Migrational Characteristics and Survival of Juvenile Salmonids Entering the Columbia River Estuary During 1982

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COASTAL ZONE AND ESTUARINE STUDIES

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ABSTRACT

The National Marine Fisheries Service, primarily funded by the Bonneville Power Administration, conducted sampling related to migrational behavior and relative survival of juvenile salmonids entering the Columbia River estuary. Beach and purse seines were used at Jones Beach (RKm 75) from March through September and November through mid-December 1982. During the peak migration (May and June), 10 beach seine sets and 5 purse seine sets were made daily beginning at sunrise and continuing for 7 h. The total salmonid catch was 229,301 fish, of which 5.0% were marked.

Based on two independent methods used to calculate the effect of river flow on catch, a 1,000 m^3/s increase in river flow decreased catch percentages by an estimated 8 or 12%.

Temporal distributions of juvenile salmon and steelhead in 1982 were similiar to previous years, with peak catches generally corresponding to dates of hatchery release rather than factors such as river flow or temperature. Peak of migration for yearling chinook salmon was during the third week of May, for steelhead and coho salmon the fourth week of May; the peaks occurred about 2 weeks later in 1982 than 1981. Four peaks were noted for subyearling chinook salmon: early April, first week of May, mid-June, and early July.

Movement rates were slowest for groups that wintered in the system and small subyearling chinook salmon released after mid-June.

Two independent comparisons showed that the outmigration of hatchery fall chinook salmon was apparently more sucessful in 1982 than in recent years.

Relative differences in survival were observed for: (1) subyearling chinook salmon from Bonneville and Spring Creek Hatcheries transported upstream and released in the Umatilla River compared to controls released at their respective hatchery; (2) subyearling chinook salmon transported from McNary Dam and released downstream from Bonneville Dam, compared to controls which migrated through the bypassed section of river; and (3) A vs B Stock steelhead reared at Hagerman Hatchery.

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INTRODUCTION

Natural runs of salmon, Oncorhynchus spp., and steelhead, Salmo gairdneri, in the Columbia and Snake River basins have declined to critical levels; major causes include: overharvest, destruction of spawning and rearing areas, and decreased survival during migration through reservoirs and dams (Blahm 1976; Netboy 1980; Smith 1979). The decline of fish has prompted increased salmon culture in an attempt to assure adequate numbers of returning adults for the various fisheries.

A significant factor affecting the decline of harvestable fish is the failure of many juveniles to successfully migrate to the ocean. Increased electrical power requirements in the Northwest have necessitated increased water storage which decreases flow at dams during the peak migration of juveniles/smolts. Consequently, migration time has been extended and more fish are passing through the turbines at each dam, decreasing survival (Raymond 1979). Fishery agencies, with the cooperation of electrical power entities, have responded by: (1) increasing and improving production at hatcheries, (2) installing and/or improving turbine bypass systems at dams, (3) transporting juvenile salmonids past dams by truck and barge to downstream release sites, and (4) recommending optimal flows during the periods of downstream migration.

To assist in evaluating fishery protection and enhancement activities the National Marine Fisheries Service (NMFS) began sampling the juvenile outmigration in 1966 in the Columbia River estuary. Migrational behavior and comparative survival rates were evaluated to gain an immediate observation of freshwater migration success. Sampling continued annually

through 1972[1/] but was then suspended until 1977 due to lack of funds. The need to reestablish sampling prompted funding by the Pacific Northwest Regional Council (PNRC) for the period 1977-1979 (Dawley et al. 1977, 1978, 1980). PNRC funds and fisheries enhancement funds allocated through NMFS were used to expand the 1980 sampling to examine juvenile migration in the coastal waters of Washington and Oregon (Dawley et al. 1981). In 1981, the Bonneville Power Administration (BPA) began funding the sampling in the upper estuary at Jones Beach (Figure 1), and the funding has continued through 1982 (Dawley et al. 1982).

The objectives for estuarine sampling in 1982 were as follows: 1) define migrational timing and behavioral characteristics in relation to fish passage conditions for both wild and hatchery smolts from release site to the Columbia River estuary, 2) estimate survival to the estuary for selected stocks of juvenile hatchery fish, 3) provide recapture rate comparisons between 1982 and previous years for similar groups of marked hatchery fish, 4) attempt to compare mitigation hatcheries in relation to juvenile survival and adult returns, and 5) correlate differences in survival of selected stocks of smolts to differences in river and dam passage conditions from 1977 to 1982.

EXPERIMENTAL AREA AND METHODOLOGY

Estuarine sampling for juvenile salmonids has been accomplished in several small river systems to evaluate movement and feeding behavior and

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1/ Sims, Carl W. August 1979. "Migrational characteristics of juvenile fall chinook salmon, Oncorhynchus tshawytscha, in the Columbia River." National Marine Fisheries Service, Coastal Zone and Estuarine Studies Division, 2725 Montlake Boulevard East, Seattle, Washington 98112. Unpublished manuscript.

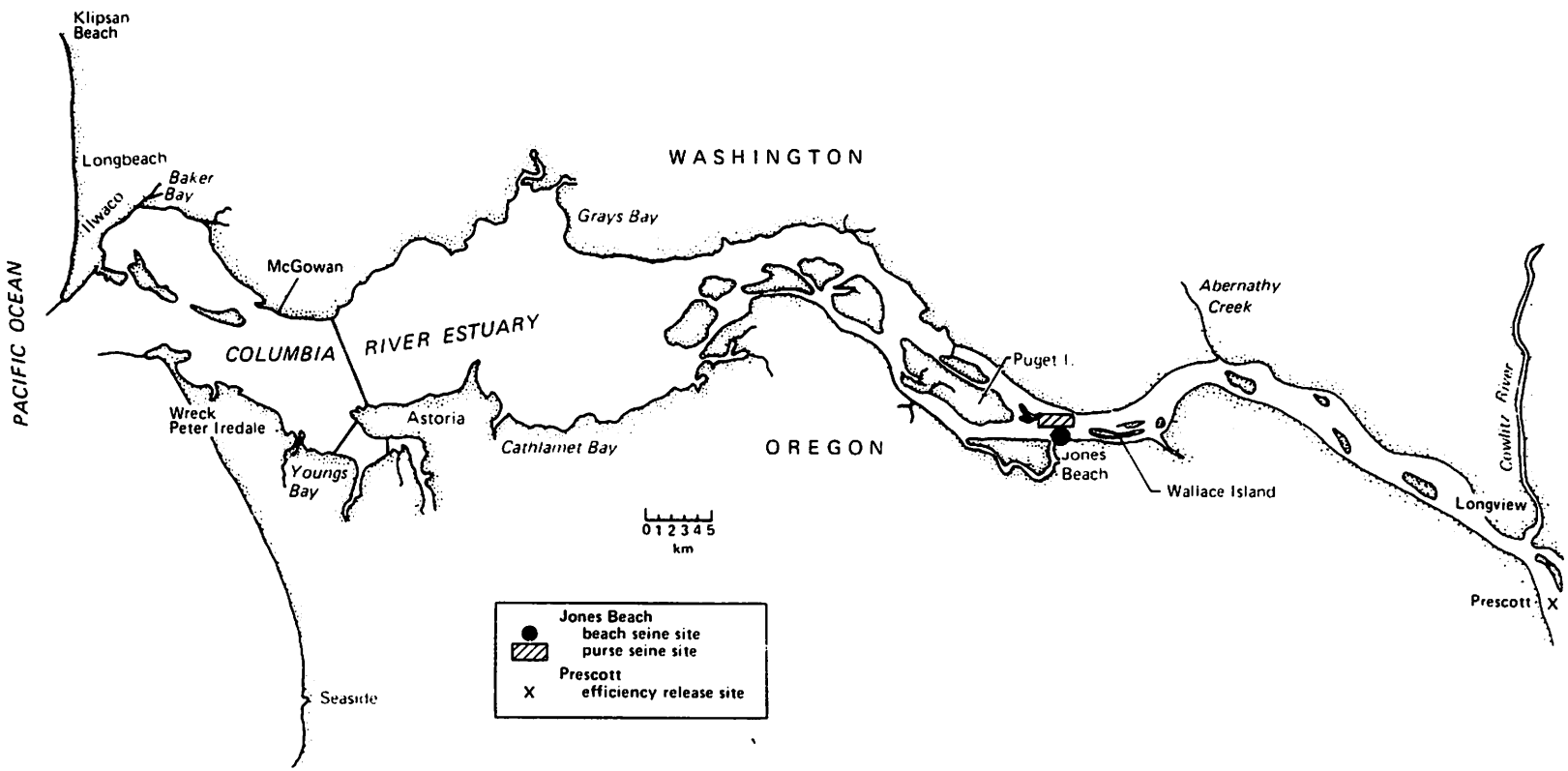


Figure 1.--Lower Columbia River and estuary; Jones Beach sampling site and Prescott release site are indicated at RKm 75 and 115, respectively.

residence times (Reimer 1973; Mason 1974; Congleton 1978; Levy and Levings 1978; and Healey 1980). The Columbia River estuarine sampling program is unique in attempting to estimate survival of many different hatchery stocks and define various aspects of migratory behavior within a large river, with spring freshet water of from 4 to 17 thousand cubic meters per second (m^3/s).

Sampling procedures presently used were developed during the early phases of this project. Various trap designs, fyke nets, trawl nets, gill nets, and seine nets were tested at 33 different locations throughout the estuary. Purse and beach seining were determined to be the most efficient sampling methods, and Jones Beach was the best sampling site. The gradually sloping sandy beach and debris-free channel made Jones Beach ideal for sampling, and not only were the most fish captured at Jones beach, but the marked fish captured represented all groups released in substantial numbers throughout the river system (except those released downstream from Jones Beach). The river at Jones Beach, Columbia River Kilometer (RKm) 75, is about 1.6 km wide and has a central ship channel that is dredged to a depth of 14 m (Figure 2).

Marked fish released by various agencies at many locations in the Columbia River system (Figure 3) and subsequently captured at Jones Beach provided the majority of the data contained in this report.

Equipment and Sampling Procedures

To examine the potential for decreasing the manpower requirements of sampling, we installed a Merwin Trap, (Hamilton et al. 1970) in August 1981 [funded by NMFS during fiscal year (FY) 1981 and BPA in FY82]. The trap

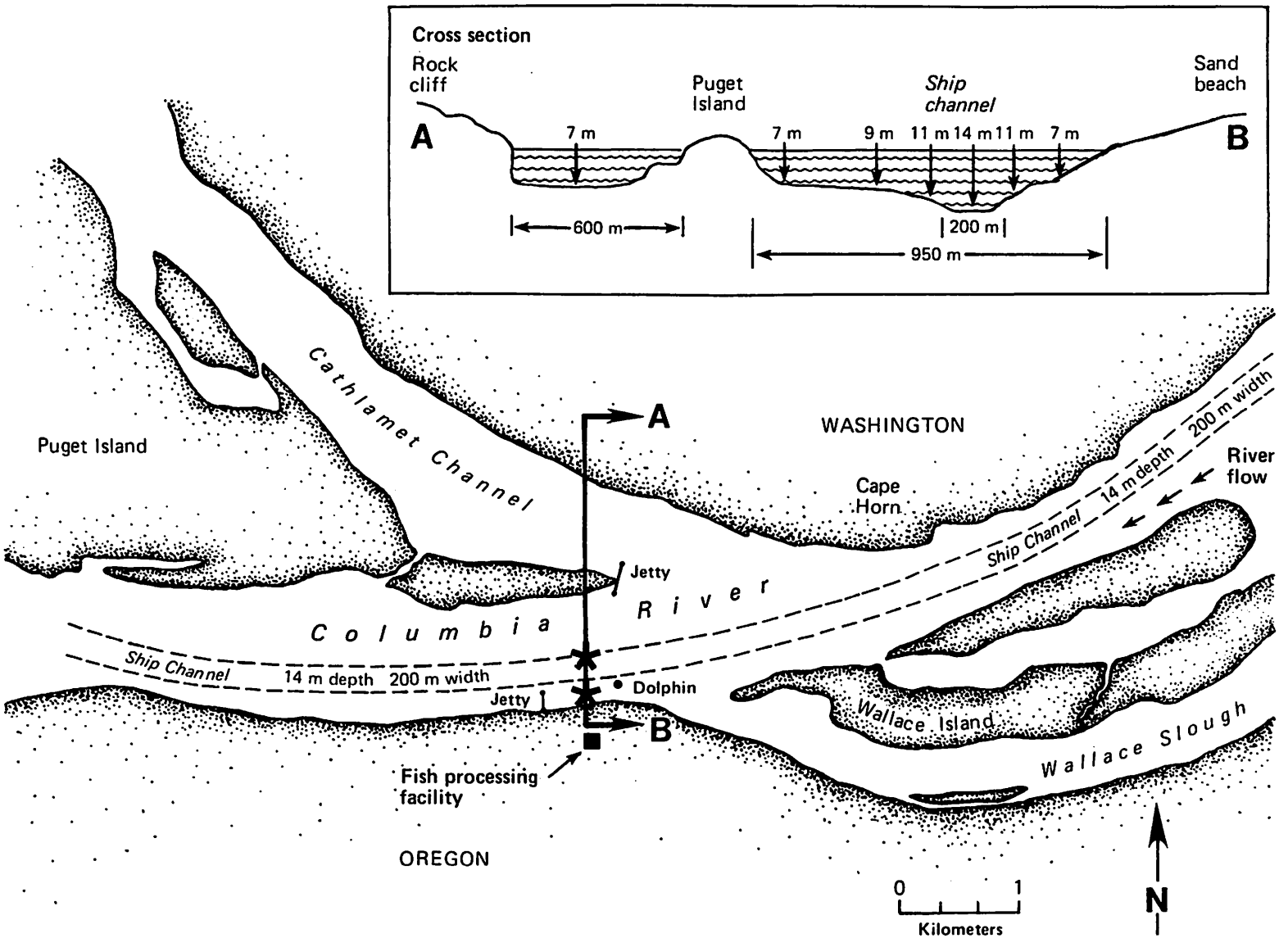
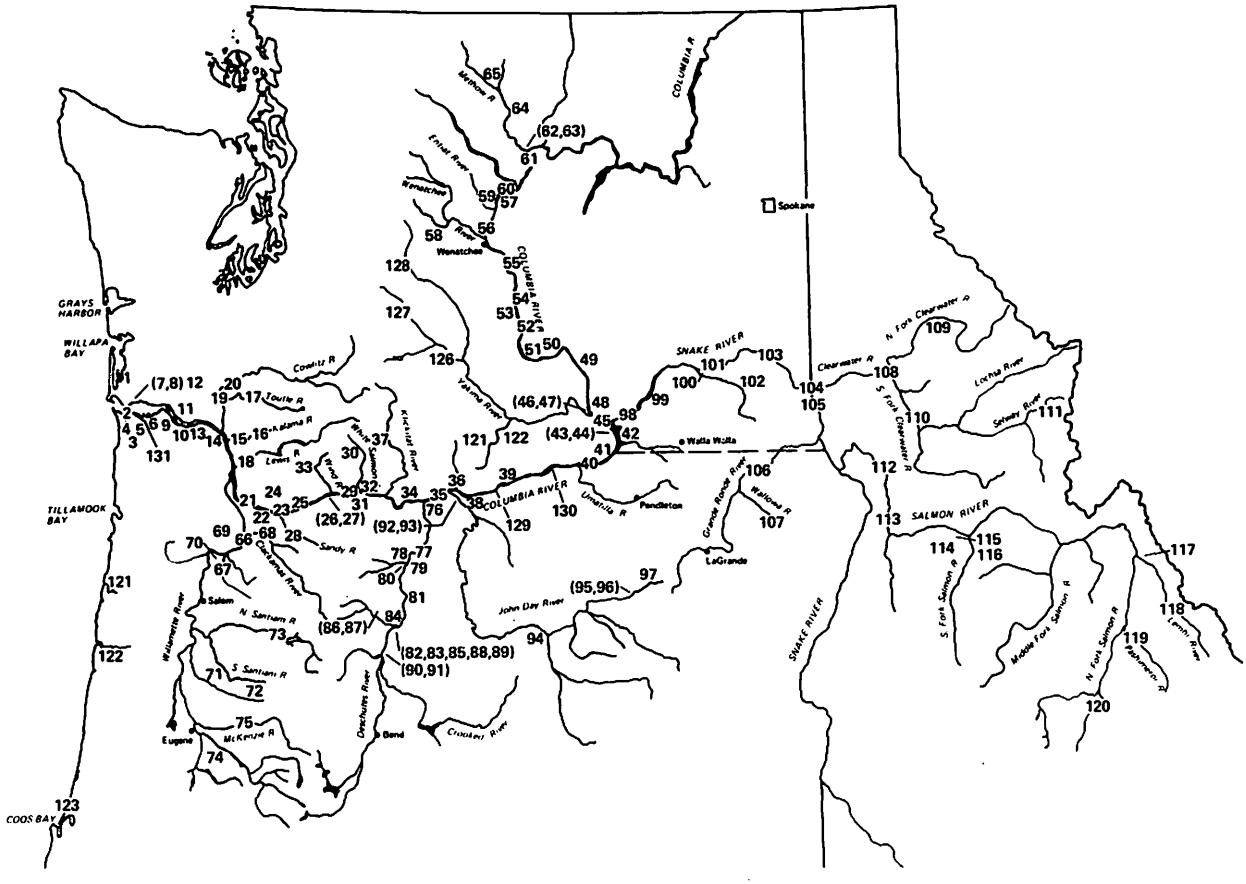


Figure 2.--Jones Beach sampling site. The beach and purse seining areas are denoted on the crossection by the two asterisks.



