for 1975 brood chum. Source: ODNR and WDF unpublished data and FWS CWT release and recovery files.

Tag code	14-9-10	14-10-10	14-14-9
<u>Release summary</u>			
Stock	Cook Creek	Walcott Slough X Cook Creek	Walcott Slough
Study Purpose	Contribution	Contribution and stock assessment	Contribution and stock assessment
Tagged releases	46,035	99,065	147,511
Size	149/lb.	187/lb.	176/lb.
Release site	Cook Creek	Cook Creek	Cook Creek
Release date	06-06-76	06-16-76	06-17-76
<u>Recovery summary</u>			
Total observed recoveries	22	43	22
Total expanded recoveries	41	135	79
Expanded catch	28	117	79
Escapement	13	18	0
% survival	0.09	0.14	0.05
Survival/lb. released	0.13	0.25	0.09
Age composition (% of total recovery)			
III	26.8	65.2	100.0
IV	61.0	34.1	0.0
V	12.2	0.7	0.0
Catch/escapement			
1978 (age-III)	4.5	10.0	(a)
1979 (age-IV)	1.5	4.1	(a)
1980 (age-V)	4.0	0.0	(a)
Total	2.2	6.5	(a)
Timing of terminal catch			
1978 (age-III)	Oct.22-Dec. 31	Oct. 29-Dec. 31	Oct. 21-Nov. 24
1979 (age-IV)	Oct. 28-Nov. 17	Oct. 28-Nov. 24	(b)
1980 (age-V)	Oct. 5-Nov. 11	(b)	(b)

(a). No escapement.

(b). No terminal catch.

Table 21. Release and recovery summary for 1976 brood chum. Sources: QONR and WDF unpublished data and FWS CWT release and recovery files.

Tag code	5-32-1	5-37-1
<u>Release summary</u>		
Stock	Walcott Slough X Cook Creek	Cook Creek
Study purpose	Stock assessment	Contribution
Tagged releases	113,201	67,324
Size	198/lb.	125/lb.
Release site	Cook Creek	Cook Creek
Release date	06-14-77	06-14-77
<u>Recovery summary</u>		
Total observed recoveries	115	49
Total expanded recoveries	257	91
Expanded catch	201	69
Escapement	56	22
% survival	0.23	0.14
Survival/lb. released	0.45	0.17
Age composition (% of total recovery)		
III	42.8	65.9
IV	57.2	34.1
V	(a)	(a)
Catch/escapement		
1979 (age-III)	1.2	2.2
1980 (age-IV)	28.4	9.3
Total	3.6	3.1
Timing of terminal catch		
1979 (age-III)	Oct. 21-Nov. 24	Oct. 21-Nov. 24
1980 (age-IV)	Oct. 5-Nov. 15	Nov. 2-22

a. No recoveries

Table 22. Age composition of 1974-1976 brood chum.

<u>Recovery year</u>	<u>Age</u>			<u>Observed recoveries</u>
	III	IV	V	
1977	7.8(a)	—	—	14
1978	64.0(b)	89.9(a)	—	128
1979	54.5(c)	31.7(b)	2.3(a)	155
1980	—	45.7(c)	4.3(b)	58
1981	—	—	0.0(c)	0

(a). Brood year 1974 (mean of 2 groups).

(b). Brood year 1975 (mean of 3 groups).

(c). Brood year 1976 (mean of 2 groups).

Table 23. Release and recovery summary for 1973-74 brood steelhead, tag code 14-1-2. Sources: ODNR unpublished data and FWS CWT release and rack recovery files.

Tag code	14-1-2
<u>Release summary</u>	
Stock	Cook Creek
Study purpose	Harvest management
Tagged releases	4,585
Size	6.5/lb.
Release site	Cook Creek
Release date	05-18-75
<u>Recovery summary</u>	
Total observed recoveries	13
Expanded catch	36 (a)
% survival	0.79+
Survival/lb. released	0.05+
Age composition (% of total recovery)	
III	19.4
IV	80.6
Catch/escapement	(a)
Timing of catch, 1977-78 (age-IV)	(b)
Median	Jan. 8-14
Range	Dec. 18-March 25

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- a. 1976-77 escapement not recorded. 1977-78 escapement was zero. Actual total return may be higher.
- b. 1976-77 data insufficient to determine timing.

Table 24. Release and recovery summary for 1974-75 brood steelhead, tag code 14-12-9. Sources: ODNR unpublished data and FWS CWT release and rack recovery files.

Tag code	14-12-9
<u>Release summary</u>	
Stock	Cook Creek
Study purpose	Harvest Management
Tagged releases	13,959
Size	8.0/lb.
Release site	Cook Creek
Release date	05-12 and 05-28-76
<u>Recovery summary</u>	
Total observed recoveries	41
Total expanded recoveries	112
Expanded catch	97 (a)
Estimated escapement	15 (a)
% survival	0.80+
Survival/lb. released	0.06+
Age composition (% of total recovery)	
III	77.7
IV	22.3
Catch/escapement, 1977-78	4.8 (a)
Timing of catch	
1977-78 (age-III) median	Dec. 11-17
Range	Nov.20-Jan. ^
1978-79 (age-IV) range	Nov. 5-Dec. 9

(a). 1978-79 escapement not recorded. Total catch presented instead. Actual return could be higher; total catch/escapement could differ from 1977-78 ratio.

Table 25. Release and recovery summary for 1975-76 brood steelhead, tag code 14-2-12. Sources: ODNR unpublished data and FWS CWT release and rack recovery files.