LEGEND

Release site	Rkm
LOWER COLUMBIA R & TRIBS.	
1. Chinook R Pd	11
2. Hammond Ore	13
3. Tucker Cr	29
4. Stavebolt Cr	34
5. Klaskanine R	37
6. Big Cr	49
7. Grays R@RM 13	57
8. Grays R@RM 21	68
9. Jones Beach	75
10. Beaver Terminal	84
11. Abernathy Cr	91
12. Elokomin R	94
13. Rainier Ore	109
14. Prescott Ore	115
15. Kalama R@RM 6	127
16. Kalama R@RM 15	141
17. Green R	160
18. Lewis R	163
19. Cowlitz R@RM 47	184
20. Cowlitz R@RM 50	189
21. Dalton Pt	206
22. Washougal R@RM 10	213
23. Skamania Light	219
24. Washougal R@RM 15	221
25. Beacon Rock	227
26. Blw Bonn D	230
27. Tanner Cr	231
28. Sandy R	235
29. Lit Wh Sal R@RM 2	261
30. Lit Wh Sal R@RM 5	268
31. Spring Cr Hat	269
32. Big Wh Rear Pd	273
33. Wind R	275
34. The Dalles D	306
35. John Day D	347
36. Towal Wash	351
37. Klickitat R	358
38. Blalock Shore	375
39. Patterson Slough	448
40. NcNary D	470
41. Port Kelly Wash	501
42. Walla Walla R@Mo	507
43. Casey Pd	516
44. Villiard Slough	521
MID COLUMBIA R & TRIBS.	
45. Pasco Wash	522
46. Yakima R@Mo	539
47. Richland Wash	540
48. Ringold Hat	568
49. Wh Bluffs	596
50. Vernita Brid	629
51. Pr Rapid Spaw Ch	639
52. Crab Cr	660
53. Wanapum D	669
54. Vantage Brid	674
55. Rock Island D	725
56. Rocky Reach D	761
57. Turtle Rock Pd	768
58. Icicle Cr	789
59. Entiat R	790
60. Chelan Hat	813
61. Wells Spaw Ch	828
62. Methow R@Mo	838
63. Pateros Ferry	839
64. Methow R@RM 28	893
65. Methow R@Hat	919
WILLAMETTE R & TRIBS.	
66. Willamette Falls	207
67. Mollalla R	220
68. Clackamas R	247
69. Tualatin R@Scogg	304
70. Mill Cr	308
71. S Santiam@Spt Ld	411
72. S Santiam@Foster	416
73. N Santiam@Minto	452
74. M Fk William@Dexter	491
75. McKenzie@Leaburg	492
DESCHUTES R & TRIBS.	
76. Deschutes R@Mo	330
77. Sherars Falls-Mo	363
78. Deschutes@RM 43	395
79. Oak Springs Hat	404
80. Maupin Trap RM 50	408
81. WmSp R-Sher Fall	425
82. Dry Cr-Wm Sp R	446
83. Deschutes@RM 84	463
84. Warm Spring Trap	464
85. Pelton D-Wm Sp R	473
86. Warm Spring R	479
87. Warm Spring R@Hat	485
88. Deschutes@RM 100	489
89. Beaver Cr-Wm Sp R	494
90. Rnd Butte Ladder	503
91. Rnd Butte Hat	506
JOHN DAY R	
92. John Day R@Mo	349
93. John Day R@RM 16	374
94. John Day@Spray Ore	623
95. N Fk John D@RM 60	744
96. M Fk John D@RM 32	749
97. John D@Granite Cr	788
SNAKE R & TRIBS.	
98. Ice Harbor D	537
99. Fishhook Park	557
100. Texas Rapids	630
101. Lit Coose D	634
102. Tucannon R	691
103. Lo Granite D	693
104. Clarkston Wash	742
105. Asotin Wash	754
106. Grand Ronde R	793
107. Wallowa Hat	940
CLEARWATER R & TRIBS.	
108. N Fk Clearwater R	809
109. Clear Cr	868
110. S Fk Clearwater R	1003
111. Lochsa R	1026
SALMON R & TRIBS.	
112. Whitebird Trap	908
113. Riggins Trap	959
114. Rapid R Hat	967
115. Lit Sal R	974
116. S Fk Salmon R	1153
117. Lemhi R@Mo	1239
118. Lemhi R	1294
119. Pahsimeroi R	1311
120. Upper Salmon R	1446
YAKIMA R	
121. Status Cr	651
122. Dry Cr	681
OUTSIDE COLUMBIA RIVER BASIN	
123. Siletz R	
124. Yaquina Bay	
125. Coos Bay Ore	
YAKIMA R	
126. Nelson Sp Pd	734
127. Nile Sp Pd	773
128. Ellensburg	776
LOWER COLUMBIA RIVER	
129. Rock Cr	368
130. Biggs	335
131. Tongue Pt	28

Figure 3.--Release sites for marked fish in Columbia River systems. Index numbers correspond to location and RKm as indicated on legend.

consisted of two holding nets; a fyke type mouth; and two lead nets, one attached to shore the other angled into the current and deep water. It was anchored in a back eddy adjacent to the northern shoreline of Wallace Island about 2 RKm upstream from Jones Beach; fishing depth was variable depending on river current. Because of the small number of fish captured, (Appendix A) the trap was operated 7 days/wk instead of the originally planned 2 days/wk. After 3 months of testing, we concluded that the trap was not an effective sampling method without modification and relocation; therefore, we ceased operation 12 November.

Purse seining was conducted in water about 9 m deep at the north edge of the ship channel near the upstream tip of Puget Island. The seine was 206 m long and 11 m deep, with mesh of 1 to 2 cm stretched measure (Johnsen and Sims 1973). The seine was set drifting with the current then towed upstream for 5 minutes before closing and pursing.

Beach seining was conducted on the Oregon shore in water about 6 m deep at the outer end of the net sweep. The net was 95 m long and 5 m deep, with mesh of 1 to 2 cm (Sims and Johnsen 1974). Seine sets were made downstream to minimize the variation in the amount of water strained as a result of tidal influences.

In November and December 1981, fall released spring chinook salmon were sampled with the purse seine (catch data were reported in Dawley et al. 1982). Limited sampling was planned for late December, January, and February but was not conducted due to lack of funds.

Sampling in 1982 was initiated on 8 and 29 March (beach and purse

seines, respectively) and conducted as originally proposed through 21 August. Seining effort varied weekly depending on the number of migrants present. Initial effort was 3 sets/day, 3 days/week with the beach seine and 3 sets/day, 2 days/week with the purse seine. Effort gradually increased until 29 April culminating with a maximum effort of 10 beach seine sets and 5 purse seine sets/day, 7 days/week. Beach seine sets were made at approximately 45-min intervals and purse sets at 90-min intervals beginning at sunrise and continuing for 7 h. Effort decreased during July and August in proportion to the number of migrants captured (Appendix Tables B1 and B2). Effort was extended about 1 month beyond the originally proposed termination to characterize the migration of a group of subyearling chinook salmon passing during late September.

Beach and purse seine sampling resumed 3 November 1982 and continued through 13 December. Final winter catch results will be compared to early spring 1983 catch data and included in the 1983 report.

Physical Data

Secchi disc readings (cm) and surface water temperatures (±0.5°C) were recorded daily at Jones Beach. Average daily river flow at Bonneville Dam was obtained from the CofE[2/].

Fish Processing

When the number of fish captured in the beach and purse seines exceeded 100, they were examined at a permanent processing facility on

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2/ U.S. Army Corps of Engineers, NPD, Reservoir Control, 210 Custom House, Portland, OR 97208.

shore; when less than 100 per set, they were processed at the sampling site. Fish were anesthetized with a 50 mg/l solution (varied with water temperature and fish size) of ethyl p-amino-benzoate (benzocaine), enumerated by species, and examined for identifying marks. Fork lengths were measured 3 days per week from a subsample of salmonids (100 each of coho salmon, O. kisutch; steelhead; yearling chinook salmon, O. tshawytscha; and subyearling chinook salmon, and all of the sockeye salmon, O. nerka, and chum salmon, O. keta, captured). Chinook salmon were separated into subyearling and yearling categories on the basis of fork length; some overlap occurred, but this method generally proved satisfactory.

Records for marked fish included: species; fork length (±0.5mm); sampling gear; and sampling site, time, and date.

Salmonids with an excised adipose fin, indicating the presence of an implanted coded wire tag (CWT), were passed through a magnetic tag detector to estimate tag retention for each species. Those fish containing tags were weighed (± 0.005 g) then sacrificed for tag identification; however, no more than 100 per species per day were sacrificed.

Stomachs from 77% of the fish sacrificed for tag identification were examined for degree of fullness. The integers 1-7 were assigned to quantify the observations as: (1) empty, (2) trace, (3) one-quarter, (4) half, (5) three-quarters, (6) full, and (7) distended full (Terry 1976). A total of 6,168 stomachs were examined through the 1982 sampling period.

Terry's fullness method, while economical, does not provide maximum information from the sacrificed fish. Consequently, approximately 4,800 stomachs were preserved, 50% of which were subsequently opened and the contents weighed to the nearest 50 micrograms. These weights, compared to

to fish weight, will ultimately provide a more exact measure than integer stomach fullness to evaluate differences between marked groups.

Preserved stomachs will be retained for future analysis; content by prey species will aid in understanding feeding and survival characteristics in the river, estuary, and near shore ocean plume. These samples were not part of the objectives for FY82; however, they will provide background information for future use. Preliminary results of several years of fullness and content analysis will be presented in the 1983 report.

Subsequent to processing, the fish were placed in a raceway with circulating river water. During June and July, salt was added (6 parts per thousand) to reduce handling stress (Long et al. 1977); the water was recirculated and refrigerated to maintain ambient river temperature. At the termination of the sampling day, the fish were transferred by gravity flow to an amphibious holding tank, transported out of the seining area, and released into the river. When fish were processed at the sampling site, they were allowed to recover from the anesthetic, immediately transported, and released outside of the sampling areas.

Biological Samples for Other Agencies

To obtain maximum utilization of sacrificed (CWT) fish, biological data/samples were provided to the following research programs: (1) scales to Oregon Department of Fish and Wildlife (ODFW)[3/], University of

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3/ Ron Williams, ODFW, 303 Extension Hall, OSU, Corvallis, OR 97331 and Jeff Zakel, 3150 E. Main St., Springfield, OR 97477.

Washington (UW)[4/], and Oregon State University (OSU)[5/]; (2) sex determinations of coho salmon were made for the U.S. Fish and Wildlife Service (USFWS)[6/]; (3) salmonid fish carcasses were provided to Washington Department of Game (WDG)[7/] for use in a marine mammal study; and (4) gill tissues for an NMFS study of smoltification[8/]. Also some branded fish were provided to USFWS[9/] for bioenergetics studies.

ANALYSIS PROCEDURES

Mark Data Expansion

To preclude sacrificing more than 100 fish per species in a single day, subsampling tagged fish, from the last set of the day, was necessary on 1 day in 1982. The tags from sacrificed fish were read and the data from the subsample was then extrapolated to represent the entire sample:

$\frac{S + L}{S} \times T = \hat{T}$--Number of fish with a unique tag code, estimated for designated day.

Where: S = Sacrificed--Number caught with excised adipose fin and positive tag detection that were sacrificed for tag identification.

L = Liberated--Number caught with excised adipose fin and positive tag detection that were not sacrificed.

T = Tag--Number of tags read with a unique tag code.

4/ Steve Matthews, UW, College of Fisheries, Seattle, WA 98195.

5/ Joseph Fisher, School of Oceanography, OSU, Corvallis, OR 97331.

6/ Percy Washington, USFWS, Naval Support Activity, Bldg. 204, Seattle, WA 98115.

7/ Richard J. Beach, WDF, 35 Portway, Astoria, OR 97103.

8/ Waldo Zaugg, NMFS, Star Rt., Cook, WA 98605.

9/ Dennis Rondorf, USFWS, National Fisheries Research Center, Willard Substation, Star Rt., Cook, WA 98605.

Expansion of mark data (tags, brands, and excised fins) were also made to incorporate a standardized effort which would provide a meaningful basis for comparisons between groups captured at different times when effort levels were dissimilar. The catch of a unique mark was expanded, if necessary, to represent maximum daily effort of 10 beach seine sets or 5 purse seine sets for an 8-h sampling period.

$$\frac{(10 \text{ or } 5)}{(E_b \text{ or } E_p)} \times \hat{T} = A^1$$ --number of fish with a unique mark, adjusted for effort for designated day.

10 = Standard Beach Effort

5 = Standard Purse Effort

E_b = Actual Beach Sets--performed on the designated day.

E_p = Actual Purse Sets--performed on the designated day.

Mark expansion for non-sampling days was an average of the adjusted catch from 2 days before and after.

Data adjustments for gear efficiency variation resulting from changes in river flow were not made.

Migrational Timing

Migrational timing at Jones Beach for subyearling chinook salmon was based on beach seine catches; purse seine catches were used to determine timing of yearling chinook salmon, coho salmon, and steelhead.

Movement Rates

Movement rates for fish of unique marked groups were calculated using distance traveled and time between the date the first fish was released at the hatchery and the median fish was captured at Jones Beach. Seasonal

average freshwater movement rates for each salmonid species were calculated using index groups from particular hatcheries to facilitate comparisons between river flow and migration rate.

Relative Survival

Relative survival estimates between similar marked groups[10/] were made by comparing catch rates at Jones Beach:

$$\frac{(\%\ \text{catch treatment} - \%\ \text{catch control})}{\%\ \text{catch control}} \times 100 = \%\ \text{difference in survival}$$

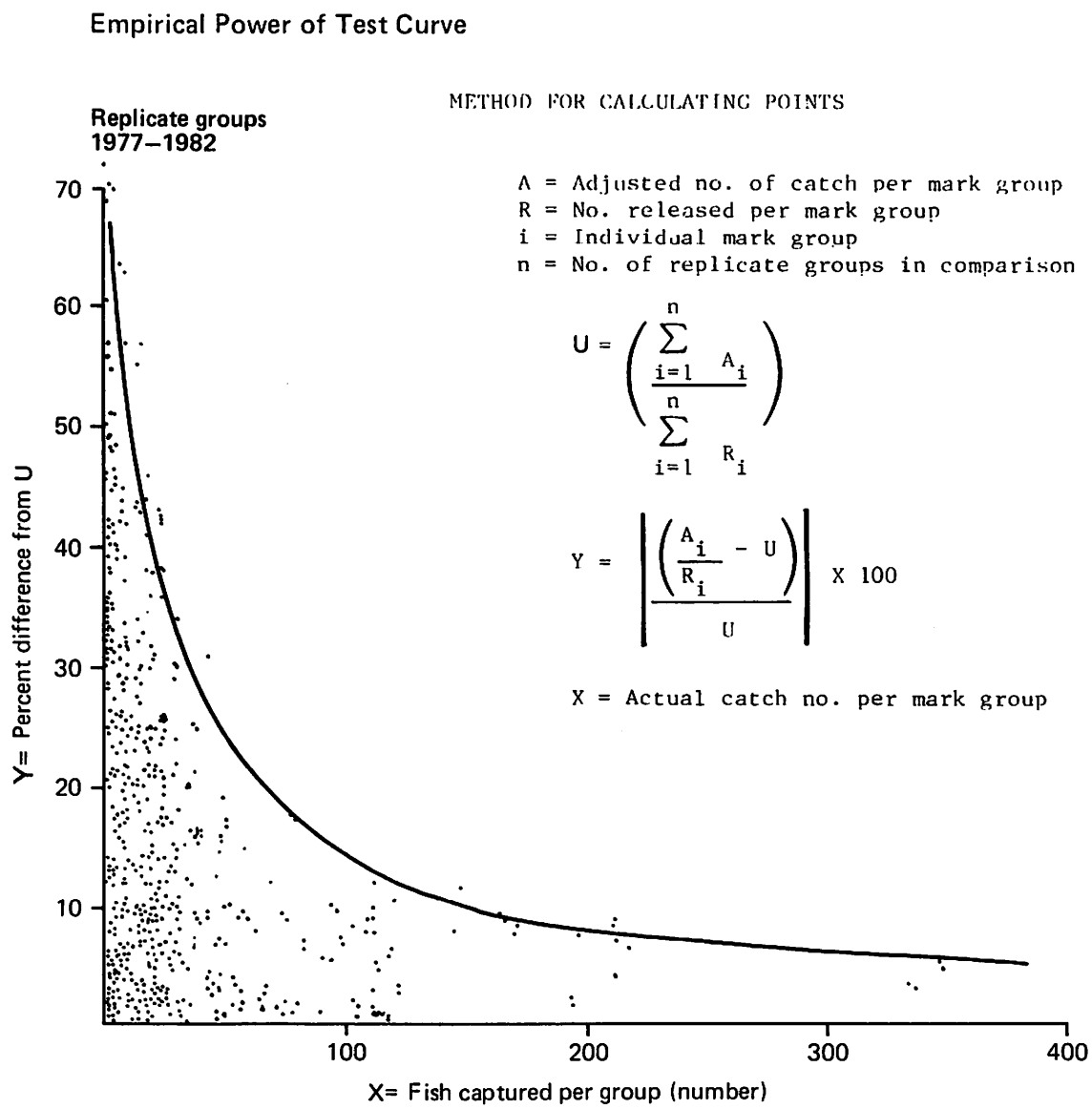
Survival of subyearling fall chinook salmon from release site to the estuary was calculated by comparing recovery rates of fish from tagged groups released at the hatchery to branded fish transported and released upstream from Jones Beach at Prescott, Oregon, (RKm 115). Survival of hatchery fish tagged for the Columbia River Fall Chinook Evaluation (CRFCE) was determined in the above manner. Groups examined originated from: Spring Creek National Fish Hatchery (NFH) during March, April, and May; Little White Salmon NFH during June; Bonneville Hatchery (ODFW) during April and May; Klickitat Hatchery (WDF) during June; and Washougal Hatchery (WDF) during June. CRFCE researchers tagged 2.5 to 5.0% of the major production releases at each hatchery (60,000 to 250,000 fish per release). An additional group of 50,000 fish from each population was freeze branded using procedures described by Mighell (1969). The branded fish from each hatchery were transported to Prescott, Oregon, in two groups, 3 days apart. Each group was acclimated for 3 days to Columbia River water, checked for brand retention, and released in mid-river coincidental with the passage of the tagged hatchery fish.

10/ For researchers desiring to utilize NMFS' sampling capabilities at Jones Beach, Appendix C describes a means of calculating the numbers of marked fish to release to assure an adequate estuarine sample.

Differences in Catch Percentages

To simplify analyses, an empirical power of the test curve was developed for comparing differences between catch ratios (no. catch/no. released) of treatment and control groups to differences of catch observed from replicate mark groups captured previously (Figure 4). To provide the baseline data for the curve, catch ratios of replicate mark groups (Appendix Table B4) were averaged (U), then the percentage difference between this average and each individual catch ratio was calculated (Y) and plotted against actual number of fish captured (X). Figure 4 shows that variation between catch ratios of replicate groups is large (as high as 71% different from U) when 25 or fewer fish were captured and small (12% or less different from U) when 100 or more fish were captured. The curve in Figure 4 represents the 95% level of confidence. This comparison method was used in this report for detecting significant differences in catch ratios.

We recommend that researchers plot catch percentage differences for treatment and control groups on Figure 4 to ascertain whether observed differences are greater than normally observed between replicate groups. If any of the points plotted fall outside the range of replicate group data, then there is a significant difference among the treatment and control group. For example, to evaluate the difference between two stocks of steelhead from Hagerman Hatchery released at the Pahsimeroi River we



METHOD FOR CALCULATING POINTS

A = Adjusted no. of catch per mark group
R = No. released per mark group
i = Individual mark group
n = No. of replicate groups in comparison

$$U = \left(\frac{\sum_{i=1}^{n} A_i}{\sum_{i=1}^{n} R_i} \right)$$

$$Y = \left| \frac{\left(\frac{A_i}{R_i} - U \right)}{U} \right| \times 100$$

X = Actual catch no. per mark group

Figure 4.--Empirical power of the test curve developed by comparing differences between catch percentages for replicate mark groups with number in catch.

have the following data:

Treatment	No. released	No. captured actual	No. captured adjusted	U	X	Y
Stock A	59,000	121	124	0.00171	121	23
Stock B	56,500	72	73		72	24

Both data points fall outside the range for replicate groups in Figure 4, thus we conclude there was a difference in survival to the estuary for Stocks A and B. G statistic evaluation provides the same conclusion but would be time consuming to calculate if more than two groups were compared. The empirical evaluation accounts for the variation that has affected the consistency of previous sampling (including random variation); consequently, it provides a more precise evaluation (Efron and Morris 1975).

RESULTS

From March to December 1982, the sampling at Jones Beach (1,491 beach seine sets and 550 purse seine sets) resulted in capturing 157,226 subyearling chinook salmon; 16,849 yearling chinook salmon; 38,969 coho salmon; and 16,257 steelhead (Appendix Tables B1 and B2).

The following summary data pertaining to mark groups, March to September, are presented in Appendix D: release information, actual and adjusted recaptures and percentages, movement rates, date ranges, and fish lengths. Preliminary mark recovery data for November and December 1982 sampling are presented in Appendix Table B5. Catch percentages of fish from marked groups were generally below 0.5% of the number released

(Appendix D). A total of 11,987 marked fish were captured, of which 8,043 had CWT (Table 1). Tag retention was lowest for steelhead (88%) and highest for subyearling chinook salmon (95%).

In 1982, water temperatures at Jones Beach ranged from 6°C in March to 21°C in August--similiar to temperature patterns observed in previous years. Secchi disk turbidity readings ranged from 19 to 165cm (Appendix Table B3).

Variation in Catch Associated with River Flow

The total catch of juvenile salmonids was 229,301, slightly greater than in 1980 and 1981--176,856 and 198,214, respectively, but considerably less than annual catches during the period 1977 to 1979--367,048; 339,392; and 360,181, respectively (Figure 5). Sampling efforts throughout the peak migration periods were similiar for all 6 years; however, river water flows varied substantially--highest in 1982, intermediate from 1978 to 1981, and low in 1977 (Figure 6).

Comparisons were made between seasonal average river flow and the corresponding Jones Beach subyearling chinook salmon catch percentage for each year since 1977 (Appendix Table B6). We found that 76% of the variability in catch percentages can be attributed to river flow, with the relationship: [Y (catch percent) = -0.043 X (flow) + 0.61--correlation coefficient = -0.87] (Figure 7). The decrease in catch resulting from an increase in flow from 6 to 7 thousand m^3/s (a change of 35.3 thousand ft^3/s) is calculated at 12% using the above equation. However, this estimate may be biased by survival differences associated with passage through reservoirs and turbines for fish released above Bonneville Dam. We assume that similiar relationships pertain to yearling salmonids, however,

Table 1.--Number of marked juvenile salmonids captured in the Columbia River estuary (RKm 75) during 1982.

Species	Coded wire tags (CWT)a/	Ad clip (no CWT)	Brands	Fin clips	Total
Chinook salmon-subyearling	5,028	277	1,738	20	7,063
Chinook salmon-yearling	496	46	349	131	1,022
Coho salmon	1,929	178	5	14	2,126
Steelhead	590	82	660	442	1,774
Sockeye salmon	0	2	0	0	2
Total	8,043	585	2,752	607	11,987

a/ Retention was lowest for steelhead (88%) and highest for subyearling chinook salmon (95%).

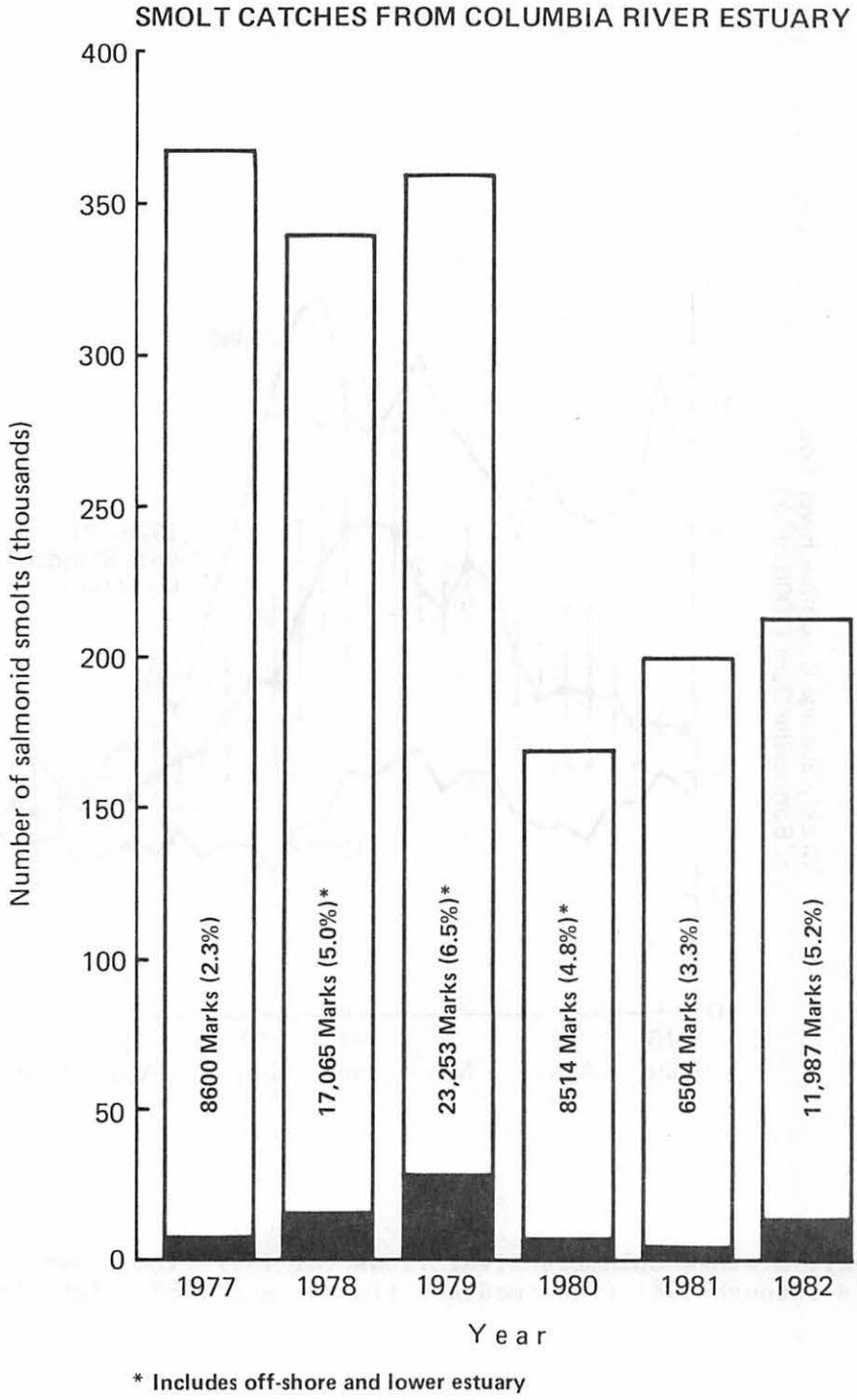


Figure 5.--Numbers of marked (darkened area) and unmarked salmonids captured at Jones Beach, 1977-82. Percentage of marked fish in total catch is shown in parenthesis.

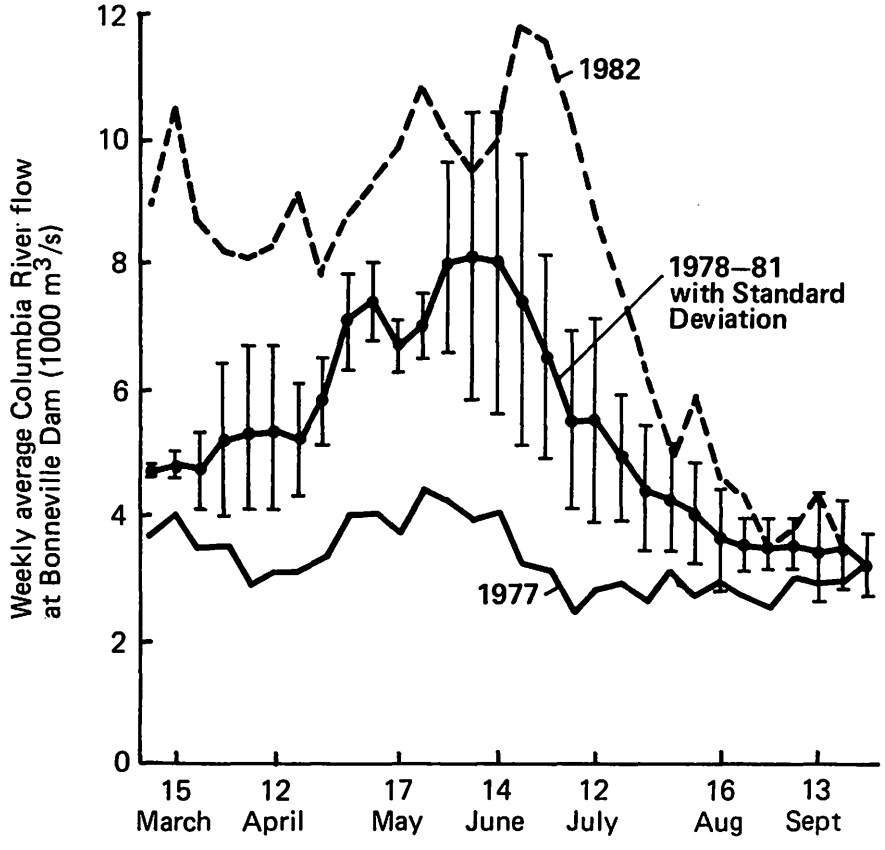


Figure 6.--Weekly average Columbia River flows for 1977 (low flows), 1978 through 1981 (intermediate flows), and 1982 (high flows).

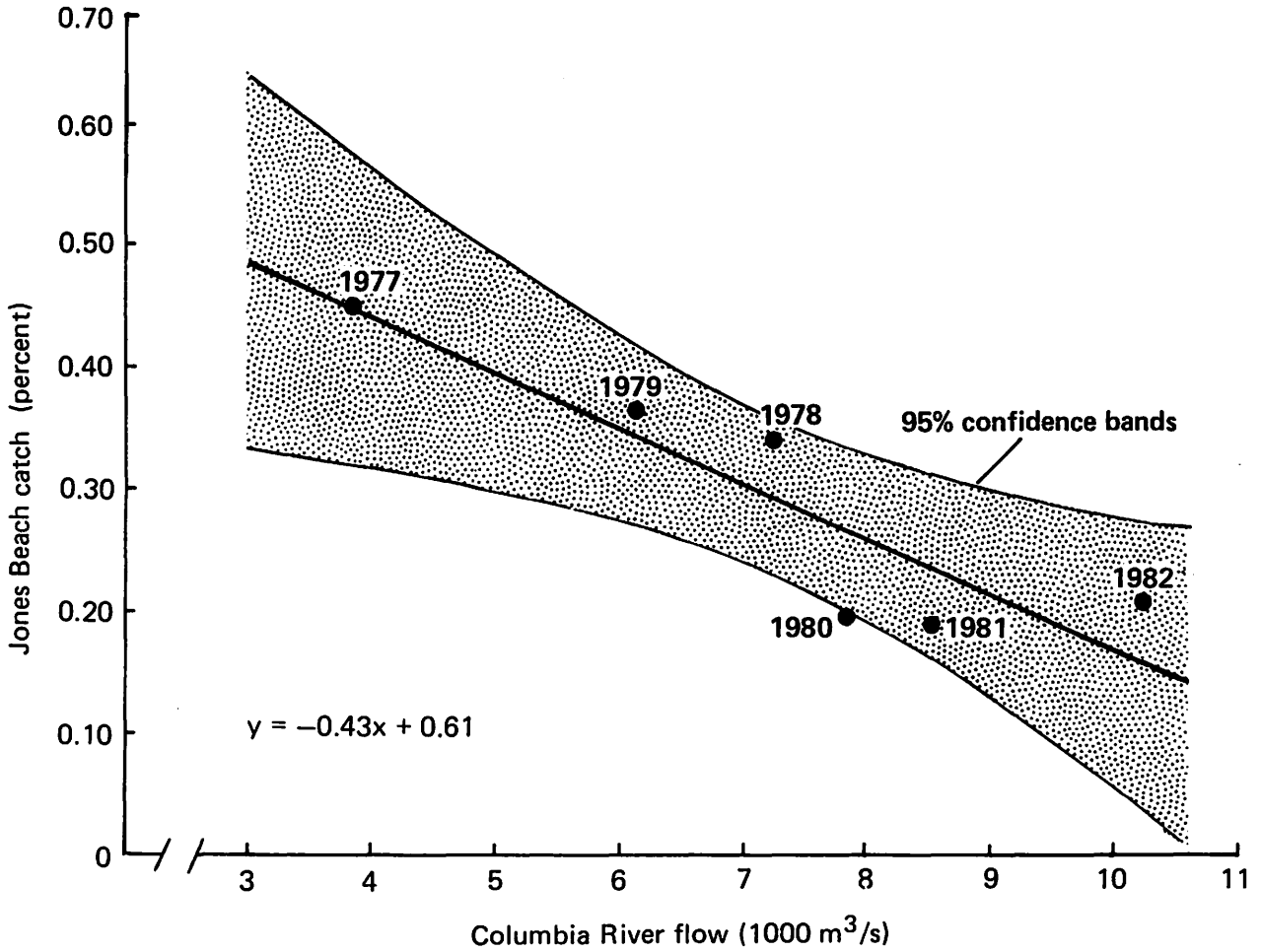


Figure 7.--Subyearling chinook salmon catch at Jones Beach as a percent of total hatchery release numbers by year plotted against seasonal average Columbia River flow at Bonneville Dam 1977-1982.

release information for unmarked fish was not compiled.

An additional comparison was made between catch percentages and river flow for marked groups from the same stock and fish size migrating at different times; only those groups released downstream from Bonneville Dam were used. The marked groups used in this report differ from those used in the 1981 report (Dawley et al. 1982) in that groups known to have dissimiliar survival rates or to have elicited abnormal catch percentages were eliminated; also, groups migrating in 1982 were added. Each species was examined separately; no significant differences were found and subsequently the data were combined. An inverse relationship between catch percentage and flow was apparent in 34 of 43 observations, (Appendix Table B7). An increase in river flow of 1,000 m^3/s (35.3 thousand ft^3/s), averaged from the range of observations, resulted in a mean decrease of 8% (s.d. 36%) in catch percentage. Those comparisons indicating greater than a $\pm$99% change were considered to be influenced by factors other than river flow and were eliminated prior to calculating the average value. The variation among the 43 comparisons was large; consequently, at present, the catch/flow relationship is not well defined.

In some instances, it may be desirable to make comparisons of recovery percentages between groups captured at different river flows, even though the adjustment factor is not well defined; the method of calculation ($\%_F$) is shown in Appendix C.

As the data base increases, estimates for the effect of flow on catches will improve.

Migration Timing

Temporal distribution of migrating salmon and steelhead (Figure 8) were similiar to past years, with peaks in catches generally corresponding with dates of major hatchery releases (Dawley et al. 1982). In 1982, the migrations of yearling chinook and coho salmon and steelhead were about 2 weeks later than in 1981; the range was slightly wider. An obvious difference in 1982 from recent years was the lack of coho salmon captured in July, which was a result of the termination of release studies.

Subyearling Chinook Salmon

Subyearling chinook salmon caught in early March were predominately unmarked fry--average 40 mm fork length. Catches increased during the last week of March coincident with the release of marked fish from Spring Creek NFH; beach seine catch per set (CPS) peaked at 45 and decreased to 23 fish by mid-April. A second peak CPS of 169 fish occurred during the first week of May, which related to the April releases from Spring Creek and Bonneville Hatcheries in addition to fish released in the Umatilla River. Catches decreased in mid-May and June (Figure 8) when higher than normal river flows occurred. Fish from Bonneville, Spring Creek, Stayton Pond, Abernathy, Little White Salmon, Oxbow, Klickitat, Kalama Falls, and Lower Kalama rearing facilities were the principal groups passing during the increased river flows. In 7 of 11 comparable groups, the catch percentages of marked fish during May and June were higher in 1982 than the average for previous years (Table 2).

In early July, a CPS of 231 fish coincided with the passage of marked fish from Washougal and Cowlitz Hatcheries. The CPS decreased to less than

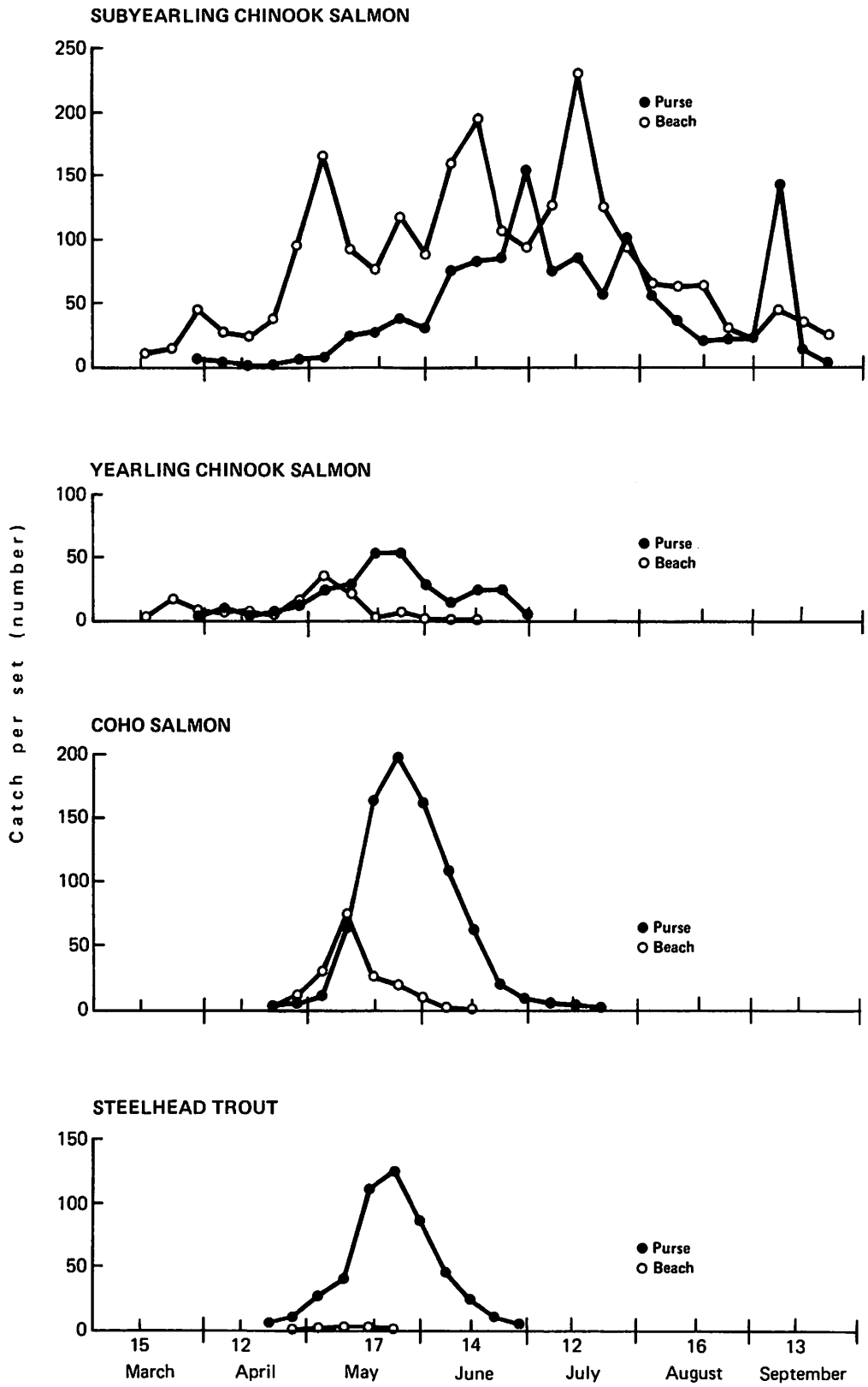


Figure 8.--Weekly catch per set averages for subyearling chinook, yearling chinook, and coho salmon and steelhead caught by beach and purse seines at Jones Beach in 1982.

Table 2.--Catch percentages for major releases of subyearling chinook salmon captured during May and June 1982, compared to previous years.

Hatchery	Juvenile catch percentages at Jones Beach[a] 1982	Avg. 1978-1981[b]
Bonneville		
Tule (well water)	0.254	0.142
Tule (Tanner Creek water)	0.160	0.186
Brights	0.216	0.105
Spring Creek		
April	0.246	0.227
May	0.128	0.118
Stayton Pond	0.081	0.091
Abernathy	0.110	0.090
Little White Salmon	0.138	0.254
Klickitat	0.111	0.081
Kalama Falls	0.153	0.456[c]
Lower Kalama	0.162	0.159

a/ Adjusted beach and purse seine percentages combined; replicate groups combined.

b/ Data from 1977 omitted because of high catch rate due to low river flows.

c/ Data from 1979 omitted because of high catch rate due to small fish size at release (180/lb). A recapture rate of 1.153 was observed including 1979 data.