Tag code	14-2-12		
<u>Release summary</u>			
Stock	Cook Creek		
Study purpose	Harvest management		
Tagged releases	8,314		
Size	6.0/lb.		
Release site	Cook Creek		
Release Date	04-77		
<u>Recovery summary</u>			
Total observed recoveries	42		
Total expanded recoveries	120		
Expanded catch	115		
Estimated escapement	5(a)		
% survival	1.43+		
Survival/lb. released	0.09+		
Age composition (% of total recovery)			
III	70.6		
IV	29.4		
Catch/escapement, 1979-80	7.75 (a)		
Timing of catch			
1978-79 (age-III)	median	Dec. 10-16	
	range	Nov. 5-Feb. 10	
1979-80 (age-IV)	median	Jan. 13-19	
	range	Dec. 9-Feb. 2	

(a). 1978-79 escapement not recorded. Total catch reported instead. Actual return could be higher. Total catch/escapement could differ from 1979-80 ratio.

Table 26. Release and recovery summary for 1976-77 brood steelhead, tag code 5-23-4. Sources: ODFW unpublished data and FWS CWT release and rack recovery files.

Tag code	5-23-4	
<u>Release summary</u>		
Stock	Cook Creek	
Study purpose	Harvest management	
Tagged releases	30,212	
Size	9.1/lb.	
Release site	Cook Creek	
Release date	04-15-78	
<u>Recovery summary</u>		
Total observed recoveries	254	
Total expanded recoveries	469	
Expanded catch	319	
Escapement	150	
% survival	1.39	
Survival/lb. released	0.14	
Age composition (% of total recovery)		
III	75.5	
IV	24.5	
Catch/escapement		
1979-80 (age-III)	1.56	
1980-81 (age-IV)	8.58	
Total	2.13	
Timing of catch		
1979-80 (age-III)	median	Dec. 30-Jan. 5
	range	Nov. 4-Feb. 6
1980-81 (age-IV)	median	Dec. 7-13
	range	Oct. 26-Jan. 31

Table 27. Distribution of catch (% of terminal area catch) for steelhead tag groups.

Brood year	Tag code	Quinault	Humptulips	Queets	Chehalis
73-74	14-1-2	100.0	0.0	0.0	0.0
74-75	14-12-9	97.9	2.1	0.0	0.0
75-76	14-2-12	98.3	0.0	1.7	0.0
76-77	5-23-4	84.3	2.8	12.5	0.3
	Mean	90.5	1.9	7.4	0.2

Table 28. Survival of other coastal coho mark or tag groups. Sources: Bagatell et al 1980, Fuss and Rasch 1981.

Hatchery and stock	Brood year	Percent survival	Catch/per pound released	Catch/escapement	Mean fork length
Simpson	64	2.09	—	1.5	—
Simpson	65	1.68	—	1.3	—
Simpson	71	5.62	0.84	4.4	69
Simpson	74	0.87	0.17	13.1	67
Simpson	74	0.52	0.11	7.6	64
Soleduck	71	15.63	2.34	5.9	65
Soleduck	74	1.23	0.20	3.0	63
Soleduck	74	1.41	0.30	7.1	65
Willapa	65	7.51	—	5.0	—
Willapa	66	2.53	—	2.5	—
Willapa	71	1.39	0.31	1.8	69
Willapa	74	0.83	0.17	3.4	63
Mean		3.44	0.55	3.3	66

Table 29 . Effect of coho stock and release site on percent contribution to catch (expanded catch per fish released).

Tag code	Stock	Release site	Contribution	
			Total	Terminal
14-15-1	Cook Creek	Cook Creek	1.92	0.00
14-2-10	Willapa	Humptulips	0.65	0.06
14-13-9	Cook Creek	Cook Creek	0.24	0.02
14-15-9	Willapa X Cook Creek	Phelan Creek	0.37	0.31
14-3-12	Skagit X Cook Creek	Cook Creek	0.84	0.15
14-4-12	Cook Creek	Cook Creek	0.90	0.16
14-5-12	Green X Cook Creek	Phelan Creek	0.81	0.10
Mean	All	All	0.82	0.11
	Cook Creek		1.02	0.06
	Exotic, hybrid		0.67	0.16
		Cook Creek	0.98	0.08
		Outplants	0.61	0.16

Table 30. Percent coho jack returns to QNFH from on-station releases; time, size at release.

Tag code	Release date	Release size	Percent jacks
14-15-1	3-14 to 5-15	13.6	35.2
14-13-9	3-22 to 4-13	14.2	7.2
14-3-12	4-27	23.2	84.9
14-4-12	4-28	17.0	31.6

Table 30 . Percent coho jack returns to ONFH from on-station releases; time, size at release.

Tag code	Release date	Release size	Percent jacks
14-15-1	3-14 to 5-15	13.6	35.2
14-13-9	3-22 to 4-13	14.2	7.2
14-3-12	4-27	23.2	88.6
14-4-12	4-28	17.0	40.9

Table 31. Survival of other steelhead release groups. Sources: Phillips et al. 1981; WDG unpublished data.