70 fish during August and September, the principal group passing during this time was released from Bonneville Hatchery on 3 August 1982.

Yearling Chinook Salmon

In mid-March, beach seine CPS for yearling chinook salmon peaked at 20, declined to an average of 10 during April, peaked again in early May at 37, then decreased (Appendix Table B1).

Initial purse seine CPS was 5 during late March then increased to 55 by the third week of May, fluctuated between 52 and 17 through late June--the last fish was captured on 6 August (Appendix Table B2).

The major mark groups captured during sampling originated from the following hatcheries: Oxbow and Bonneville--March; McKenzie, Round Butte, Oakridge, and Cowlitz--April; Kooskia, Leavenworth, and Marion Forks--May; and McCall--early June.

Coho Salmon

The first juvenile coho salmon were caught in late March (7 fish captured between 26 March and 13 April); the peak CPS of 200 occurred during the last week of May (Appendix Table B2). The major marked groups sampled during the peak were from Eagle Creek, Cascade, Sandy, Lower Kalama, Lewis River, Cowlitz, and Washougal Hatcheries. The migration was essentially complete by late June--the last fish of the summer was captured on 11 August; 9 were captured during November.

Steelhead

Steelhead were caught during the first week in April, and peak catches (123 CPS, purse seine) occurred during the fourth week in May (Appendix Table B2). The major mark groups sampled during the peak were from

Hagerman, Dworshak, Niagara Springs, Tucannon, Chelan, and Cowlitz Hatcheries. Steelhead were scarce by August; 10 fish were captured in November and December.

Movement Rates

In 1982, there was a wide range of movement rates of CWT groups--up to 131 km/day (Appendix D). The fastest movement was affected by transportation of fish from Lower Granite and McNary Dams to release sites downstream from Bonneville Dam. The slowest movement involved individuals that wintered in the Columbia River or its tributaries and migrated in the spring (Appendix Table B8), also small fall chinook salmon 3.5 (130/lb), 3.8 (117/lb), and 4.8 g fish (98/lb) that were released during June from Kalama Falls, Lower Kalama, and Cowlitz Hatcheries, respectively.

Though movement rates for subyearling chinook salmon generally increase with fish size, within group comparisons of daily mean lengths have shown both <u>increasing</u> and <u>decreasing</u> trends through the recovery period (Dawley et al. 1982). Seasonal average movement rates using index groups of each species (Table 3) should be used only for general comparisons between years.

Size Characteristcs

Generally unmarked fish captured in mid-river with the purse seine were 5 to 20 mm longer than those captured near shore with the beach seine (Figure 9). Marked fish captured in mid-river were also consistently longer than those captured near shore (Appendix D).

Survival Estimates for Selected Hatchery Stocks

Survival to the estuary of eight selected groups of CWT hatchery fall

Table 3.--Average and range of migration rates for selected groups of marked juvenile salmon and steelhead from release site to Jones Beach, 1978-1981 and 1982.

	Chinook salmon				Coho salmon		Steelhead	
	Subyearling		Yearling					
	1978-1981	1982	1978-1981	1982	1978-1981	1982	1978-1981	1982
Average km/day[a]	18	16	20	16	19	14	33	36
Range km/day	2-48	2-41	5-46	8-25	6-57	5-25	3-63	26-45
No. mark group	49	12	41	9	26	8	23	3

a/ Averaged from marked groups representing large releases (>10,000) and released at similar sites 1978-1982; calculated using date of median fish captured.

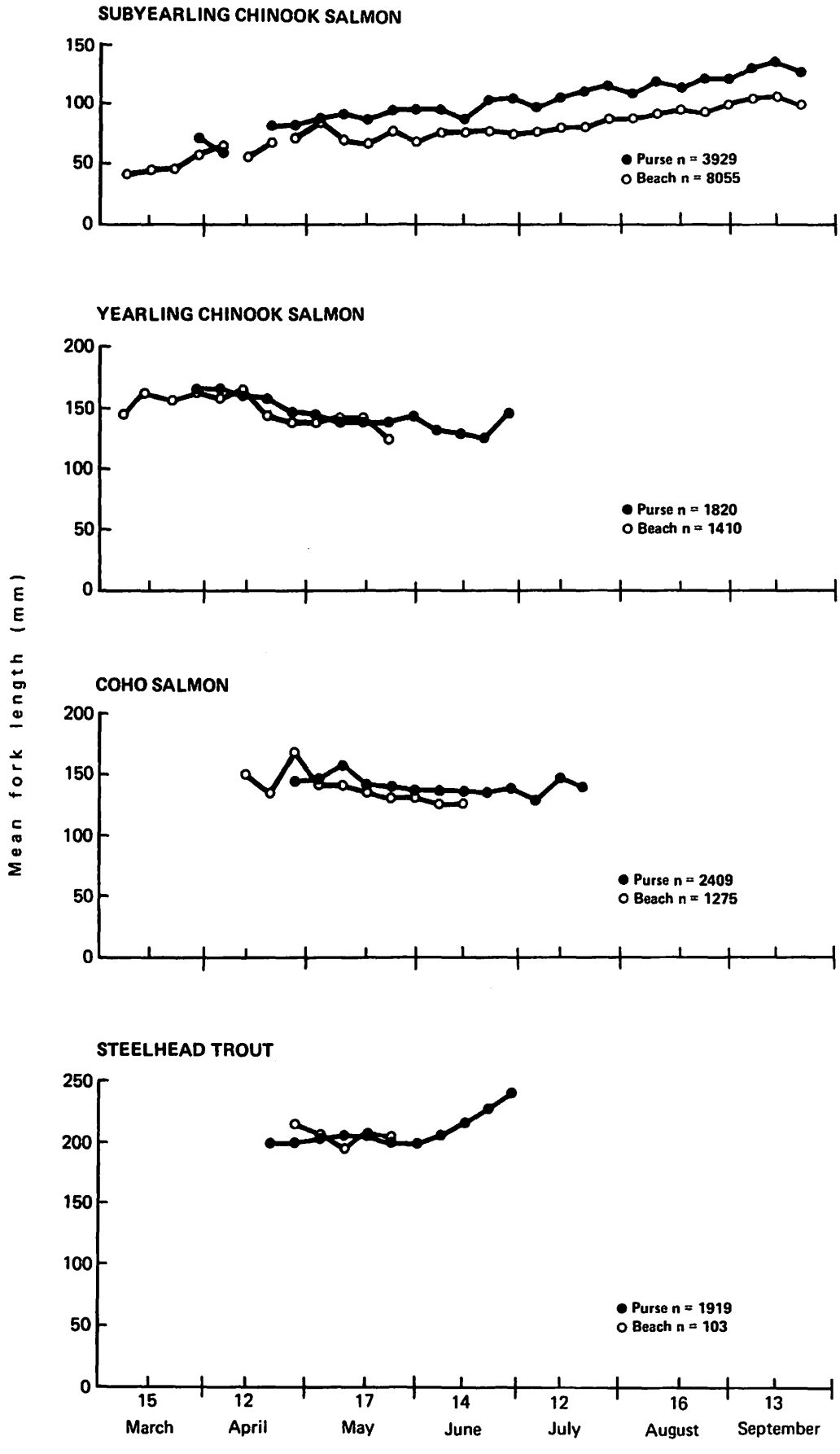


Figure 9.--Weekly mean fork lengths of subyearling chinook, yearling chinook, and coho salmon and steelhead caught in beach and purse seines at Jones Beach in 1982. n = number measured.

chinook salmon was measured by comparing recovery percentages of the fish released at the hatchery and branded subsamples released upriver at Prescott, Oregon, (RKm 115).

The survival estimates were: Spring Creek Hatchery releases in March--82%, April--86%, and May--74%; Bonneville Hatchery, well water rearing--59%, Tanner Creek water rearing--63%; Little White Salmon Hatchery--87%; Klickitat Hatchery--105%; and Washougal Hatchery--163%. In general, the survival estimates for 1982 were higher than in previous years (Appendix Table B9). The 105% estimate for Klickitat Hatchery fish may have been affected by the fact that 12% of the tagged fish were captured before the official release date, consequently, timing of hatchery and Prescott releases were different. The Washougal Hatchery survival estimate (163%) was unrealistic. It appears that the problem may be partially related to timing differences between the hatchery versus the Prescott mark releases; for example, the tagged hatchery fish were being captured in December; whereas, the last fish from the branded subsamples was captured on 16 August. Transported fish passing Jones Beach too rapidly for representative recovery percentage (Dawley et al. 1982) may also be causing fluctuations. Final evaluation of the survival estimates for 1978-1982 will be made using adult return information.

Passage Through Dams and Reservoirs

The effect of river flow on gear efficiencies at Jones Beach has limited our capability to examine migrant survival in relation to passage conditions at dams except for paired test and control releases or subjective evaluation as a function of movement rates (Dawley et al. 1982).

Mark recovery data for test and control groups of yearling chinook and coho salmon and steelhead from the Mid-Columbia Public Utilities District systems evaluation are provided in Appendix D (Pages 4, 8, 9, 11, 13, 16, and 17). Test and control groups of subyearling chinook salmon from the Bonneville Second Powerhouse evaluation are provided in Appendix D (Page 18).

Wild Fish Mark Recaptures

In 1982, there were 1,445 wild chinook salmon marked in the John Day River; none of these fish were captured at Jones Beach. We did, however capture 2 of 3,863 tagged wild fish released in the John Day River during May and June 1981 [captured on 3 and 5 May 1982, fork lengths 124 and 106 mm, respectively (Appendix D)].

Fall Released Chinook Salmon Recoveries

Recoveries of chinook salmon marked and released in the fall of 1981 ranged from 0 to 13 (0 to 0.04%) per group (Table 4). The recovery percentage was low due to limited fishing effort during the period of passage; collectively the smaller fish were recovered in lower percentages, and these recoveries were more often made the following spring (1982). We expect to provide statistically valid observations from fall, winter, and spring sampling in 1982/1983 in the 1983 annual report.

Relative Survival Between Groups

Studies to enhance survival during culture, freshwater migration, seawater entry, and the early stage of ocean residence are being conducted at hatcheries, some of which were built and operated for mitigating salmon and steelhead runs lost as a result of hydroelectric projects in the

Table 4.--Fall, winter, and spring recoveries at Jones Beach for Juvenile chinook salmon released in October and November of 1981.

Release information							Recoveries at Jones Beach	
Tag code (AD/D1/D2)	Site	Source	Stock/ treatment	No./lb	Size (g)	No.[a]	1981	1982
07 21 38	Tanner Cr.	Bonneville	Tule	11	41	51454	4	5
07 21 39	Tanner Cr.	Bonneville	Tule	9	50	50072	5	4
07 21 42	Tanner Cr.	Bonneville	Bright	11	41	49813	5	1
07 21 41	Tanner Cr.	Bonneville	Bright	9	50	50702	4	1
07 25 19	McKenzie	McKenzie	Intermediate	18	25	36773	0	2
07 22 23	McKenzie	McKenzie	Ungraded	8	57	31089	9	0
07 25 17	McKenzie	McKenzie	Large	6	76	38632	11	0
07 24 21	M. FK. William	Oakridge	Small	28	16	30590	0	0
07 24 23	M. FK. William	Oakridge	Intermediate	19	24	31712	0	3
07 24 18	M. FK. William	Oakridge	Large	7	65	31654	3	0
07 23 08	M. FK. William	Oakridge	Ungraded	9	50	29709	0	5
07 22 37	M. FK. William	Dexter	Ungraded	4	114	29386	12	1
07 25 23	N. Santiam	Marion Fks.	Carson	25	18	41423	0	2
07 25 24	Oakridge	Oakridge	Carson	23	20	50855	0	5
07 23 49	Deschutes R.	Round Butte	Time/size	11	41	26911	0	1
07 23 47	Deschutes R.	Round Butte	Time/size	6	76	44212	2	0

[a] Release numbers from PMFC 1982 coded wire tag release report.

Columbia River system. We examined the catch data from those studies and other enhancement studies (Appendix D) to evaluate survival trends of the various experimental groups during their migration to Jones Beach. The estimates of survival differences reported herein are based on 1982 fish catches at Jones Beach and should be examined as a supplement to those relative survival trends for the years 1977 through 1981 reported by Dawley et al. (1982). Survival to the estuary is correlated with the effects of fish size at release, transportation past dams, nutrition, rearing density, chemical treatments, and various stocks.

Effects of Fish Size

Spring chinook salmon reared and marked for size/survival research at Kooskia Hatchery showed an increased catch percentage for larger fish, 0.031% for 21.6 g (21/lb) fish compared to 0.055% for 50.3 g (9/lb) fish (Table 5). However, because of the small number of fish captured (17 and 24, respectively) the difference between catches from these groups is not statistically valid using our power of the test curve. However, we found from past examinations that increased size appears to enhance survival to the estuary. A reevaluation of all size at release studies for survival to the estuary, including the study in 1982, by the methods given in Fleiss (1981) indicates that there is a significant direct relationship between size and catch percentage. The data tabulated in the 1982 report yield six groups for which Fleiss' gradient in proportions test can be applied. For these groups the probability values for an increase in catch percentage with an increase in size are 0.065, 0.064, 0.107, 0.0025, 0.018, and 0.061. Only two of these values are significant at the $\alpha = 0.05$ level; however, if the Fisher procedure for combining probabilities from independent tests of

Table 5.--Catch percentages of juvenile spring chinook salmon from size at release studies, 1982.

Release site/source	Release date (da/mo/yr)	Juvenile[a] catches at Jones Beach		Average size at release	
		No.	%	No./lb	g
Clear Creek, ID/ Kooskia Hatchery	16 Ap 82	17	0.031	21	21
Kooskia Hatchery	16 Ap 82	24	0.055	9	50

[a] Actual number captured (beach and purse seine) and adjusted percent captured. Capture comparisons not made for actual catches less than 10 fish.

significance (Sokal and Rohlf 1981) is applied to these probabilities, we obtain a chi-square value of 41.046 with 12 degrees of freedom which is significant at the $\alpha = 0.005$ level.

Effects of Transportation

We examined the effects of transportation for all marked groups recovered at Jones Beach with the exceptions of those groups from which 50% of the catch was made in 2 days or less and those groups from which fewer than 10 fish were recovered (Dawley et al. 1982). Three studies with subyearling chinook salmon and one study with steelhead provided sufficient recaptures for evaluation.

The transportation of subyearling chinook salmon from Spring Creek and Bonneville Hatcheries upriver to the Umatilla River resulted in a significant decrease in survival (58 and 46%, respectively) compared to controls released at the hatcheries. Estuarine catch rates of summer and fall chinook salmon transported downstream from McNary Dam and released below Bonneville Dam indicate a seasonal average benefit of 148% increase in survival over controls released in McNary Dam tailrace (Appendix Table B10). Comparisons during seven date ranges produced only one incidence of higher control catch rate than transported catch rate. Estimated survival increases for transported subyearling chinook salmon in past years were 200, 800, 383 and 75%, respectively, for the years 1981, 1980, 1979, and 1978.

The transportation of steelhead from the Methow River downstream to below Priest Rapids Dam (Wells Spawning Channel fish) increased survival 12%, insignificant based on the numbers captured--23 and 25, respectively (Figure 4).

Effects of Nutrition

Relative survival comparisons were made for nutritional studies conducted at Spring Creek, Bonneville, and Sandy Hatcheries (Table 6). There were no significant differences between catch percentages for any of the marked groups used for the following comparisons: (1) Spring Creek Hatchery fall chinook salmon given a salt supplemented diet (0.176%) versus controls with no salt (0.174%); (2) Bonneville Hatchery fall chinook salmon fed Oregon Moist Pellet (OMP 2) (0.082%) versus fish fed a presscake formulation (PC) (0.090%); and (3) Sandy Hatchery coho salmon fed OMP2, OMP4, PC-4, PC-6, or Abernathy diet, (0.161, 0.148, 0.109, 0.163, 0.146%, respectively).

Effects of Rearing Density

In 1982, there were 66 unique tag lots of coho salmon reared at various pond loading densities (Table 7). There were no significant differences between Jones Beach catch percentages for any pond loading densities tested. The effects of rearing densities within the ranges tested on coho salmon appear to be minimal during migration to the estuary.

Effects of Chemical Treatments

There were no significant differences in catch percentage between treatment and control for fish groups receiving prophylactic chemical treatments [erythromycin and vibrio vaccine studies (Table 8)].

Effects of Different Fish Stocks

A significant difference was not apparent between catch percentages of Carson stock versus Santiam stock spring chinook salmon released at Marion Forks Hatchery (Table 9).

Table 6.--Catch percentages of marked fish from nutrition studies, 1982.

Tag (AG/D1/D2)[a]	Diet	Release Information site (source)	Release Information date (da/mo/yr)	Juvenile catches at Jones Beach[b] No.	Juvenile catches at Jones Beach[b] %
		Fall chinook salmon			
		Spring Cr. Hat			
05/10/53	Control (OMP)		15 Apr 82	68	0.177
05/10/54	Control (OMP)			71	0.170
05/10/55	7% Salt			71	0.199
05/10/56	7% Salt			64	0.152
		Bonneville Hat.			
07/24/14	OMP 2		04 Jun 82	34	0.067
07/24/15	OMP 2			50	0.096
07/24/16	Presscake			45	0.093
07/24/17	Presscake			46	0.087
		Coho salmon			
		Sandy Hat.			
07/25/50	OMP 2		30 Apr 82	50	0.190
07/25/58	OMP 2			36	0.131
07/25/71	OMP 4			34	0.126
07/25/54	OMP 4			46	0.170
07/25/53	PC-4			25	0.099
07/25/55	PC-4			33	0.118
07/25/49	PC-6			31	0.132
07/25/57	PC-6			53	0.193
07/25/52	Abernathy			36	0.135
07/25/56	Abernathy			43	0.157

a/ Binary tag AG=agency code; D1=data; and D2=data 2.

b/ Number is actual catch; % represents adjusted catch.

Table 7.--Marked coho salmon from rearing density studies caught at Jones Beach, 1982.

Tag (Ag/Dl/D2)	Release information: Site	Release information: Date (da/mo/yr)	Density	Juvenile catches at Jones Beach a/: No.	Juvenile catches at Jones Beach a/: %
			lb./ft^3/in b/ (fish/water/avg. fk. len)		
05/10/35-36	Eagle Creek Hat.	06 May 82	0.15	71	0.203
05/10/37-38			0.30	139	0.178
05/10/39-40			0.45	229	0.179
			lb./gal./min c/ (fish/water)		
63/24/20-24	Cowlitz Hat.	03 May 82	20.00	95	0.196
63/24/25-29			19.80	72	0.143
63/24/30-34			11.60	81	0.158
63/24/35-39			12.60	92	0.182
63/24/40-44			12.70	101	0.197
63/24/45-49			12.20	95	0.192
63/25/13-17	Washougal Hat.	25 May 82	13.63	44	0.101
63/25/18-22			12.13	34	0.084
63/25/23-27			9.80	32	0.072
63/25/28-32			8.64	38	0.094
63/25/33-37			6.64	40	0.094
63/25/38-42			5.39	29	0.093

a/ Actual catch (beach plus purse seine) and adjusted percent catch with replicates combined.

b/ Jamieson Holoway, USFWS, Eagle Creek Hatchery, Rt. 1 Box 610, Estacada, OR 97203.

c/ Robert Foster, WDF, 115 General Admin. Bldg., Olympia, WA 98504.

Table 8.--Catch percentages of marked fish from chemical treatment studies, 1982.

Mark (Ag/D1/D2)	Chemical treatment	Release information: Site (source)	Release information: Species	Release information: Date (da/mo/yr)	Juvenile catches at Jones Beach a/: No.	Juvenile catches at Jones Beach a/: %
Vibrio vaccine						
10/24/04	Vibrio vaccine	Niagara Spr.	Steelhead	09 Apr 82	56	0.147
10/24/50	Control				53	0.131
10/24/12 & RD SU 4	Vibrio vaccine	McCall Hat.	Sp. chinook	08 Apr 82	16	0.032
10/24/13 & RD SU 2	Control				25	0.047
10/24/15	Vaccine	Rapid R. Hat.	Sp. chinook	27 Mar 82	15	0.047
10/24/14	Control				11	0.031
Erythromycin treatment						
63/21/34	Control	Cowlitz Hat.	Sp. chinook	01 Apr 82	9	0.052
63/23/11	Control				11	0.072
63/23/09	Treatment				16	0.087
63/23/10	Treatment				6	0.029

a/ Actual catch and adjusted percentage catch, beach plus purse seine.

Table 9.--Catch percentages of marked fish from stock comparison studies, 1982.

Tag (AG/D1/D2)	Release information: Site (source)	Stock	Date (da/mo/yr)	Size (no./lb)	Juvenile catches at Jones Beach[a/]: No.	%
			Spring chinook salmon			
07/25/25	N. Santiam @Minto/ Marion Fks. Hat.	Carson	15 Mar 82	16	12	0.025
07/25/26	N. Santiam @Minto/ Marion Fks. Hat.	Carson	16 Mar 82	17	13	0.033
07/25/27	N. Santiam @Minto/ Marion Fks. Hat.	Carson	17 Mar 82	15	26	0.067
07/25/28	N. Santiam @Minto/ Marion Fks. Hat.	Santiam	18 Mar 82	14	14	0.045
07/25/29	N. Santiam @Minto/ Marion Fks. Hat.	Santiam	19 Mar 82	17	22	0.063
07/25/30	N. Santiam @Minto/ Marion Fks. Hat.	Santiam	20 Mar 82	15	20	0.052
			Steelhead			
05/10/20	Pahsimeroi R./ Hagerman Hat.	A	07 Apr 82	2	121	0.211
05/10/21	Pahsimeroi R./ Hagerman Hat.	B	07 Apr 82	4	72	0.129

a/ Actual catch (purse seine plus beach seine) and adjusted percentage catch.

There was a highly significant difference in catch percentage of Stock A versus Stock B steelhead reared at Hagerman Hatchery [0.221 to 0.129% (Table 9)]; although the difference may also be attributed to size related survival difference between the two groups [Stock A fish were released at 227 g each (2/lb) and Stock B were released at 113 g each (4/lb)].

Juvenile Catches Compared to Adult Recoveries

Presently, adult recovery information is not adequate for statistical comparison to estuarine catch data; however, this should improve because 1979, 1980, and 1981 adult recovery data will be available in the near future.

Incidental Catches of Nonsalmonids

Nonsalmonid species were a major portion of the Jones Beach catch (Appendix Tables B11 and B12). Catches of northern squawfish, Ptychocheilus oregonensis, were greater than in the 1960s and 1970s (Figure 10). Populations of other species show less change.

SUMMARY AND CONCLUSIONS

During 1982, BPA and NMFS funded a study of juvenile salmonid migrants entering the Columbia River estuary. The general objectives were as follows: (1) define migration timing and movement rates; (2) obtain catch percentages for marked groups to evaluate smolt survival to the estuary and compare to adult returns; and (3) amass information on which concepts may be developed to restore, enhance, and protect the salmonid resources of the Columbia River. Marked fish recoveries were the basis to partially accomplish the objectives in 1982.

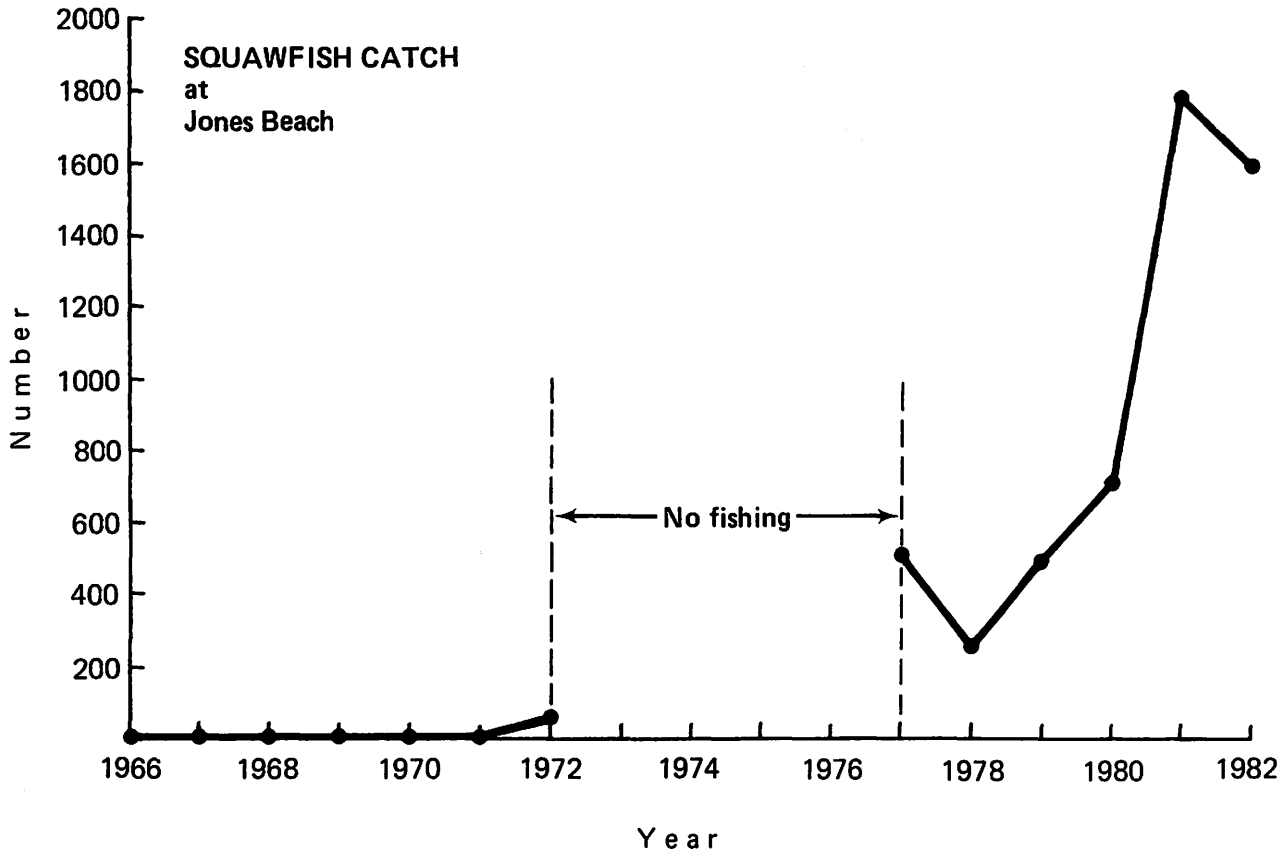


Figure 10.--Annual catch of northern squawfish at Jones Beach, 1966-1982.

Beach and purse seines were used to sample at Jones Beach (RKm 75). During the May and June peak migration period, 10 beach seine and 5 purse seine sets were made daily; fewer sets were made during March, April, July, August, September, November, and December. Total catch was 157,226 subyearling chinook salmon; 16,849 yearling chinook salmon; 38,969 coho salmon; and 16,257 steelhead--approximately 5.0% of the fish captured had been marked.

Variation in Catch Percentage

More fish were captured in 1982 than in 1980 and 1981 but less than in 1977-1979. Fishing effort throughout the peak migration period was similiar for the 6 years; however, river flows varied substantially. Two independent methods were used to estimate the effect of river flow on Jones Beach catches: (1) comparisons of differences in catch percentages of marked fish groups released downstream from Bonneville Dam--included were groups of subyearling and yearling chinook and coho salmon and steelhead from the same stock and fish size migrating about the same time of year during different years; and (2) a comparison of annual catches of unmarked subyearling chinook salmon (as a percentage of total hatchery releases) to seasonal river flows, 1977 to 1982. Using the two methods, a 1,000 m^3/s increase in river flow decreased catches 8 and 12%, respectively. Continued data collections are required to perfect and document the relationship between catch percentage and river flow; however, a gross adjustment of catch statistics reflecting differences in river flow is possible.

Migration Characteristics

Temporal distributions of juvenile salmon and steelhead were similiar to previous years. Peak catches occurred for yearling chinook salmon during the third week of May; coho salmon and steelhead during the fourth week of May; and subyearling chinook salmon during late March, early May, mid-June, and mid-July.

We concluded that fluctuations in catch and average fork lengths of unmarked subyearling chinook salmon were directly attributable to time, fish size, and magnitude of hatchery releases.

Survival to the Estuary for Fall Chinook Salmon

Survival estimates for eight selected groups of CWT hatchery fall chinook salmon were higher than in previous years as were catch percentages in May and June for 7 of 11 comparable groups, even though river flows were greater. Consequently, we conclude that the 1982 outmigration of subyearling chinook salmon was more successful than in recent years. Evaluation of the validity of these survival estimates from 1978-1982 will be made using adult recovery data.

Relative Survival Between Groups

We examined the catch data to evaluate survival differences of various experimental groups during their migration to Jones Beach. Using an empirical method of evaluation, based upon number of fish captured, significant differences in catch percentages were determined as follows: (1) transporting subyearling chinook salmon upstream to the Umatilla River from Spring Creek and Bonneville Hatcheries resulted in lower catch percentages than releasing fish at the hatcheries; (2) transporting

subyearling chinook salmon from McNary Dam to downstream from Bonneville Dam resulted in a higher capture rate than that of the controls which migrated through the bypassed river section; and (3) Stock A steelhead were captured at a higher rate than Stock B steelhead reared at Hagerman Hatchery, although the larger size of Stock A fish may have contributed to this increased survival.

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APPENDIX A

SAMPLING JUVENILE SALMONIDS USING A MODIFIED LAKE MERWIN FISH TRAP AT RKM 77

A modified Lake Merwin trap (described by Hamilton et al. 1970), was used near Jones Beach to evaluate the trap's use as a sampling tool to replace beach and purse seines. The trap body was anchored in an eddy (at RKm 77) on the north side of Wallace Island to provide a low current sanctuary for fish captured. The following modifications to the original trap design were made to sample both mid-river and shore oriented migrants: (1) the center lead was extended to 69 m, positioned at approximately 35° to the river flow, and fished to a depth of 6 m and (2) the side wing was extended to shore at a similar angle, with the lead line touching bottom for the 41-m distance. Sampling began 29 August 1981 and was terminated 12 November 1981. The trap, which was to sample 24 h a day, 7 days per week was checked one or two times daily depending on numbers of fish caught.

Total catch was 280 subyearling chinook salmon, 33 coho salmon, and 3 steelhead (Appendix Table A1). High tides and increased river flow adversely affected the trap operation. Large quantities of debris accumulated in the trap, as did algal growth on the trap netting, decreasing its efficiency (though the debris was extracted daily and trap leads were washed every week). River currents caused the center lead to rise near the surface, severely decreasing the trap's sampling effectiveness.

Trap catches were poorly correlated with either beach or purse seine catches. During a 3-week period (27 August through 16 September) all three sampling procedures were used, with the following catches of subyearling chinook salmon: beach seine, 55 sets (5 min per set), 635 fish; purse seine, 6 sets (5 min per set), 190 fish; trap, 19 days fishing (24 h per day), 50 fish. We concluded that this particular trap design was not an

Table A1.--Weekly Merwin trap catches at RKm 77, 27 August through 18 November 1981.

SPECIES

Date (Mo./Day)	Chinook (subyearling)	Coho	Steelhead	Stickleback	Shad (subyearling)	Shad (yearling)	Flounder	Carp	Sucker	Crappie	Bass	Chub	Squawfish	Sculpin	Cutthroat	Chinook, Jack	Chinook, Adult	Coho, Jack	Coho, Adult	Eulachon (Longfin)	Sturgeon	Sandroller	Bluegill	Whitefish	Catfish	Goldfish	Lamprey	Tadpole	Bivalvia	Crayfish	Perch	Days not fished
8/27-9/2	8			6	2				2	1		90	10	5	1	4																2
9/3 -9/9	10			1	5		1		3	3		262	8	11	1							1							1			0
9/10-9/16	38			40	50		4		4	8		76	34	10	1	1			6				1									0
9/17-9/23	26			7	13		1		1	10		49	9	10							1	1	1									0
9/24-9/30	15			54	19		2		2	6	3	28	18	12								7								1		0
10/1-10/7	10			21	18		4		7	25	1	33	10	5	1																	2
10/8-10/14	107	20	1	215	472	1	113	2	43	186	22	353	47	10	31				2			4		3	2			2				0
10/15-10/21	18	2	1	25	55		8	1	6	59	9	43	8	27	4		3		2		2	5				2						0
10/22-10/28	11			11	7		2		9	25	3	33	13	9	9				1			2					1				1	0
10/29-11/4	22	8		96	14		1	1	7	50	8	45	8	32	5			3	2	1		4										0
11/5-11/11	10	3		51	7		10		8	30	5	21	1	17	1	1		1	1													0
11/12-11/18	5				1		1		1	2		7		3	1					2												6
Totals	280	33	2	527	663	1	147	4	93	405	51	1040	166	151	55	6	3	4	14	3	3	24	2	3	2	2	1	2	1	1	1	

effective method to replace beach or purse seine sampling. Two additional full-time workers required to maintain the trap, and the alterations necessary to make the trap efficient, made it uneconomical to continue its use. We also speculated that its location was not appropriate to intercept a substantial portion of the migratory population.

APPENDIX B

MISCELLANEOUS TABLES AND FIGURES RELATING TO MIGRATION OF JUVENILE SALMONIDS

Table B1.--A summary of beach seine catches at Jones Beach, Oregon (RKm 75), 8 March - 13 December 1982.

Date (Mo./Day)	No. sets	Chinook salmon Subyearling Total catch (no.)	Chinook salmon Subyearling Catch per set (no.)	Chinook salmon Yearling Total catch (no.)	Chinook salmon Yearling Catch per set (no.)	Coho salmon juv. Total catch (no.)	Coho salmon juv. Catch per set (no.)	Steelhead juv. Total catch (no.)	Steelhead juv. Catch per set (no.)
3/8 - 3/11	7	88	13	18	3	0	0	0	0
3/12 - 3/18	9	91	10	46	5	0	0	0	0
3/19 - 3/25	9	110	12	180	20	0	0	0	0
3/26 - 4/1	24	1,076	45	215	9	2	0	0	0
4/2 - 4/8	35	963	28	325	9	1	0	1	0
4/9 - 4/15	61	1,406	23	464	8	14	0	2	0
4/16 - 4/22	57	2,244	39	331	6	37	1	9	0
4/23 - 4/29	57	5,411	95	837	15	498	9	38	1
4/30 - 5/6	70	11,814	169	2,615	37	1,931	28	92	1
5/7 - 5/13	70	6,454	92	1,746	25	5,218	74	115	2
5/14 - 5/20	70	5,271	75	221	3	1,790	26	76	1
5/21 - 5/27	69	8,234	119	496	7	1,460	21	72	1
5/28 - 6/3	66	5,960	89	61	1	505	8	9	0
6/4 - 6/10	70	11,270	161	37	1	98	1	6	0
6/11 - 6/17	69	13,564	197	40	1	60	1	9	0
6/18 - 6/24	67	7,061	105	18	0	16	0	5	0
6/25 - 7/1	68	6,399	94	5	0	6	0	0	0
7/2 - 7/8	52	6,603	127	0	0	1	0	0	0
7/9 - 7/15	69	15,965	231	0	0	5	0	0	0
7/16 - 7/22	52	6,431	124	0	0	0	0	0	0
7/23 - 7/29	40	3,713	93	0	0	0	0	1	0
7/30 - 8/5	38	2,483	65	0	0	0	0	0	0
8/6 - 8/12	40	2,514	63	0	0	0	0	0	0
8/13 - 8/19	39	2,500	64	0	0	0	0	0	0
8/20 - 8/26	38	1,124	30	0	0	0	0	0	0
8/27 - 9/2	19	427	22	0	0	0	0	0	0
9/3 - 9/9	17	771	45	0	0	0	0	0	0
9/10 - 9/16	17	601	35	0	0	0	0	0	0
9/17 - 9/23	20	513	26	0	0	0	0	0	0
9/24 - 9/30	0	-	-	-	-	-	-	-	-
10/1 - 10/7	0	-	-	-	-	-	-	-	-
10/8 - 10/14	0	-	-	-	-	-	-	-	-
10/15- 10/21	0	-	-	-	-	-	-	-	-
10/22- 10/28	0	-	-	-	-	-	-	-	-
10/29- 11/4	13	199	15	0	0	1	0	0	0
11/5 - 11/11	34	891	26	0	0	4	0	0	0
11/12- 11/18	38	575	15	0	0	3	0	4	0
11/19- 11/25	23	182	8	0	0	1	0	1	0
11/26- 12/2	28	178	6	0	0	0	0	0	0
12/3 - 12/9	26	136	5	0	0	0	0	1	0
12/10- 12/13	11	36	3	0	0	0	0	0	0
Totals	1,491	133,258		7,655		11,652		441	

Table B2.-- A summary of purse seine catches at Jones Beach, Oregon (RKm 75), 29 March - 13 December 1982.

Date (Mo./Day)	No. sets	Chinook salmon Subyearling Total catch (no.)	Chinook salmon Subyearling Catch per set (no.)	Chinook salmon Yearling Total catch (no.)	Chinook salmon Yearling Catch per set (no.)	Coho salmon juv. Total catch (no.)	Coho salmon juv. Catch per set (no.)	Steelhead juv. Total catch (no.)	Steelhead juv. Catch per set (no.)
3/29 - 4/1	9	43	5	46	5	1	0	2	0
4/2 - 4/8	6	3	1	64	11	0	0	0	0
4/9 - 4/15	4	0	0	19	5	0	0	0	0
4/16 - 4/22	10	13	1	99	10	10	1	38	4
4/23 - 4/29	17	72	4	271	16	58	3	146	9
4/30 - 5/6	31	202	7	850	27	298	10	839	27
5/7 - 5/13	31	694	22	933	30	1,995	64	1,194	39
5/14 - 5/20	35	873	25	1,933	55	5,815	166	3,869	111
5/21 - 5/27	35	1,319	38	1,812	52	6,995	200	4,302	123
5/28 - 6/3	34	1,017	30	1,002	29	5,465	161	2,856	84
6/4 - 6/10	34	2,565	75	573	17	3,685	108	1,463	43
6/11 - 6/17	35	2,822	81	864	25	2,163	62	765	22
6/18 - 6/24	27	2,274	84	619	23	499	18	247	9
6/25 - 7/1	23	3,600	157	102	4	169	7	61	3
7/2 - 7/8	22	1,629	74	1	0	94	4	14	0
7/9 - 7/15	18	1,536	85	4	0	55	3	15	0
7/16 - 7/22	7	390	56	0	0	9	1	1	0
7/23 - 7/29	9	921	102	1	0	3	0	0	0
7/30 - 8/5	9	519	58	0	0	2	0	0	0
8/6 - 8/12	9	348	39	1	0	1	0	0	0
8/13 - 8/19	8	157	20	0	0	0	0	0	0
8/20 - 8/26	6	134	22	0	0	0	0	0	0
8/27 - 9/2	4	84	21	0	0	0	0	0	0
9/3 - 9/9	6	877	146	0	0	0	0	0	0
9/10 - 9/16	5	88	18	0	0	0	0	0	0
9/17 - 9/23	6	37	6	0	0	0	0	0	0
9/24 - 9/30	0	-	-	-	-	-	-	-	-
10/1 - 10/7	0	-	-	-	-	-	-	-	-
10/8 - 10/14	0	-	-	-	-	-	-	-	-
10/15- 10/21	0	-	-	-	-	-	-	-	-
10/22- 10/28	0	-	-	-	-	-	-	-	-
10/29- 11/4	6	54	9	0	0	0	0	0	0
11/5 - 11/11	18	478	27	0	0	0	0	0	0
11/12- 11/18	23	463	20	0	0	0	0	3	0
11/19- 11/25	15	403	29	0	0	0	0	1	0
11/26- 12/2	25	270	11	0	0	0	0	0	0
12/3 - 12/9	15	64	4	0	0	0	0	0	0
12/10- 12/13	8	19	2	0	0	0	0	0	0
Totals	550	23,968		9,194		27,317		15,816	

Table B3.--Weekly mean water temperatures and secchi disk readings at Jones Beach; river flow and spillway flow rates at Bonneville Dam (weekly averages), 1982.