Stock	Release site	Brood year	Percent survival	Survival per lb. released	Catch per escapement
Bogachiel	Bogachiel	74-75	15.5	(a)	10.4
Bogachiel	Bogachiel	75-76	4.8	(a)	6.0
and Soleduck	and Bear Creek	76-77	8.0	(a)	4.5
		Mean	9.4		7.0
Chambers	Chambers	76-77	1.1	0.06	79.8
Creek	Creek	77-78	1.0	0.06	(b)
		Mean	1.0	0.06	
Chambers	Green	74-75	4.1	(a)	79.8
Creek and	River	75-76	4.4	(a)	(c)
Green River		76-77	5.0	(a)	(c)
		77-78	4.7	(a)	(c)
		Mean	4.6		
Quinault	Humptulips	75-76	0.9	(a)	(c)
Aberdeen and	River	76-77	3.0	(a)	(c)
Humptulips		77-78	1.5	(a)	(c)
		Mean	1.8		
Chambers	Skagit	74-75	3.0	(a)	(c)
Creek	River	75-76	2.2	(a)	(c)
		76-77	2.4	(a)	(c)
		77-78	1.1	(a)	(c)
		Mean	2.2		
Chambers	Samish	75-76	2.9	(a)	0.8
Creek	River	76-77	2.7	(a)	1.7
		77-78	1.0	(a)	1.3
		Mean	2.2		1.3
Combined	Combined	Combined	3.5	(d)	

(a). Not available

(b). No catch in terminal area.

(c). No trapping done

(d). All release sites weighted equally.

Table 32. Survival and release size of hatchery steelhead. Source: Royal 1973.

Hatchery	Size at Release	% survival
Chambers Creek	4.4/lb.	12.7
Various (a)	6.0 (b)	7.0
Chambers Creek	7.5	6.7
Chambers Creek	9.0	6.4
Various (a)	11.0	2.0
Chambers Creek	12.0	4.8

(a). Determined graphically from plot of survival versus size of 34 release groups in Washington, Oregon and California.

(b). Recommended minimum size for release.

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APPENDIX I - CHINOOK RECOVERY DATA

<u>Tag Code</u>	<u>Recovery Year</u>	<u>Fishery</u>	<u>Observed</u>	<u>Recoveries Expanded</u>	<u>Mean Fork Length</u>	<u>Number Measured</u>
5-2-10	1976	Alaska Commercial	5	7	71	5
		Canada Sport and Troll	16	61	63	16
		Washington-Oregon Ocean Sport and Troll	3	10	70	3
		Quinault River Net	a	a	a	a
		QNFH	4	4	-	0
		<u>TOTAL</u>	<u>28</u>	<u>82</u>	<u>63</u>	<u>25</u>
	1977	Alaska Commercial	30	63	78	30
		Canada Sport and Troll	28	108	79	28
		Washington-Oregon Ocean Sport and Troll	b	14	81	b
		Quinault River Net	15	161c	85	10
		QNFH	15	15	85	12
		<u>TOTAL</u>	<u>88</u>	<u>361</u>	<u>80</u>	<u>80</u>
	1978	Alaska Commercial	12	46	88	12
		Canada Sport and Troll	5	24	90	5
		Washington-Oregon Ocean Sport and Troll	1	4	87	1
		Quinault River Net	12	43d	85	2
		QNFH	2	2	96	2
		<u>TOTAL</u>	<u>32</u>	<u>119</u>	<u>89</u>	<u>22</u>

APPENDIX I - CHINOOK RECOVERY DATA (continued)

Tag Code	Recovery Year	Fishery	Observed	Recoveries Expanded	Mean Fork Length	Number Measured
5-2-10 (cont)	GRAND TOTAL	Alaska Commercial	47	116	80	47
		Canada Sport and Troll	49	193	80	49
		Washington-Oregon Ocean Sport and Troll	3	28	79	3
		Quinault River Net	27+	204	85	12
		ONFH	21	21	87	14
		<u>TOTAL</u>	147	562	81	125
5-3-10	1975	Washington-Oregon Ocean Sport and Troll	1	11	57	1
		ONFH	1	1	-	0
		<u>TOTAL</u>	2	12	57	1
	1976	Alaska Commercial	7	11	67	7
		Canada Sport and Troll	42	180	58	41
		Washington-Oregon Ocean Sport and Troll	7	33	64	7
		ONFH	14	14	-	0
		<u>TOTAL</u>	70	238	60	55
	1977	Alaska Commercial				
		Canada Sport and Troll	19	90	75	19
		Washington-Oregon Ocean Sport and Troll	14+	71	82	14
		Quinault River Net	9	92a	86	5
		ONFH	5	5	81	5
		<u>TOTAL</u>	69	294	80	65
	1978	Alaska Commercial	7	24	85	7
		Canada Sport and Troll	4	16	87	4
		Quinault River Net	7	22c	91	3
		<u>TOTAL</u>	18	62	87	14

APPENDIX I - CHINOOK RECOVERY DATA (continued)

Tag Code	Recovery Year	Fishery	Recoveries		Mean Fork Length	Number Measured
			Observed	Expanded		
5-3-10 (cont)	GRAND	Alaska Commercial	34	71	78	36
	TOTAL	Canada Sport and Troll	65	286	65	64
		Washington-Oregon Ocean Sport and Troll	22+	115	75	22
		Quinault River Net	16	114	88	8
		QNFH	20	20	77	6
		<u>TOTAL</u>	157	606	72	136
5-4-10	1975	Canada Sport and Troll	1	9	51	1
	1976	Alaska Commercial	1	4	69	1
		Canada Sport and Troll	9	25	61	8
		Washington-Oregon Ocean Sport and Net	1	6	65	1
		QNFH	2	2	-	0
		<u>TOTAL</u>	13	37	62	10
1977		Canada Sport and Troll	7	32	75	7
		Washington-Oregon Ocean Sport and Troll	1	3	84	1
		Quinault River Net	1	3c	-	0
		QNFH	1	1	-	0
		<u>TOTAL</u>	10	39	76	8
GRAND TOTAL		Alaska Commercial	1	4	69	1
		Canada Sport and Troll	17	66	66	16
		Washington-Oregon Ocean Sport and Troll	2	9	74	2
		Quinault River Net	1	3	-	0
		QNFH	3	3	-	0
		<u>TOTAL</u>	24	85	68	19