Date (mo./day)	Water temp. (°C)	Secchi (cm)	Flow a/ Total (kcms)	Flow a/ Spill (kcms)
3/5 - 3/11	7	-	9.0	4.0
3/12- 3/18	6	-	10.5	5.6
3/19- 3/25	6	-	8.7	3.6
3/26- 4/1	7	-	8.2	4.6
4/2 - 4/8	7	-	8.1	2.6
4/9 - 4/15	8	20	8.3	2.6
4/16- 4/22	8	44	9.1	3.5
4/23- 4/29	10	45	7.8	2.1
4/30- 5/6	11	53	8.7	2.8
5/7 - 5/13	12	61	9.2	3.0
5/14- 5/20	13	69	9.9	4.7
5/21- 5/27	13	64	10.8	4.9
5/28- 6/3	14	70	10.0	4.1
6/4 - 6/10	14	75	9.5	3.3
6/11- 6/17	14	64	10.0	3.8
6/18- 6/24	16	70	11.7	5.6
6/25- 7/1	17	74	11.5	5.5
7/2 - 7/8	18	65	10.4	5.5
7/9 - 7/15	18	82	8.7	2.3
7/16- 7/22	20	82	6.9	0.4
7/23- 7/29	20	90	6.2	0.1
7/30- 8/5	19	82	5.0	0.0
8/6 - 8/12	20	112	5.9	0.0
8/13- 8/19	20	98	4.6	0.0
8/20- 8/26	21	130	4.3	0.0
8/27- 9/2	21	110	3.4	0.0
9/3 - 9/9	20	103	3.8	0.0
9/10- 9/16	19	138	4.3	0.0
9/17- 9/23	19	123	3.4	0.0
10/29-11/04	12	75	4.9	0.0
11/5- 11/11	10	45	4.5	0.0
11/12-11/18	9	42	4.3	0.0
11/19-11/25	8	39	4.5	0.0
11/26-12/2	7	39	4.6	0.0
12/3-12/9	7	33	5.0	0.0
12/10-12/16	6	43	4.8	0.0

a/ kcms= 1000 m^3/s = 35,300 ft^3/s

Table B4.--Mark groups recovered at Jones Beach from 1977-1982 which were identified as replicates or near replicates and used to empirically define variability of catch percentages.

REPLICATE GROUPS 1982

Marks (Loc Br Rot) (Ag/D1/D2)	Site/Source	Number (thou)	Date (da/mo/yr)	Juvenile catches at Jones Beach a/ (no.)	(%)
		SUBYEARLING CHINOOK SALMON			
05/04/35	Lit. Wh. Sal. Hat.	101.3	2/Jn/82-3/Jn/82	121	0.123
05/04/36		98.4		146	0.150
07/23/30	Oxbow Hat.	52.3	4/Jn/82-25/Jn/82	45	0.095
07/24/11		52.5		46	0.100
05/10/53	Spring Cr. Hat.	43.1	15/Ap/82	68	0.177
05/10/54		48.5		71	0.170
05/10/55	" " "	41.2	"	71	0.201
05/10/56		48.2		64	0.152
05/10/58	Abernathy SCDC	90.6	20/Ap/82-1/Jn/82	93	0.105
05/10/59		29.7		34	0.124
07/24/14	Bonneville Hat.	51.6	04/Jn/82	34	0.067
07/24/15		52.4		50	0.096
07/24/16	" "	52.5	"	45	0.093
07/24/17		54.1		46	0.087
05/08/51	Spring Cr. Hat.	46.7	8/Ap/82-13/Ap/82	48	0.103
05/10/57		102.3		105	0.106
LD T 1	Bonneville Dam	51.8	"	221	0.430
RD T 1	(Bonneville Hat.)	54.4		199	0.368
LD T 2	" "	52.9	"	215	0.411
RD T 2		49.8		159	0.321
		YEARLING CHINOOK SALMON			
07/25/25	Marion FKs Hat.	50.6	15/Mr/82	12	0.025
07/25/26		50.6	16/Mr/82	13	0.033
07/25/27		49.5	17/Mr/82	26	0.067
07/25/28	" " "	50.0	18/Mr/82	14	0.045
07/25/29		49.4	19/Mr/82	22	0.063
07/25/30		49.2	22/Mr/82	20	0.052
63/23/09	Cowlitz Hat.	23.9	01/Ap/82	16	0.087
63/23/10		23.2		6	0.029

Table B4. Continued

63/23/11	" "	24.3	"	10	0.072
63/21/34		24.0		9	0.052
10/24/12 & RD SU 4	S. FK. Salmon R. (McCall Hat.)	40.7	8/Ap/82-10/Ap/82	16	0.039
10/24/13 & RD SU 2		40.5		25	0.062
		COHO SALMON			
05/10/35	Eagle Creek Hat.	20.0	06/My/82	29	0.153
05/10/36		19.1		42	0.238
05/10/37	" "	42.6	"	68	0.174
05/10/38		42.4		77	0.182
05/10/39	" "	68.2	"	114	0.175
05/10/40		66.6		115	0.182
07/25/49	Sandy Hat.	23.9	30/Ap/82	31	0.135
07/25/57		28.1		43	0.193
07/25/50	" "	26.4	"	50	0.196
07/25/58		27.8		36	0.131
07/25/54	" "	27.6	"	46	0.170
07/25/51		27.2		34	0.126
07/25/55	" "	28.2	"	33	0.118
07/25/53		25.9		25	0.099
07/25/56	" "	27.6	"	43	0.157
07/25/52		26.8		36	0.135
63/24/20	Cowlitz Hat.	09.7	03/My/82	18	0.188
63/24/21		09.8		15	0.154
63/24/22		10.3		25	0.244
63/24/23		10.2		18	0.179
63/24/24		10.1		19	0.189
63/24/25	" "	10.5	"	13	0.127
63/24/26		10.4		15	0.145
63/24/27		10.4		15	0.145
63/24/28		10.5		18	0.175
63/24/29		10.4		11	0.107
63/24/30	" "	10.5	"	17	0.162
63/24/31		10.5		13	0.125
63/24/32		10.1		16	0.158
63/24/33		10.4		17	0.163
63/24/34		10.4		18	0.174
63/24/35	" "	10.3	"	18	0.176
63/24/36		10.3		20	0.195
63/24/37		10.1		17	0.169
63/24/38		10.2		20	0.197
63/24/39		10.3		17	0.169

Table B4. Continued

63/24/40	" "	10.5	"	24	0.244
63/24/41		10.6		16	0.151
63/24/42		10.6		17	0.161
63/24/43		10.4		22	0.216
63/24/44		10.7		22	0.206
63/24/45	" "	10.2	"	16	0.157
63/24/46		10.3		21	0.205
63/24/47		10.5		24	0.231
63/24/48		10.2		15	0.145
63/24/49		10.0		19	0.191
07/24/29	Cascade Hat.	27.7		25	0.096
07/24/33		28.2		30	0.113
63/25/13	Washougal Hat.	10.1	25/My/82	9	0.094
63/25/14		09.8		9	0.097
63/25/15		10.2		14	0.141
63/25/16		09.9		6	0.063
63/25/17		09.8		6	0.065
63/25/18	" "	10.1	"	6	0.061
63/25/19		10.1		8	0.082
63/25/20		10.0		4	0.044
63/25/21		10.2		4	0.039
63/25/22		10.2		12	0.125
63/25/23	" "	10.1	"	7	0.074
63/25/24		10.0		4	0.043
63/25/25		10.1		5	0.051
63/25/26		10.1		7	0.076
63/25/27		10.0		9	0.093
63/25/28	" "	10.1	"	9	0.093
63/25/29		10.1		12	0.125
63/25/30		10.1		10	0.105
63/25/31		10.0		4	0.041
63/25/32		09.9		3	0.031
63/25/33	" "	9.6	"	8	0.087
63/25/34		9.6		9	0.097
63/25/35		9.6		5	0.055
63/25/36		9.5		7	0.079
63/25/37		9.6		11	0.123
63/25/38	" "	8.0	"	8	0.108
63/25/39		7.9		8	0.109
63/25/40		8.1		2	0.025
63/25/41		8.1		4	0.055
63/25/42		7.9		7	0.097

STEELHEAD

10/24/04	Pahsimeroi R.	40.1	09/Ap/82	56	0.143
10/24/50	(Niagara Springs Hat.)	40.5		47	0.133

Table B4. Continued

REPLICATE GROUPS 1981

Mark (Loc Br Rot) (Ag/D1/D2)	Site/Source	Number (thou)	Date (da/mo/yr)	Juvenile catches at Jones Beach a/ (no.)	(%)
	SUBYEARLING CHINOOK SALMON				
05/07/44	Abernathy SCDC	22.3	15/Ap/81-26/My/81	11	0.050
05/07/45		74.1		48	0.065
07/23/41	Tanner Cr.	50.8	12/My/81	45	0.090
07/23/42	(Bonn. Hat.)	51.6		45	0.088
07/23/43	" "	53.2	"	59	0.112
07/23/44		51.8		55	0.107
07/23/45	" "	51.0	"	41	0.081
07/23/46		50.8		58	0.115
05/07/47	Lit Wh Sal Hat.	183.4	4/Jn/81-5/Jn/81	117	0.065
05/08/49		52.4		43	0.083
05/08/50		13.3		4	0.031
05/07/43	Rock Cr.	25.7	21/Ap/81-22/Ap/81	10	0.040
05/07/46	(Spring Cr. Hat.)	150.5		56	0.038
05/07/40	Spring Cr. Hat.	104.6	25/Mr/81	63	0.061
05/07/48		28.8		12	0.042
05/07/50	" "	13.7	"	9	0.066
05/07/51		15.3		8	0.053
05/07/41	" "	76.7	15/Ap/81	78	0.103
05/07/49		30.9		35	0.114
	YEARLING CHINOOK SALMON				
10/22/21	Lemhi R	50.0	08/Ap/81	7	0.015
10/22/22	(Hayden Pd)	51.0		7	0.014
10/05/19	Kooskia Hat.	17.9	07/Ap/81	2	0.012
10/22/19		37.7		3	0.009
10/22/20		38.6	08/Ap/81	4	0.011
07/22/47	N Santiam R.	49.9	05/No/80	4	0.009
07/22/48	(Marion Fks. Hat.)	49.9	6/No/80-7/No/80	5	0.011
07/22/51	" " "	47.1	16/Mr/81-23/Mr/81	7	0.015
07/22/50		49.6	17/Mr/81-20/Mr/81	7	0.015
07/22/49		50.2	18/Mr/81-20/Mr/81	10	0.020
07/22/53	" " "	42.2	16/Mr/81-24/Mr/81	10	0.025
07/22/52		39.6	23/Mr/81-24/Mr/81	10	0.026

Table B4. Continued

10/21/17	S Fk Salmon	40.4	06/Ap/81	17	0.043
10/21/18	(McCall Hat.)	40.8		18	0.045
10/21/28		47.6		19	0.040
07/22/18	McKenzie@Leaburg	32.3	05/No/80	1	0.003
07/22/21	(McKenzie Hat.)	37.9		4	0.011
07/22/17	" "	30.1	16/Mr/81	4	0.014
07/22/20		35.6		11	0.032
07/22/22		36.0		11	0.031
07/22/25	M Fk Willam @	26.5	"	9	0.035
07/23/03	Dexter	31.2		12	0.040
07/23/05	(Oakridge Hat.)	29.9		14	0.048
07/23/07		31.6		17	0.054
10/22/36	Rapid R Hat.	49.0	12/Ap/81	3	0.007
10/22/37		44.2		7	0.016
10/22/38		51.9		10	0.020
05/08/22	Warm Sp R@Hat.	66.7	02/Ap/81	20	0.030
05/08/24		32.3		4	0.014
05/08/23	" "	170.1	9/Ap/81-16/Ap/81	48	0.029
05/08/25	" "	85.9	09/Ap/81	16	0.019
		COHO SALMON			
07/22/55	Tanner Cr.(Bonn Hat)	27.6	01/My/81	21	0.077
07/22/57		28.9		16	0.056
07/22/56	" " "	27.3	"	20	0.074
07/22/58		28.0		12	0.044
07/22/59	" " "	29.8	"	34	0.114
07/22/62		27.7		25	0.091
07/22/60	" " "	28.1	"	17	0.061
07/22/63		29.6		18	0.061
07/22/61	" " "	29.7	"	20	0.067
07/23/01		28.8		22	0.077
07/21/27	Tanner Cr.	24.9	06/My/81	24	0.098
07/21/30	(Cascade Hat.)	26.6		28	0.105
07/21/28	" "	27.9	08/Jn/81	21	0.076
07/21/31		26.0		25	0.097
07/21/29	" "	27.7	06/Jl/81	13	0.048
07/21/32		28.9		19	0.067
RA IY 1	Rock Island	05.0	24/My/81	2	0.041
RA IY 2	(Turtle Rock Pd)	04.9	25/My/81	1	0.021
LA IY 1	" "	05.0	27/My/81	2	0.040
LA IY 2		04.9	28/My/81	1	0.021

Table B4. Continued

LA IN 2	" "	01.0	01/Jn/81	1	0.101
LA IN 4		01.0		1	0.101
63/21/50	Washougal Hat.	51.7	30/Ap/81	45	0.088
63/22/02		51.9		46	0.089
63/21/51	" "	52.8	27/My/81	35	0.068
63/22/03		52.4		35	0.068
		STEELHEAD			
10/22/41	Pahsimerio R	37.5	30/Mr/81	32	0.086
10/22/42	(Niagara Sp Hat.)	37.9		19	0.051
10/22/43		38.4	01/Ap/81	20	0.052
LA F 2	Clarkston	01.7	01/My/81	3	0.175
LA S 1	(Lo Granite)	02.2		3	0.137
LA F 3	" "	05.5	5/My/81-9/My/81	10	0.181
LA S 2		06.8		13	0.191

REPLICATE GROUPS 1980

Mark (Loc Br Rot) (Ag/D1/D2)	Site/Source	Number (thou)	Date (da/mo/yr)	Juvenile catches at Jones Beach a/ (no.)	(%)
		SUBYEARLING CHINOOK SALMON			
07/21/33	Tanner Cr.	50.4	27/My/80	12	0.024
07/21/34	(Bonn. Hat.)	49.9		14	0.029
07/21/35	" "	48.0	"	24	0.051
07/21/36		49.4		26	0.053
07/21/62	Skamania Lt.	50.1	27/My/80-28/My/80	21	0.042
07/21/63	(Oxbow Hat.)	53.0		20	0.039
05/06/48	Blw Bonn D	99.5	19/My/80	40	0.042
05/06/49	(Spring Cr. Hat.)	99.7		31	0.033
05/06/44	Abernathy Cr.	35.2	14/My/80-8/Ap/80	18	0.053
05/06/46		112.4	8/Ap/80-14/My/80	42	0.039
		YEARLING CHINOOK SALMON			
LD IL 2	Methow R@Mo	15.0	05/My/80	5	0.034
RD IL 2	(Leavenworth Hat.)	13.8		2	0.015
LD F 1	" "	16.4	10/My/80	6	0.037
RD F 1		15.2		2	0.014
LD IY 1	" "	15.2	13/My/80	7	0.046
RD IY 1		13.3		1	0.008

Table B4. Continued

LD IL 3	Pr Rapid	15.2	20/My/80	5	0.033
RD IL 3	(Leavenworth Hat.)	14.7		4	0.028
LD F 2	" "	16.2	22/My/80	3	0.019
RD F 2		15.4		13	0.084
LD IY 2	" "	15.2	27/My/80	16	0.105
RD IY 2		13.2		7	0.053
LA PP 1	Wh Bluffs	32.6	24/Ap/80	13	0.040
& 03/49/02	(Leavenworth Hat.)	32.6		13	0.040
LA S 1		35.4		16	0.046
& 03/50/02		35.4		16	0.046
LD IL 1	Richland	15.9	22/My/80	4	0.026
RD IL 1	(Leavenworth Hat.)	13.6		6	0.044
LD F 3	" "	16.2	26/My/80	6	0.037
RD F 3		15.8		8	0.051
LD IY 3	" "	15.4	29/My/80	10	0.065
RD IY 3		13.9		6	0.044
LA PI 2	Icicle Cr.	32.9	27/Ap/80	6	0.019
LA PI 4	(Leavenworth Hat.)	33.0	01/My/80	4	0.013
LA PI 1		32.7	24/Ap/80	4	0.013
RA 9 1	Dalton Pt.	32.4	24/Ap/80	14	0.044
RA IK 1	(Leavenworth Hat.)	32.9		22	0.068
RA 9 2	" "	32.7	27/Ap/80	15	0.047
RA IK 2		32.8		29	0.090
07/20/43	Dexter	31.3	05/No/79	5	0.017
07/20/45	(Oakridge Hat.)	30.8		6	0.020
RA IK 3	Dalton Pt.	32.6	01/My/80	34	0.101
& 03/54/02	(Leavenworth Hat.)	32.6		34	0.101
RA 9 3		32.4		27	0.084
07/20/18	Blw Willam Fall	34.7	5/No/79-6/No/79	3	0.009
07/20/19	(S Santiam Hat.)	35.0		4	0.012
07/20/20	Foster	33.0	"	2	0.007
07/20/21	(S Santiam)	34.8		1	0.003
07/20/22		34.2		1	0.003
07/20/48	McKenzie Hat.	31.0	15/Mr/80	18	0.059
07/20/51		29.4		13	0.045
07/20/42	Dexter	30.7	10/Mr/80-11/Mr/80	20	0.066
07/20/44	(Oakridge Hat.)	30.7	10/Mr/80	25	0.082
07/19/49	Deschutes R	28.1	14/Ap/80	15	0.054
07/19/50	(Rnd Butte Hat.)	29.9		8	0.027
07/19/51		29.1	14/Ap/80-15/Ap/80	7	0.025

Table B4. Continued

07/19/45	S. Santiam Hat.	29.4	14/Mr/80	23	0.079
07/19/46		29.9		19	0.065
07/19/47	Blw Willam Fall	32.1	13/Mr/80-14/Mr/80	36	0.113
07/19/48	(S Santiam Hat.)	28.5		30	0.107
05/06/27	Warm Spring@Hat	16.8	7/Ap80-14/Ap/80	51	0.032
05/06/28		10.8		5	0.046
10/21/25	Lemhi R	40.1	1/Ap/80-3/Ap/80	2	0.005
10/21/26	(Hayden Cr. Pd)	41.1	3/Ap/80-4/Ap/80	4	0.010
		COHO SALMON			
07/20/31	Sandy Hat.	25.1	01/My/80	16	0.064
07/20/33		25.1		15	0.060
07/20/32	" "	25.5	"	16	0.063
07/20/34		25.2		17	0.068
07/20/35	" "	25.9	"	12	0.047
07/20/36		24.4		20	0.083
07/20/37	" "	26.0	"	13	0.050
07/20/38		26.4		20	0.076
63/19/31	Green R	38.6	07/My/80	43	0.112
63/20/58	(Toutle Hat.)	39.4		31	0.080
LD 52 1	Rocky Reach Fore	24.1	13/My/80	7	0.029
RD 52 1	(Turtle R.Pd)	24.1		5	0.021
LD 52 2	Rocky Reach Tail	25.4	"	10	0.040
RD 52 2	(Turtle R.Pd)	22.4		5	0.023
LD IX 2	Rocky Reach Fore	27.1	16/My/80	5	0.019
RD IX 2	(Turtle R.Pd)	24.8		2	0.009
LD IH 2	" "	24.9	19/My/80	8	0.033
RD IH 2		27.2		3	0.012
LD IH 3	Rocky Reach Tail	27.9	"	4	0.015
RD IH 3	(Turtle R.Pd)	25.4		6	0.024
63/20/39	Washougal@Hat.	99.6	08/My/80	82	0.084
63/20/40		98.6		68	0.070
63/20/37	" "	97.2	09/Jn/80	53	0.056
63/20/38		97.8		65	0.068
63/19/54	" "	106.7	07/Jl/80	126	0.119
63/19/55		106.9		118	0.112
05/03/59	Lit Wh Sal R	42.3	23/My/80	12	0.030
05/06/54	(Willard Hat.)	51.5		6	0.012

Table B4. Continued

05/06/60	Blw Bonn Dam	33.7	24/My/80	3	0.009
05/06/50	(Willard Hat.)	47.9	25/My/80	8	0.018
05/06/55		51.4		18	0.036

STEELHEAD

RD X3 1	Pahsimeroi R.	05.4	4/Fe/80-27/Ap/80	1	0.019
LA SU 1	(Dworshak Hat.)	05.0	23/Ap/80-27/Ap/80	1	0.020
RD IU 2	Lemhi R.	10.5	22/Ap/80	2	0.019
LA SU 4	(Dworshak Hat.)	10.1	24/Ap/80	2	0.020
LA X3 3	Dworshak Hat.	10.1	29/Ap/80	2	0.020
RA DT 3		09.9		2	0.021
10/21/56	Pahsimeroi	49.9	6/Ap/80-16/Ap/80	26	0.054
10/21/57	(Niagra Sp. Hat.)	50.3	7/Ap/80-17/Ap/80	31	0.062
LD Y 1	Wells D Fore.	13.4	01/My/80	1	0.008
RD Y 1	(Wells Spw. Ch.)	13.0		1	0.008
LD Y 3	Wells D Tail.	13.0	"	2	0.016
RD Y 3	(Wells Spw. Ch.)	12.2		1	0.009
LD K 3	Wells D Fore.	14.3	03/My/80	1	0.007
RD K 3	(Wells Spw. Ch.)	13.6		1	0.008
LD K 2	Wells D Tail.	13.1	"	2	0.016
RD K 2	(Wells Spw. Ch.)	13.8		1	0.008
LD IJ 3	Wells D Fore.	13.1	05/My/80	1	0.008
RD IJ 3	(Wells Spw. Ch.)	11.2		1	0.009

REPLICATE GROUPS 1979

Mark (Loc Br Rot) (Ag/D1/D2)	Site/Source	Number (thou)	Date (da/mo/yr)	Juvenile catches at Jones Beach a/ (no.)	(%)
	SUBYEARLING CHINOOK SALMON				
LD IC 1	John Day D	20.0	06/Jn/79	29	0.146
LD IC 2	(Spring Cr. Hat.)	20.4		21	0.103
LD IC 3		19.8		20	0.101
LD IF 1	" "	19.6	05/Jn/79	19	0.097
LD IF 2		20.1		6	0.030
LD IF 3		20.2		15	0.074
LD IK 1	" "	19.5	"	17	0.087
LD IK 2		19.5		10	0.052
LD IK 3		19.5		19	0.098
LD PI 1	" "	21.2	06/Jn/79	17	0.081
LD PI 2		20.2		24	0.119
LD PI 3		19.6		22	0.113

Table B4. Continued

RD IC 1	" "	24.8	"	26	0.106
RD IC 2		20.0		19	0.095
RD IC 3		20.2		21	0.105
RD PI 1	" "	20.1	"	30	0.150
RD PI 2		20.3		23	0.114
RD PI 3		20.1		21	0.105
RD IF 1	" "	20.1	05/Jn/79	16	0.080
RD IF 2		20.1		18	0.090
RD IF 3		19.7		23	0.117
RD IK 1	" "	21.5	"	30	0.140
RD IK 2		20.7		33	0.160
RD IK 3		19.0		28	0.148
03/55/01	Big Wh. Pd.	28.5	26/Jn/79	25	0.088
03/56/01	(Spring Cr. Hat.)	34.7		17	0.049
03/57/01		36.3		11	0.031
05/04/34	Spring Cr Hat.	95.5	20/Ap/79	196	0.206
05/04/44		135.5		281	0.208
05/04/48	Lit Wh Hat.	177.8	22/Jn/79	254	0.144
05/04 49		264.8		412	0.156
63/18/56	Elokomin Hat.	22.7	15/Jn/79	0	0.000
63/19/56		127.1		3	0.003
63/16/46	Grays R Hat.	73.8	09/Jn/79	4	0.006
63/18/33		07.6		4	0.054
63/19/37		68.1		3	0.005
		YEARLING CHINOOK SALMON			
07/16/56	Tanner Cr.	50.9	30/Oc/78	6	0.012
07/16/59	(Bonn. Hat.)	37.8		4	0.011
07/16/58	" "	44.8	"	4	0.009
07/16/60		44.4		6	0.014
10/04/15	Rapid R	127.0	15/Mr/79-15/Ap/79	30	0.024
10/04/24	(Dworshak Hat.)	122.0		48	0.040
LD IH 1	Vantage Brid	49.8	11/My/79	85	0.172
RD IZ 4	(Leavenworth Hat.)	55.9		94	0.168
LD IZ 1	" "	62.6	12/My/79	95	0.152
RD IZ 2		50.0		94	0.189
RD IH 1	Wanapum D	38.4	13/My/79	92	0.240
RD IZ 1	(Leavenworth Hat.)	49.0		101	0.208
LD IZ 2	" "	52.4	14/MY/79	83	0.159
RD IZ 3		62.5		100	0.160

Table B4. Continued

07/17/27	N. Santiam	43.9	06/No/78	10	0.023
07/17/28	(Marion Fks. Hat.)	48.9		8	0.016
05/03/52	Willard Hat.	35.5	01/No/78	2	0.006
05/03/53		35.7		1	0.003
05/03/54		36.9		1	0.003
07/19/26	S. Santiam Hat.	31.5	07/No/78	3	0.009
07/19/27		32.7		1	0.003
07/19/28		21.1		1	0.005
07/19/29	Blw Willam Fall	32.6	"	3	0.009
07/19/30	(S Santiam Hat.)	32.8		7	0.021
07/16/26	Mill Cr.	51.5	8/No/78-9/No/78	8	0.016
07/19/17	(Bonn Hat)	48.2	09/No/78	10	0.022
07/19/18		51.1		8	0.016
05/03/49	Lit Wh Hat.	31.1	19/Ap/79	20	0.065
05/03/50	(Willard Hat.)	31.2		12	0.039
05/03/51		32.9		10	0.032
07/16/57	Tanner Cr.	47.8	13/Mr/79	105	0.221
07/16/61	(Bonn. Hat.)	32.7		62	0.190
07/17/30	N Santiam	48.1	3/Ap/79-5/Ap/79	29	0.060
07/17/25	(Marion Fks Hat.)	49.6		32	0.066
07/17/26		49.6		21	0.043
07/17/31		49.3		35	0.071
07/17/29		44.9		37	0.082
07/17/32	" "	50.6	"	37	0.073
07/17/47	Eagle Cr. Hat.	46.2	01/Mr/79	39	0.086
07/17/48		48.2		50	0.104
07/19/19	S Santiam R	31.6	21/Mr/79	24	0.077
07/19/20	(Oakridge Hat.)	32.8		32	0.099
07/19/21		32.4		38	0.118
07/19/22	Blw Willam Fall	34.2	23/Mr/79	45	0.132
07/19/23	(Oakridge Hat.)	34.5		60	0.175
07/19/24		36.3		46	0.131
63/18/15	Cowlitz Hat.	22.9	23/Ap/79	34	0.148
63/18/17		24.0		35	0.146
63/18/16		24.4		36	0.147
63/18/18		24.3		34	0.140
		COHO SALMON			
07/17/49	Sandy Hat.	27.4	01/My/79	28	0.103
07/17/50		27.4		25	0.092
07/17/51		27.4		32	0.117
07/17/52		27.9		28	0.101

Table B4. Continued

07/19/08	Tanner Cr.	27.9	07/My/79	18	0.065
07/19/11	(Cascade Hat.)	26.9		18	0.068
07/19/07	" "	27.1	"	37	0.137
07/19/10		25.9		32	0.124
07/19/09	" "	24.5	06/Jl/79	50	0.204
07/19/12		25.1		56	0.223
63/19/11	Toutle Hat.	42.4	07/My/79	46	0.109
63/19/12		34.6		40	0.117
63/19/13	" "	40.4	07/Jn/79	103	0.255
63/17/58		39.7		107	0.270
63/19/28	" "	39.7	06/Jl/79	109	0.275
63/19/29		41.1		96	0.234
63/19/23	Washougal Hat.	74.3	07/My/79	81	0.110
63/19/24		80.6		87	0.109
63/19/25	" "	73.0	07/Jn/79	120	0.166
63/19/26		82.8		119	0.145
63/19/27	" "	81.0	06/Jl/79	197	0.244
63/19/34		82.0		191	0.233
		STEELHEAD			
RA Y 1 &WHLBWH	Blw Bonn Dam (Chelan Hat.)	23.3	28/Ap/79	38	0.164
RA Y 2 &WHLBRD		24.3		21	0.087
RA Y 3 &WHLBOR		22.8		21	0.095
LA AN 1 &WHLBYW	Icicle Cr. (Chelan Hat.)	23.9	26/Ap/79	22	0.093
LA AN 2 &WHLBPK		19.1		14	0.074
LA AN 3 &WHLBLG		24.1		19	0.080
RA T 4	Blw Bonn. Dam	20.7	17/My/79	90	0.434
RA Y 4	(Tucannon Hat.)	22.0		68	0.308
LD P 1	Wells Dam	10.0	04/My/79	2	0.021
LD P 3	(Wells Spaw. Ch.)	10.0		1	0.010
RD P 1	" " "	10.0	"	4	0.041
RD P 3		09.6		2	0.021

Table B4. Continued

REPLICATE GROUPS 1978

Mark (Loc Br Rot) (Ag/Dl/D2)	Site/Source	Number (thou)	Date (da/mo/yr)	Juvenile catches at Jones Beach a/ (no.)	(%)
		SUBYEARLING CHINOOK SALMON			
05/03/52	Lit Wh Sal Hat.	35.5	01/No/78	3	0.009
05/03/53		35.7		0	0.000
05/03/54		36.9		0	0.000
05/03/39	Spring Cr. Hat.	49.9	18/Au/78	6	0.014
05/03/40		52.0		7	0.014
05/03/41		50.5		6	0.012
05/60/01		98.1	18/Ap/78	153	0.157
05/62//01		92.3		175	0.191
05/03/43	Lit Wh Hat.	49.5	25/My/78	96	0.195
05/03/44		51.3		107	0.209
05/03/45		52.1		127	0.244
05/03/46	" "	49.8	"	114	0.230
05/03/47		49.4		99	0.202
05/03/48	" "	49.5	"	121	0.246
05/03/55	" "	39.3	12/Jl/78	15	0.039
05/03/56		40.1		18	0.046
05/03/57		39.1		28	0.072
05/03/42	" "	50.5	24/My/78	106	0.740
05/61/01		48.4		117	0.243
05/63/01		52.2		105	0.202
07/17/08	Abv Willam Fall	50.9	31/My/78	44	0.087
07/17/10	(S Santiam Hat.)	51.1	01/Jn/78	52	0.102
07/19/29	Blw Willam Fall	32.6	07/No/78	3	0.011
07/19/30	(S. Santiam Hat.)	32.8		5	0.016
07/17/06	Mill Cr.	48.6	05/My/78	21	0.044
07/17/07	(S. Santiam Hat.)	51.5		11	0.022
07/16/58	Tanner Cr.	44.8	30/Oc/80	14	0.032
07/16/60	(Bonn. Hat.)	44.4		16	0.037
07/16/56	" "	50.9	"	12	0.024
07/16/59		37.8		8	0.022
		YEARLING CHINOOK SALMON			
09/16/27	S. Santiam Hat.	28.7	07/No/77	2	0.008
09/16/29		28.7		1	0.004
09/16/61	N. Santiam Hat.	48.6	13/Mr/78-14/Mr/78	17	0.036
09/16/62	(Marion Fks Hat.)	45.9		22	0.049
09/16/63		50.2		17	0.034

Table B4. Continued

09/17/01	" "	49.1	"	28	0.058
09/17/02		49.6		22	0.046
09/17/03		50.0		22	0.044
09/16/23	Blw Willam Fall	26.9	"	30	0.113
09/16/24	S. Santiam Hat.)	24.6		25	0.102
63/16/01	Klickitat Hat.	144.8	31/Mr/78	73	0.051
63/16/02		146.3		76	0.053
63/16/12	Cowlitz Hat.	28.2	08/Mr/78	34	0.122
63/16/13		27.7		27	0.098
63/17/09	" "	89.4	"	124	0.139
63/17/10		87.9		109	0.125
63/17/11	" "	58.2	"	77	0.133
63/17/12		56.9		85	0.150
63/17/17	" "	71.3	"	70	0.099
63/17/18		69.4		64	0.093
07/16/11	Rnd Butte Hat.	46.4	31/My/78	33	0.072
07/16/12		46.2		34	0.074
09/16/30	Blw Willam Fall	25.9	08/No/77	4	0.015
09/16/31	(S Santiam Hat.)	29.0		3	0.010
WHRDLB RAL1	Blw. Bonn. Dam	37.0	09/My/78	26	0.084
WHRDPK RAL2	(Kooskia Hat.)	36.9	"	22	0.098
WHRDPK RAL3	" " "	35.4	"	20	0.093
WHRDXY RAL4	" " "	37.1	"	15	0.049
		COHO SALMON			
09/16/44	Sandy Hat.	33.1	02/My/78	25	0.077
09/16/45		33.9		14	0.042
09/16/46		32.4		16	0.050
09/16/47		33.6		26	0.078
09/16/48		33.6		18	0.054
09/16/49		33.9		21	0.062
09/16/50		33.2		24	0.073
09/16/51		34.3		19	0.056
09/16/52		33.0		22	0.068
LA ID 1	John Day D	31.4	09/My/78	33	0.105
LA ID 2	(Carson Hat.)	31.5		37	0.119
LA ID 3		32.3		22	0.069
RA ID 1	" "	33.0	22/My/78	28	0.085
RA ID 2		33.0		17	0.053
RA ID 3		33.0		12	0.037
LD IJ 1	Blw Bonn Dam	31.5	18/My/78	13	0.042
LD IJ 2	(Carson Hat.)	33.1		17	0.053
LD IJ 3		32.3		27	0.085

Table B4. Continued

REPLICATE GROUPS 1977

Mark (Loc Br Rot) (Ag/D1/D2)	Site/Source	Number (thou)	Date (da/mo/yr)	Juvenile catches at Jones Beach a/ (no.)	(%)
	SUBYEARLING CHINOOK SALMON				
05/44/01	Spring Cr. Hat.	96.7	8/Ap/77	216	0.223
05/45/01		95.8		207	0.216
05/49/01		75.8		215	0.284
& RD U 1		75.8		215	0.284
05/41/01	Big Wh Pd	87.7	18/Ap/77	358	0.409
05/42/01	(Spring Cr. Hat.)	91.4		333	0.366
09/16/06	Blw Willam Fall	92.0	2/Ap/77-4/Ap/77	238	0.259
09/16/11	(Aumsville Pd.)	46.4		143	0.309
09/16/07		43.5		123	0.284
09/16/12	Abv Willam Fall	44.6	"	106	0.239
09/16/13	(Aumsville Pd.)	43.1		103	0.239
	YEARLING CHINOOK SALMON				
13/09/11	Cowlitz Hat.	88.0	08/Mr/77	44	0.050
13/09/12		88.6		36	0.041
13/09/14	" "	61.7	"	31	0.051
13/11/04		61.6		24	0.039
13/13/01	" "	28.7	"	12	0.042
13/13/04		27.9		12	0.043
09/16/02	Rnd Butte Hat.	29.4	02/My/77	2	0.007
09/16/01		31.7		2	0.007
	COHO SALMON				
05/20/04	Willard Hat.	88.3	2/My/77-4/My-77	20	0.023
05/21/04		93.8		21	0.024
09/05/13	Sandy Hat.	60.6	06/My/77	23	0.038
06/06/06		57.2		24	0.043
06/06/07		58.7		26	0.045
06/06/08		59.9		25	0.043
06/06/09		60.1		24	0.041
06/05/14	" "	24.8	27/Ap/77	8	0.034
06/05/15		24.4		8	0.034
06/06/01		25.8		7	0.028
06/06/02		20.1		6	0.030
06/06/03		22.8		6	0.027
06/06/04		23.4		10	0.044
LA X3 1	Pasco	16.6	01/My/77	3	0.019
RA X3 1	(Turtle Rock Pd.)	16.6		1	0.007

Table B4. Continued

STEELHEAD

10/13/07	Dworshak Hat.	30.0	07/Ap/77	4	0.015
10/13/09		30.9		3	0.010
10/13/10		60.2		9	0.016
10/13/11		61.7		7	0.012
10/13/13		62.2		5	0.009
10/02/36	Pahsimeroi R.	55.4	5/Ap/77-10/Ap/77	2	0.004
10/02/35	(Niagra Sp. Hat.)	59.3		5	0.010

a/ Actual number recovered from beach and purse seines and % of total release recovered (adjusted for effort).

Table B5.-Preliminary mark recaptures by beach and purse seine sampling at Jones Beach, Oregon, (RKm 75) November and December, 1982.