APPENDIX I - CHINOOK RECOVERY DATA (continued)

<u>Tag Code</u>	<u>Recovery Year</u>	<u>Fishery</u>	<u>Observed</u>	<u>Recoveries Expanded</u>	<u>Mean Fork Length</u>	<u>Number Measured</u>
5-5-10	1976	Alaska Commercial	1	2	64	1
		Canada Sport and Troll	7	24	56	7
		Washington-Oregon Ocean Sport and Net	5	26	66	5
		QNFH	2	2	-	0
		<u>TOTAL</u>	<u>15</u>	<u>54</u>	<u>60</u>	<u>13</u>
	1977	Alaska Commercial	3	4	83	3
		Canada Sport and Troll	7	29	84	7
		Quinault River Net	1	5c	-	0
		QNFH	2	2	103	1
		<u>TOTAL</u>	<u>13</u>	<u>40</u>	<u>85</u>	<u>11</u>
	1978	Canada Sport and Troll	1	2	99	1
		Quinault River Net	1	10d	-	0
		<u>TOTAL</u>	<u>2</u>	<u>12</u>	<u>99</u>	<u>1</u>
GRAND TOTAL		Alaska Commercial	4	6	78	4
		Canada Sport and Troll	15	55	72	15
		Washington-Oregon Ocean Sport and Troll	5	26	66	5
		Quinault River Net	2	15	-	0
		<u>QNFH</u>	<u>4</u>	<u>4</u>	<u>103</u>	<u>1</u>
		<u>TOTAL</u>	<u>30</u>	<u>106</u>	<u>73</u>	<u>25</u>

APPENDIX I - CHINOOK RECOVERY DATA (continued)

Tag Code	Recovery Year	Fishery	Recoveries		Mean Fork Length	Number Measured
			Observed	Expanded		
5-6-10	1975	Canada Sport and Troll	1	4	33	1
		Washington-Oregon Ocean Sport and Troll	$\frac{1}{2}$	$\frac{11}{15}$	$\frac{51}{42}$	$\frac{1}{2}$
		TOTAL				
	1976	Alaska Commercial	2	2	65	2
		Canada Sport and Troll	38	134	62	37
		Washington-Oregon Ocean Sport and Troll	3	15	68	3
		QNFH	9	9	-	-0
TOTAL	$\frac{52}{160}$		$\frac{63}{63}$	$\frac{42}{42}$		
	1977	Alaska Commercial	26	53	81	26
		Canada Sport and Troll	27	86	76	27
		Washington-Oregon Ocean Sport and Troll	7+	49	77	7
		Quinault River Net	13	87c	84	5
		QNFH	8	8	87	8
TOTAL	$\frac{73}{283}$		$\frac{80}{80}$	$\frac{73}{73}$		

APPENDIX I - CHINOOK RECOVERY DATA (continued)

Tag Code	Recovery Year	Fishery	Recoveries		Mean Fork Length	Number Measured
			Observed	Expanded		
5-6-10 (cont)	1978	Alaska Commercial	4	13	85	4
		Canada Sport and Troll	3	11	90	3
		Quinault River Net	11	41d	90	4
		QNFH	1	1	87	1
		TOTAL	19	66	88	12
GRAND TOTAL		Alaska Commercial	32	68	81	32
		Canada Sport and Troll	69	235	69	88
		Washington-Oregon Ocean Sport and Troll	11	75	72	11
		Quinault River Net	24	128	87	9
		QNFH	18	18	87	9
TOTAL	154	524	75	129		

-
- a. Data not available.
 - b. Washington-Oregon observed data possibly duplicated in Quinault River data.
 - c. Range of expansion factors: 2.0 to 20.0.
 - d. Range of expansion factors: 1.3 to 10.8.

APPENDIX II - CHINOOK TERMINAL CATCH TIMING

Tag Code	Recovery Year	Statistical Week	Dates	Recoveries	
				Observed	Expanded
5-2-10	1977	32-38	Jul 31-Sep 17	3	21
		39-40	Sep 18-Oct 1	5	19
		41	Oct 2-8	5	10
		42	Oct 9-15	1	5
		44	Oct 23-29	1	3
		36	Sep 3-9	1	3
	1978	38	Sep 17-23	2	3
		39	Sep 24-30	4	15
		40	Oct 1-7	1	2
		41	Oct 8-14	3	6
		42	Oct 15-21	1	3
		37			
5-3-10	1977	32-38	Jul 31-Sep 17	1	7
		39-40	Sep 18-Oct 1	4	15
		41	Oct 2-8	2	4
		42	Oct 9-15	2	11
		36	Sep 3-9	1	3
		37	Sep 10-16	2	7
	1978	38	Sep 17-23	3	5
		41	Oct 8-14	1	2
		36	Sep 2-8	1	3
		37	Sep 9-15	1	2
1979	37				

APPENDIX II - CHINOOK TERMINAL CATCH TIMING (continued)

<u>Tag Code</u>	<u>Recovery Year</u>	<u>Statistical Week</u>	<u>Dates</u>	<u>Recoveries</u>	
				<u>Observed</u>	<u>Expanded</u>
5-4-10 5-5-10	1977	41	Oct 2-8	1	2
	1977	43	Oct 16-22	1	5
	1978	44	Oct 29-Nov 4	1	6
5-6-10	1977	39-40	Sep 19-Oct 1	5	19
		41	Oct 2-8	6	12
		43	Oct 16-22	2	9
	1978	34	Aug 20-26	1	4
		35	Aug 27-Sep 2	1	3
		36	Sep 3-9	3	8
		37	Sep 10-16	2	7
		38	Sep 17-23	1	2
		39	Sep 24-30	2	7
		41	Oct 8-14	1	2

APPENDIX III - COHO RECOVERY DATA

Tag Code	Recovery Year(s)	Fishery	Recoveries		Mean Fork Length	Number Measured
			Observed	Expanded		
14-15-1	1976	California Troll	1	7	56	1
		Oregon Troll	25	181	64	24
		Oregon Sport	5	17	67	2
		British Columbia Troll	55	250	63	54
		British Columbia Sport	1	3	-	-
		Washington Ocean Sport	25	151	60	25
		Washington Troll	69	354	62	69
		QNFH	68	68	62	34
		TOTAL	249	1,031	62	209
		14-2-10	1977	Oregon Troll	4	17
Oregon Sport	1			6	69	1
British Columbia Troll	3			14	68	3
Washington Ocean Sport	6			35	63	6
Washington Troll	4			19	60	4
Humtulsips River Net-a	2			10	64	1
TOTAL	20			101	63	19
14-13-9	1976 ^b -77			Oregon Troll	6	46
		Oregon Sport	1	7	50	1
		British Columbia Troll	6	45	67	6
		British Columbia Net	1	4	60	1
		Washington Ocean Sport	15	84	66	15
		Washington Troll	21	97	62	21
		Puget Sound Net	1	2	57	1
		Quinault River Net-c	5h	14h	78	5
		Queets River Net-c	5h	6h	-	-
		QNFH-d	28	333	66	23
		TOTAL	89	638	65	79

APPENDIX III - COHO RECOVERY DATA (continued)

<u>Tag Code</u>	<u>Recovery Year(s)</u>	<u>Fishery</u>	<u>Observed</u>	<u>Recoveries Expanded</u>	<u>Mean Fork Length</u>	<u>Number Measured</u>
14-15-9	1977	Oregon Troll	1	6	56	1
		Washington Coastal Net-e	4	31	73	2
		TOTAL	5	37	67	3
14-3-12	1978	Oregon Troll	3	12	60	3
		Oregon Sport	2	8	59	2
		Alaska Commercial-c	1	14	68	1
		British Columbia Troll	47	258	59	47
		British Columbia Net	1	2	64	1
		Washington Ocean Sport	8	27	56	8
		Washington Troll	38	161	58	38
		Puget Sound Net	1	3	67	1
		Quinault River Net-f	41d	93d	-	-
		Queets River Net-f	5d	13d	-	-
		QNFH	51	51	60	34
TOTAL	198	642	59	135		
14-4-12	1977 ^b -78	Oregon Troll	2	4	59	2
		Oregon Sport	2	8	58	2
		British Columbia Troll	60	364	58	60
		British Columbia Sport	1	3	-	-
		Washington Ocean Sport	15	55	55	14
		Washington Troll	29	124	56	29
		Puget Sound Net	1	3	67	1
		Quinault River Net-g	43	100	-	-
		Queets River Net-g	9	18	-	-
		QNFH	52	52	53	30
		TOTAL	214	731	56	138

APPENDIX III - COHO RECOVERY DATA (continued)

Tag Code	Recovery Year(s)	Fishery	Recoveries		Mean Fork Length	Number Measured
			Observed	Expanded		
14-5-12	1978	British Columbia Troll	18	180	59	18
		British Columbia Net	3	7	60	3
		Washington Ocean Sport	9	33	56	9
		Washington Troll	16	66	58	16
		Quinault River Net-h	2	7	74	3
		Queets River Net-h	12	28	62	1
		Quillayute River-h,i	--	3	-	-
		QNFH	3	3	-	-
		TOTAL	63	327	59	50

III-3

- a. Source WDF - QDNR data missing.
- b. A small number of jacks were captured in sport fisheries.
- c. WDF lists 9 observed and 37 expanded recoveries from these two fisheries combined.
- d. Expansion factor greater than 10.
- e. QDNR lists 2 observed and 4 expanded recoveries from this fishery.
- f. WDF lists 8 observed and 147 expanded recoveries from these two fisheries combined.
- g. WDF lists 12 observed and 171 expanded recoveries from these two fisheries combined.
- h. WDF lists 6 observed and 39 expanded recoveries from these two fisheries combined.
- i. WDF does not give observed catch.

APPENDIX IV - COHO TERMINAL CATCH TIMING

<u>Tag Code</u>	<u>Recovery Year</u>	<u>Fishery</u>	<u>Statistical Week</u>	<u>Dates</u>	<u>Observed</u>	<u>Recoveries Expanded</u>
14-13-9	1977	Quinalt River Net	39-41	Sep 18-Oct 8	2	6
			42-44	Oct 9-29	2	5
			45-47	Oct 30-Nov 19	1	3
			39	Sep 18-24	5	6
14-15-9	1977	Queets River Net	39	Sep 18-24	1	1
			44-47	Oct 23-Nov 19	1	3
14-3-12	1978	Quinalt River Net	35-37	Aug 27-Sep 16	7	15
			38a	Sep 17-23	13	37
			39	Sep 24-30	3	7
			40	Oct 1-7	11	20
			41	Oct 8-14	7	14
			37-38	Aug 27-Sep 16	1	2
			40	Oct 1-7	2	3
			41	Oct 8-14	2	8

APPENDIX IV - COHO TERMINAL CATCH TIMING (continued)

Tag Code	Recovery Year	Fishery	Statistical Week	Dates	Recoveries	
					Observed	Expanded
14-4-12	1978	Quinault River Net	35-37	Aug 27-Sep 16	8	17
			38a	Sep 17-23	13	37
			39	Sep 24-30	3	7
			40	Oct 1-7	12	22
			41	Oct 8-14	5	10
			42	Oct 19-21	2	7
			36	Sep 4-10	1	2
			37-38	Sep 11-23	1	2
			39	Sep 24-30	1	3
			40	Oct 1-7	4	6
			41	Oct 8-14	1	4
46	Nov 12-18	1	1			
14-5-12	1978	Quinault River Net	40	Oct 1-7	1	2
			45-46	Nov 5-18	1	5
			37-38	Sep 10-23	2	3
			39	Sep 24-30	3	8
			40a	Oct 1-7	4	6
			41	Oct 8-14	2	8
			42	Oct 15-21	1	3

a. Median recovery week.

APPENDIX V - CHUM RECOVERY DATA

Tag Code	Recovery Year	Fishery	Recoveries		Mean Fork Length	Number Measured
			Observed	Expanded		
14-2-2	1977	Quinault River Net	7	41a	69	2
		QNFH	<u>2</u>	<u>2</u>	72	<u>2</u>
		TOTAL	9	43	70	4
	1978	Quinault River Net	28	281b	75	4
		QNFH	<u>13</u>	<u>13</u>	71	<u>3</u>
		TOTAL	41	294	73	7
	1979	Quinault River Net	1	2	69	1
		QNFH	<u>1</u>	<u>1</u>	71	<u>1</u>
		TOTAL	2	3	70	2
GRAND TOTAL		Quinault River Net	36	324	72	7
		QNFH	<u>16</u>	<u>16</u>	71	<u>6</u>
		TOTAL	52	340	72	13
14-3-2	1977	Quinault River Net	1	2a	72	1
		QNFH	<u>4</u>	<u>4</u>	69	<u>2</u>
		TOTAL	5	6	70	3
	1978	Quinault River Net	22	174b	78	6
		QNFH	<u>20</u>	<u>20</u>	72	<u>3</u>
		TOTAL	42	194	76	9
	1979	Quinault River Net	2	6	84	2
		QNFH	<u>2</u>	<u>2</u>	83	<u>2</u>
		TOTAL	4	8	84	4

APPENDIX V - CHUM RECOVERY DATA (continued)

Tag Code	Recovery Year	Fishery	Recoveries		Mean Fork Length	Number Measured
			Observed	Expanded		
14-3-2 (cont)	GRAND TOTAL	Quinault River Net QNFH	25 <u>26</u>	182 <u>26</u>	79 <u>74</u>	9 <u>7</u>
		TOTAL	51	208	77	16
14-9-10	1978	Quinault River Net QNFH	2 <u>2</u>	9b <u>2</u>	- <u>73</u>	0 <u>1</u>
		TOTAL	4	11	73	1
	1979	Quinault River Net QNFH	6 <u>10</u>	15 <u>10</u>	77 <u>74</u>	5 <u>9</u>
		TOTAL	17	25	75	1
	1980	Quinault River Net QNFH	1 <u>1</u>	4 <u>1</u>	81 <u>73</u>	1 <u>1</u>
		TOTAL	2	5	77	2
GRAND TOTAL		Quinault River Net QNFH	9 <u>13</u>	28 <u>13</u>	78 <u>74</u>	6 <u>11</u>
		TOTAL	22	41	75	17

APPENDIX V - CHUM RECOVERY DATA (continued)

Tag Code	Recovery Year	Fishery	Recoveries		Mean Fork Length	Number Measured
			Observed	Expanded		
14-10-10	1978	Quinault River Net	11	80b	-	0
		QNFH	<u>8</u>	<u>8</u>	-	<u>0</u>
		TOTAL	19	88	-	0
	1979	Quinault River Net	14	37	76	14
		QNFH	<u>9</u>	<u>9</u>	<u>74</u>	<u>9</u>
		TOTAL	23	46	75	23
	1980	QNFH	1	1	76	1
		GRAND TOTAL	25	117	76	15
		QNFH	<u>18</u>	<u>18</u>	<u>74</u>	<u>10</u>
TOTAL	43	135	75	25		
14-14-9	1978	Quinault River Net	22	79b	68	4
5-32-1	1979	Quinault River Net	23	59	70	22
		QNFH	<u>51</u>	<u>51</u>	<u>68</u>	<u>51</u>
		TOTAL	74	110	69	73
	1980	Quinault River Net	36	142	75	34
		QNFH	<u>5</u>	<u>5</u>	<u>73</u>	<u>5</u>
		TOTAL	41	147	75	39
GRAND TOTAL	59	201	73	56		
QNFH	<u>56</u>	<u>56</u>	<u>68</u>	<u>56</u>		
TOTAL	115	257	71	112		

APPENDIX V - CHUM RECOVERY DATA (continued)

<u>Tag Code</u>	<u>Recovery Year</u>	<u>Fishery</u>	<u>Observed</u>	<u>Recoveries Expanded</u>	<u>Mean Fork Length</u>	<u>Number Measured</u>
5-37-1	1979	Quinault River Net	16	41	69	15
		QNFH	19	19	67	19
		TOTAL	35	60	68	34
	1980	Quinault River Net	11	28	74	6
		QNFH	3	3	77	3
		TOTAL	14	31	75	9
	1979 GRAND TOTAL	Quinault River Net	27	69	70	21
		QNFH	22	22	68	22
		TOTAL	49	91	69	43

- a. Range of expansion factor: 2.4-5.9.
- b. Range of expansion factor: 2.2-27.7.

APPENDIX VI - CHUM TERMINAL CATCH TIMING

<u>Tag Code</u>	<u>Recovery Year</u>	<u>Statistical Week</u>	<u>Date</u>	<u>Recoveries</u>		
				<u>Observed</u>	<u>Expanded</u>	
14-2-2	1977	46-47	Nov 6-19	4	18	
		48-49	Nov 20-Dec 3	3	18	
	1978	43	Oct 22-28	3	16	
		44	Oct 29-Nov 4	6	41	
	45	Nov 5-11	4	111		
	46	Nov 12-18	8	27		
	47	Nov 19-25	3	7		
	1979	48-53	Nov 26-Dec 31	4	9	
		46	Nov 11-17	1	1	
	14-3-2	1977	44-45	Oct 23-Nov 5	1	2
			37-41	Sept 10-Oct 14	3	14
1978		42	Oct 15-21	1	12	
		43	Oct 22-28	5	26	
44		Oct 29-Nov 4	7	47		
46		Nov 12-18	4	13		
1979		48-53	Nov 26-Dec 31	2	5	
		42	Oct 14-20	1	3	
		43	Oct 21-27	1	2	
14-9-10		1978	43	Oct 22-28	1	5
			48-53	Nov 26-Dec 31	1	2
	1979	44	Oct 28-Nov 3	3	6	
		45	Nov 4-10	1	2	
	1980	46	Nov 11-17	2	3	
		44	Oct 26-Nov 1	1	3	

APPENDIX VI - CHUM TERMINAL CATCH TIMING (continued)

<u>Tag Code</u>	<u>Recovery Year</u>	<u>Statistical Week</u>	<u>Date</u>	<u>Recoveries</u>	
				<u>Observed</u>	<u>Expanded</u>
14-10-10	1978	44	Oct 29-Nov 4	1	7
		45	Nov 5-11	1	28
		46	Nov 12-18	6	20
	1979	48-53	Nov 26-Dec 31	3	7
		44	Oct 28-Nov 3	6	11
		45	Nov 4-10	4	10
		46	Nov 11-17	2	3
47	Nov 18-24	2	6		
14-14-9	1978	46	Nov 12-18	8	27
		47	Nov 19-25	3	7
		48-53	Nov 26-Dec 31	11	25

APPENDIX VI - CHUM TERMINAL CATCH TIMING (continued)

<u>Tag Code</u>	<u>Recovery Year</u>	<u>Statistical Week</u>	<u>Date</u>	<u>Observed</u>	<u>Recoveries Expanded</u>
5-32-1	1979	43	Oct 21-27	3	5
		44	Oct 28-Nov 3	10	19
		45	Nov 4-10	7	17
		46	Nov 11-17	1	1
		47	Nov 18-24	2	6
		41	Oct 5-11	1	4
	1980	42	Oct 12-18	1	2
		43	Oct 19-25	1	4
		44	Oct 25-Nov 1	24	69
		45	Nov 2-8	7	14
		46	Nov 9-15	2	4
		47			
5-37-1	1979	43	Oct 21-27	2	3
		44	Oct 28-Nov 3	5	9
		45	Nov 4-10	5	12
		46	Nov 11-17	3	4
		47	Nov 18-24	1	3
		45	Nov 2-8	4	8
	1980	46	Nov 9-15	4	8
		47	Nov 16-22	3	4

APPENDIX VII - STEELHEAD RECOVERY DATA

<u>Tag Code</u>	<u>Recovery Year</u>	<u>Fishery</u>	<u>Observed</u>	<u>Recoveries Expanded</u>	<u>Mean Fork Length</u>	<u>Number Sampled</u>
14-1-2	1976-77a	Quinault River Net	2	7	-	0
	1977-78	Quinault River Net	11	29	-	0
	GRAND TOTAL	Quinault River Net	<u>13</u>	<u>36</u>	-	<u>0</u>
14-12-9	1977-78	Quinault River Net	19	70	67	9
		Humtulpips River Net	1	2	-	0
		QNFH	15	15	67	12
		TOTAL	<u>35</u>	<u>87</u>	<u>67</u>	<u>21</u>
14-2-12	1978-79a 1979-80	Quinault River Net	6	25	86	1
		Quinault River Net	25	95	69	10
		Humtulpips River Net	1	2	-	0
		QNFH	15	15	67	12
		TOTAL	<u>41</u>	<u>112</u>	<u>68</u>	<u>22</u>
14-2-12	1978-79a 1979-80	Quinault River Net	23	84	68	14
		Quinault River Net	13	29	80	14
		Queets River Net	1	2	-	0
		QNFH	5	5	78	5
		TOTAL	<u>19</u>	<u>36</u>	<u>79</u>	<u>19</u>
14-2-12	GRAND TOTAL	Quinault River Net	36	113	74	33
		Queets River Net	1	2	-	0
		QNFH	5	5	78	5
		TOTAL	<u>42</u>	<u>120</u>	<u>74</u>	<u>38</u>

APPENDIX VII - STEELHEAD RECOVERY DATA (continued)

<u>Tag Code</u>	<u>Recovery Year</u>	<u>Fishery</u>	<u>Observed</u>	<u>Recoveries Expanded</u>	<u>Mean Fork Length</u>	<u>Number Sampled</u>
5-23-4	1979-80	Quinalt River Net	51	204	64	51
		Humtulpis River Net	1	2	-	0
		Lower Chehalis River Net	1	1	-	0
		Queets River Net	6	9	-	0
		<u>QNFH</u>	<u>138</u>	<u>354</u>	<u>63</u>	<u>135</u>
		<u>TOTAL</u>	<u>197</u>		<u>63</u>	<u>186</u>
	1980-81	Quinalt River Net	27	65	74	27
		Humtulpis River Net	3	7	-	0
		Queets River Net	15	31	-	0
		<u>QNFH</u>	<u>12</u>	<u>12</u>	<u>72</u>	<u>12</u>
				<u>TOTAL</u>	<u>57</u>	<u>73</u>
GRAND TOTAL		Quinalt River Net	78	269	67	78
		Humtulpis River Net	4	9	-	0
		Lower Chehalis River Net	1	1	-	0
		Queets River Net	21	40	-	0
		<u>QNFH</u>	<u>150</u>	<u>469</u>	<u>64</u>	<u>147</u>
		<u>TOTAL</u>	<u>254</u>	<u>65</u>	<u>225</u>	

a. Hatchery escapement not recorded.

APPENDIX VIII - STEELHEAD TERMINAL CATCH TIMING

Tag Code	Recovery Year	Fishery	Statistical Week	Date	Recoveries				
					Observed	Expanded			
14-1-2	1976-77	Quinault River Net	52-3	Dec 18-Jan 21	1	4			
			4-5	Jan 22-Feb 4	1	3			
			52	Dec 18-24	1	4			
			53	Dec 25-31	1	4			
			2	Jan 8-14	3	7			
			4	Jan 22-28	2	5			
	1977-78	Quinault River Net	6	Feb 5-11	2	4			
			12	Mar 19-25	2	5			
			14-12-9	1977-78	Quinault River Net	48-49	Nov 20-Dec 3	4	9
						50	Dec 4-10	5	23
						51a	Dec 11-17	1	6
						52	Dec 18-24	3	13
53	Dec 25-31	3				11			
1	Jan 1-7	2				6			
4	Jan 22-28	1				2			
52	Dec 18-24	1				2			
1978-79	Humtulsips River Net	Quinault River Net				45-46	Nov 5-18	2	6
						48	Nov 20-Dec 2	2	5
						49	Dec 3-9	2	14

APPENDIX VIII- STEELHEAD TERMINAL CATCH TIMING (continued)

Tag Code	Recovery Year	Fishery	Statistical Week	Date	Recoveries	
					Observed	Expanded
14-2-12	1978-79	Quinault River Net	45-46	Nov 5-18	4	12
			47	Nov 19-25	1	5
			48	Nov 26-Dec 2	1	2
			49	Dec 3-9	2	14
			50a	Dec 10-16	8	25
			51	Dec 17-23	4	12
			52-1	Dec 24-Jan 6	1	7
			2	Jan 7-13	1	3
			5-6	Jan 28-Feb 10	1	4
			50	Dec 9-15	1	3
			53-1	Dec 30-Jan 5	1	3
			3a	Jan 13-19	5	15
			4	Jan 20-26	5	7
			5	Jan 27-Feb 2	1	1
53-1	Dec 30-Jan 5	1	2			
5-23-4	1979-80	Quinault River Net	45-47	Nov 4-24	2	3
			49	Dec 2-8	2	4
			50	Dec 9-15	7	18
			52	Dec 23-29	4	26
			53-1a	Dec 30-Jan 5	8	21
		Queets River Net				

APPENDIX VIII - STEELHEAD TERMINAL CATCH TIMING (continued)

Tag Code	Recovery Year	Fishery	Statistical Week	Date	Recoveries	
					Observed	Expanded
5-23-4 (cont)	1979-80	Quinault River Net	2	Jan 6-12	4	22
			3	Jan 13-19	8	23
			4	Jan 20-26	5	7
			5	Jan 27-Feb 2	4	6
			6	Feb 3-9	2	4
			7	Feb 10-6	5	10
			48	Nov 25-Dec 1	4	4
	1980-81	Queets River Net	49	Dec 2-8	3	7
			50	Dec 9-15	4	8
			51	Dec 16-22	1	2
			52	Dec 23-29	1	6
			2	Jan 6-12	1	2
			3	Jan 13-19	1	2
			1980-81	Quinault River Net	44-45	Oct 26-Nov 8
46	Nov 9-15	2			5	
48	Nov 23-29	1			3	
49	Nov 30-Dec 6	5			14	
50a	Dec 7-13	4			9	
51	Dec 14-20	7			18	
53-1	Dec 28-Jan 3	4			8	
3	Jan 11-17	2			6	
5	Jan 25-31	1			1	
48	Nov 23-29	4			4	
49	Nov 30-Dec 6	3			7	
50	Dec 7-13	4			8	
51	Dec 14-20	1			2	
52	Dec 21-27	1			6	
2	Jan 4-10	1	2			
3	Jan 11-17	1	2			
1980-81	Queets River Net	44-45	Oct 26-Nov 8	1	1	
		46	Nov 9-15	2	5	
		48	Nov 23-29	1	3	
		49	Nov 30-Dec 6	5	14	
		50a	Dec 7-13	4	9	
		51	Dec 14-20	7	18	
		53-1	Dec 28-Jan 3	4	8	
		3	Jan 11-17	2	6	
		5	Jan 25-31	1	1	
		48	Nov 23-29	4	4	
		49	Nov 30-Dec 6	3	7	
		50	Dec 7-13	4	8	
		51	Dec 14-20	1	2	
		52	Dec 21-27	1	6	
2	Jan 4-10	1	2			
3	Jan 11-17	1	2			

a. Median timing week.