CWT a/ (Ag/D1/D2)	Actual no. recaptures	CWT (Ag/D1/D2)	Actual no. recaptures	CWT (Ag/D1/D2)	Actual no. recaptures
		Chinook salmon			
		Beach seine catches			
05/09/52	1	07/25/46	100	63/24/21	3
05/09/53	1	07/25/48	97	63/24/62	1
07/23/63	115	07/27/19	2	63/24/63	2
07/25/20	2	07/27/21	2	63/26/03	8
07/25/45	94	63/20/32	1		
		Purse seine catches			
05/09/52	1	07/25/21	2	07/26/19	1
07/16/27	1	07/25/45	13	07/27/19	1
07/23/63	4	07/25/46	18	07/27/21	1
07/25/20	2	07/25/48	8		

(Loc. Brand Rot. b/)			Clips c/	Actual no. recaptures
			Chinook salmon	
			Beach seine catches	
			LV	4
RA	PI	4		9
RA	PI	1		2
			Purse seine catches	
			LV	7
RA	PI	4		1

a/ Coded wire tags- (Agency code/Data 1/Data 2).
b/ Loc.=Location of brand (L=left, R=right, D=dorsal, P=posterior).
Rot.=Rotation of brand (1=upright, 2=90° to right, 3=180° to right, 4=270° to right).
c/ Ad=adipose fin; LV=left ventral fin; RV=right ventral fin; LP=left pectoral fin; RP=right pectoral fin; LM=left maxillary; TC=top caudal; D=dorsal fin.

Table B6.--Annual number of fall chinook salmon reared, numbers and percent of fall chinook salmon catches at Jones Beach, and seasonal average river flows from 1977-1982.

	1977	1978	1979	1980	1981	1982
No. released from hatcheries (millions)[a/]	84.2	77.1	82.3	66.3	72.2	70.0
No. captured at Jones Beach (thousands)[b/]	381	263	303	131	139	154
Percent captured[c/]	0.45	0.34	0.37	0.20	0.19	0.22
River flow $\left[\frac{\text{thou } m^3}{s}\right]$ [d/]	3.8	7.2	6.1	7.7	8.5	10.2

a/ Data obtained from Idaho Department of Fish and Game, Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service, and Washington Department of Fisheries. Only fish released upstream of Jones Beach included.

b/ The following adjustment of catches was used to standardize effort levels between years; (weekly average beach seine catch per set from 9 April to 30 September) X 70 sets per week. Catch per set numbers are listed for 1977-1981 in Dawley et al. 1982 (Appendix Table A6), and for 1982, Appendix Table B1.

c/ A constant percentage of wild fish within the catch each year was assumed and the error from not including an estimated number was ignored.

d/ Average river flow at Bonneville Dam during May and June.

Table B7.--Mark groups used to evaluate effects of flow on catch percentage at Jones Beach.

Release site a/	Stock or treatment	1977 Catch (%) b/	1977 Flow (kcms) c/	1978 Catch (%)	1978 Flow (kcms)	1979 Catch (%)	1979 Flow (kcms)	1980 Catch (%)	1980 Flow (kcms)	1981 Catch (%)	1981 Flow (kcms)	1982 Catch (%)	1982 Flow (kcms)
						Subyearling chinook salmon							
Bonneville	Brights 35-40/lb	-	-	-	-	-	-	-	-	0.16	5.1	0.20	5.9
Bonneville Hatchery	Well water production	0.44	4.0	-	-	0.17	6.8	-	-	0.12	6.9	0.25	8.7
Bonneville Hatchery	Tanner Cr. production	-	-	-	-	0.17	6.8	-	- d/	0.09	6.6	0.19	10.0
Washougal Hatchery	Production	-	- e/	-	- f/	0.44	4.4	0.33	6.8	0.24	7.2	0.37	8.7
Kalama Falls Hatchery	Production	0.67	2.6	0.63	4.2	-	- g/	0.24	4.9	0.12	10.1	0.15	10.4
Toutle Hatchery	Production	0.66	3.1	0.56	5.7	0.76	3.6	-	-	-	-	-	-
Lower Kalama Hatchery	Production	-	- h/	0.14	7.3	-	-	0.19	8.4	0.13	9.9	0.16	11.5
Cowlitz Hatchery	Production	-	-	0.42	6.4	-	-	-	-	0.38	7.2	0.38	6.9
Bonneville	OMP 2	-	-	-	-	-	-	-	- d/	0.10	6.3	0.08	9.5
Bonneville	Presscake	-	-	-	-	-	-	-	-	0.12	6.3	0.09	9.5
						Yearling chinook salmon							
McKenzie	Graded medium	-	-	-	-	-	-	0.08	4.8	0.08	4.3	0.01	8.1
McKenzie Hatchery	Graded large	-	-	-	-	-	-	0.15	4.0	0.08	4.6	0.01	8.1
McKenzie Hatchery	Ungraded	-	-	-	-	-	-	0.11	4.0	0.03	4.6	0.03	8.1
Carson Hatchery	Production	-	-	-	-	0.09	7.6	0.07	8.0	-	-	-	-
Eagle Creek Hatchery	Production	-	-	0.07	7.4	0.11	6.9	-	-	-	-	-	-
Marion Forks Hatchery @Minto	Carson stock	-	-	0.57	6.7	0.08	7.6	-	-	0.02	5.4	0.04	8.7
Marion Forks Hatchery @Minto	Santiam stock 12-14/lb	-	-	0.84	6.7	0.09	7.6	-	-	0.04	5.4	0.05	7.8
Dexter Pond @Minto	Graded small	-	-	-	-	0.18	5.1	0.13	4.0	0.13	4.6	0.04	9.1
Dexter Pond @Minto	Graded medium	-	-	-	-	0.28	5.1	0.15	3.8	0.10	4.3	0.03	8.3
Oakridge Hatchery @Dexter	Graded large	-	-	-	-	0.30	5.1	0.20	4.0	0.06	4.3	0.09	8.1
Oakridge Hatchery @Dexter	Graded large	-	-	-	-	0.17	5.1	0.15	4.0	0.10	4.6	0.08	8.2
South Santiam Hatchery	Production	-	-	0.08	7.2	-	-	0.18	4.0	-	-	-	-
Below William Falls (S. Santiam Hatchery)	Transport	-	-	0.24	7.2	-	-	0.27	3.8	-	-	-	-
Cowlitz Hatchery	Density/Erythromycin	-	-	0.45	6.5	0.19	5.1	-	-	-	-	0.06	8.3
Bonneville Hatchery	Tule	-	-	-	-	0.39	5.7	0.22	3.8	-	-	0.44	8.5
Bonneville Hatchery	Brights	-	-	-	-	0.40	5.7	0.32	3.8	-	-	0.35	8.5
						Coho salmon							
Washougal Hatchery	Lt. April/Early May Rel.	-	-	-	-	0.14	7.3	0.14	8.0	0.11	6.1	-	-
Washougal Hatchery	Lt. May/Early June Rel.	-	-	-	-	0.17	5.0	-	- i/	0.09	10.1	0.09	10.0
Washougal	July release	-	-	-	-	0.50	3.6	0.26	4.9	-	-	-	-
Toutle Hatchery	May release	-	-	-	-	0.14	6.9	0.19	6.8	-	-	-	-
Cascade Hatchery	May release	-	-	-	-	0.08	6.9	0.08	6.8	0.11	6.1	-	-
Cascade Hatchery	June release	-	-	-	-	0.15	5.0	-	-	0.10	10.8	-	-
Cascade Hatchery	July release	-	-	-	-	0.45	3.6	-	-	0.13	7.1	-	-
Sandy Hatchery	Menhaden diet	-	-	0.08	7.4	0.11	6.9	-	-	-	-	-	-
Sandy Hatchery	Soy diet	-	-	0.10	7.4	0.15	6.9	-	-	-	-	-	-
Sandy Hatchery	Herring diet	-	-	0.07	7.4	0.12	6.9	-	-	-	-	-	-
Sandy Hatchery	Anchovy diet	-	-	0.09	7.4	0.13	6.9	-	-	-	-	-	-
Sandy Hatchery	OMP 4	-	-	-	-	-	-	0.137	6.8	0.07	6.6	0.15	9.9
Sandy Hatchery	OMP 2 Acid	-	-	-	-	-	-	0.117	6.8	0.07	6.6	-	-
Sandy Hatchery	OMP 2 Frozen wet fish	-	-	-	-	-	-	0.126	6.8	0.10	6.6	0.16	9.9
Sandy Hatchery	OMP 2 Fresh & frozen	-	-	-	-	-	-	0.136	6.8	0.09	6.6	-	-
Sandy Hatchery	Presscake 4	-	-	-	-	-	-	-	-	0.12	6.6	0.11	9.9
Eagle Creek Hatchery	0.45 Density	-	-	0.17	7.9	0.22	5.6	-	-	0.19	9.9	0.18	10.0

a/ Groups used were only those released downstream of Bonneville due to variation in survival associated with proportion of spill to turbine discharge at dams, also, only those released at the same size from the same site. Prescott release groups and others with rapid movement rates were not used due to variability.
b/ Adjusted percent catch all years.
c/ Seven day average of total river flow at Bonneville Dam during the week of median fish recapture for all years.
d/ Did not use due to effects of Mt. St. Helens.
e/ No purse seine effort and larger than other years.
f/ Larger size than other years.
g/ Abnormal behavior causing exceptionally large catches.
h/ Abnormally low catches.
i/ Diseased fish; poor survival to estuary.

Table B8.--Marked juvenile salmonids released in 1981 and captured during 1982.

Release information					Individuals recaptured by month 1982									
(Ag/Dl/D2)	Site	Date (da/mo)	Size (no./lb)	Recaptures 1981	Mr	Ap	My	Jn	Jl	Au	Se	Oc	No	De
				Chinook salmon										
07/21/02	M Fk John D @RM 62	28 My to 19 Jn	210	0	0	0	2	0	0	0	0	-	0	0
07/21/38	Tanner Creek	09 No	11	4	3	2	0	0	0	0	0	-	0	0
07/21/39	Tanner Creek	09 No	9	5	4	0	0	0	0	0	0	-	0	0
07/21/41	Tanner Creek	09 No	9	4	1	0	0	0	0	0	0	-	0	0
07/21/42	Tanner Creek	09 No	11	5	1	0	0	0	0	0	0	-	0	0
07/22/37	M Fk William @Dexter	05 No	4	12	1	0	0	0	0	0	0	-	0	0
07/23/08	M Fk William @Dexter	05 No	9	0	2	2	1	0	0	0	0	-	0	0
07/23/49	Deschutes R @RM 100	05 No	11	0	0	0	1	0	0	0	0	-	0	0
07/24/23	M Fk William @Dexter	05 No	19	0	2	1	0	0	0	0	0	-	0	0
07/25/19	McKenzie @Leaburg	05 No	18	0	2	0	0	0	0	0	0	-	0	0
07/25/23	N Santiam @Minto	03 No	25	0	0	0	2	0	0	0	0	-	0	0
07/25/24	N Santiam @Minto	03 No	23	0	0	1	4	0	0	0	0	-	0	0
63/21/48	Washougal R @RM 15	06 Jl to 01 Se	81	18	1	0	0	0	0	0	0	-	0	0
63/21/56	Cowlitz R @RM 50	27 to 28 Jn	86	494	0	1	0	0	0	0	0	-	0	0
63/25/51	Washougal R @RM 15	26 to 30 Jn	71	417	0	0	1	0	0	0	0	-	0	0
				Total	17	7	11	0	0	0	0	-	0	0
				Steelhead										
05/07/29	Wm Sp R @Hwy 26	01 to 02 Ap	54	0	0	0	1	2	0	0	0	-	0	0
07/22/02	Wallowa Hat	03 to 08 Ap	5	12	0	0	1	0	0	0	0	-	0	0
62/16/08 & LAT 2 Ad	Grand Ronde R	04 to 15 My	7	51	0	0	1	0	0	0	0	-	0	0
				Total	0	0	3	2	0	0	0	-	0	0
				Grand Total	40									

Table B9.--Estimated survival to the estuary of selected hatchery stocks of fall chinook salmon resulting from recapture comparisons at Jones Beach of tagged hatchery fish to similar branded fish released at Prescott, Oregon, (RKm 115), 1978 through 1982.

Year	Mark a/	Recaptures b/ (no.)	(%)	Median date	Calc. Hat. survival c/ (%)	Notes
SPRING CREEK HATCHERY						
March Release						
1978	05/56/01	174	0.153	15 April	42	
	RD U 1	53	0.363	12 April		
1979	05/04/46	229	0.174	7 April	18	
	RD U 1	143	0.947	7 April		
1980	-	-	-	-	-	Poor effort on brands
1981	-	-	-	-	-	
1982	05/10/50	106	0.099	15 April	82	
	RD T 3	53	0.120	13 April		
April Release						
1978	05/60/01	153	0.197	29 April	40	
	05/62/01	175	0.232	2 May	48	
	RD U 3	52	0.488	7 May		
1979	05/04/44	281	0.257	3 May	83	
	05/04/34	196	0.261	3 May	84	
	RD U 2	60	0.309	5 May		
1980	-	-	-	-	-	Poor effort on brands
1981	05/07/41	78	0.126	28 April	131	
	05/07/49	35	0.130	30 April	135	
	RD U 1	17	0.096	29 April		
1982	05/10/51	84	0.246	26 April	86	
	RD U 1	141	0.286	29 April		
May Release						
1978	05/57/01	106	0.088	24 May	49	
	RD U 2	17	0.181	3 June		
1979	05/04/33	98	0.087	22 May	61	
	RD U 4	32	0.143	1 June		
1980	05/06/41	55	0.129	13 May	61	Branded fish affected by
	RP U 1	37	0.295	26 May	44	Mt. St. Helens, tagged
	RP U 4	12	0.210	25 May		fish not affected.

Table B9. Continued

Year	Mark a/	Recaptures b/ (no.)	(%)	Median date c/	Calc. Hat. survival (%)	Notes
SPRING CREEK HATCHERY						
May Release (cont)						
1981	05/07/42	105	0.171	11 May	90	
	RD U 3	46	0.190	13 May		
1982	05/10/52	73	0.128	25 May	74	
	RD U 3	90	0.173	26 May		
BONNEVILLE HATCHERY						
Early May Release (well water)						
1978	-	-	-	-	-	
1979	07/16/08	128	0.167	9 May	52	
	RD U 3	57	0.322	19 May		
1980	-	-	-	-	-	
1981	07/21/56	148	0.121	1 May	104	
	RD U 2	28	0.116	4 May		
1982	07/24/07	262	0.248	1 May	59	
	RD U 2	219	0.420	3 May		
Late May and June Release (Tanner Cr. water)						
1978	-	-	-	-	-	
1979	-	-	-	-	-	
1980	07/21/57	56	0.085	1 June	41/55	Tagged and branded fish affected by high turbidity from the St. Helens eruption.
	LP U 3	41	0.207	5 June		
	LP U 4	26	0.154	4 June		
1981	07/23/29	57	0.092	21 May		
	LD U 1	45	0.228	23 May	33	
1982	07/24/08	182	0.192	3 June	63	
	LD U 1	159	0.307	4 June		
LITTLE WHITE SALMON HATCHERY						
1978	05/03/43-48	664	0.358	8 June	53	
	LD U 1	69	0.670	12 June		
1979	05/04/08	254	0.210	3 July	59	
	05/04/49	412	0.223	4 July	63	
	LD U 3	70	0.355	30 June		

Table B9. Continued

Year	Mark a/	Recaptures b/ (no.)	(%)	Median date c/	Calc. Hat. survival (%)	Notes
LITTLE WHITE SALMON HATCHERY (cont)						
1980	05/06/43	94	0.073	19 June	23/35	Tagged and branded fish affected by high turbidity from the St. Helens eruption.
	LA U 4	73	0.316	19 June		
	LA U 3	50	0.210	19 June		
1981	05/07/47	117	0.071	11 June	52	
	05/08/49	43	0.091	11 June	67	
	LD U 2	33	0.136	16 June		
1982	05/04/35	121	0.123	11 June	77	
	05/04/36	146	0.150	10 June	94	
	LD U 2	83	0.159	11 June		
KLICKITAT HATCHERY						
June Release						
1978	-	-	-	-	-	
1979	63/19/49	224	0.127	7 June	60	
	LD U 1	45	0.210	18 June		
1980	-	-	-	-	-	
1981	-	-	-	-	-	
1982	63/21/57	214	0.111	13 June	105	
	LD U 3	54	0.106	14 June		
WASHOUGAL HATCHERY						
June Release						
1978	-	-	-	-	-	
1979	63/19/46	589	0.472	1 July	53	
	63/19/38	296	0.393	30 June	64	
	LD U 2	154	0.740	30 June		
1980	-	-	-	-	-	Poor effort on brands
1981	63/22/51	417	0.238	5 July	123	
	LD U 3	24	0.193	9 July		
1982	63/24/61	427	0.373	13 July	163	
	RD U 4	97	0.228	9 July		

a/ Tag group released at hatchery; branded group transported and released at Prescott, Oregon, (RKm 115).
b/ Actual number recaptured, beach and purse seine, adjusted percent.
c/ Median date weighted by actual number recaptured in beach and purse seine.

Table B10.--Recapture rates at Jones Beach and estimated survival increases for subyearling chinook salmon transported from McNary Dam to downstream of Bonneville Dam in 1982.

Mark or Brand (Ag/D1/D2) (Loc. Brand Rot.)	Release date	Release no.	Recapture no. Act.	Recapture no. Adj.	Adj. %	Combined adj. %		Average survival increase from transporting %	
			MCNARY DAM						
Tail race releases (control)									
LA H 1,2 (23/16/09)	6/24-26	5,631	1	4	0.071				
LA IF 1,3 (23/16/09)	6/29-7/1	3,036	0	0	0	0.098			
LA IC 1,3 (23/16/11)	7/6-13	3,516	2	8	0.228				
LA IM 1,3 (23/16/11)	7/15-17	8,335	1	4	0.048	0.052	.072		
LA IF 2,4 (23/16/11)	7/20-22	7,031	1	4	0.057				
LA IC 2,4 (23/16/13)	7/27-29	7,762	2	8	0.103	0.072			
LA IM 2,4 (23/16/11)	8/3-5	3,390	0	0	0				
LA +Y 1,2,3,4 (23/16/15)	8/10-27	12,157	2	19	0.156				
LA +U 1,2,3,4 (23/16/15)	8/17-9/3	11,086	1	5	0.045				
Truck transport									
RA V 1 (23/16/10)	6/25-7/2	5,400	7	10	0.185			89	
RA V 2 (23/16/12)	7/12-21	18,800	8	33	0.176	0.179		238	148
RA V 3 (23/16/14)	7/26-8/6	15,500	8	28	0.181			151	

Table B11.--Catch composition by month of beach seine samples at Jones Beach, Oregon (RKm 75), January through December, 1982.

Month	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
No. sets	42	227	305	294	229	162	60	0	123	49	1,491
Species											
Chinook-subyearling *Oncorhynchus tshawytscha*	1,168	11,832	32,214	41,487	33,940	8,342	2,078	-	1,962	235	133,258
Chinook-yearling *Oncorhynchus tshawytscha*	431	2,354	4,739	129	2	0	0	-	0	0	7,658
Coho-juvenile *Oncorhynchus kisutch*	2	741	10,540	353	6	0	0	-	9	1	11,652
Sockeye-juvenile *Oncorhynchus nerka*	0	4	31	6	3	3	0	-	1	0	48
Steelhead-juvenile *Salmo gairdneri*	0	61	351	22	0	0	0	-	5	1	441
Chum-juvenile *Oncorhynchus keta*	0	9	2	2	0	0	0	-	0	0	13
Coastal cutthroat *Salmo clarki*	1	62	83	5	7	38	50	-	23	0	269
Threespine stickleback *Gasterosteus aculeatus*	1,941	9,281	8,791	8,840	10,235	8,360	16,432	-	68,000	3,600	127,120
American shad-juv.-suby. *Alosa sapidissima*	0	0	0	0	77	1,940	5,297	-	3,800	470	11,514
American shad-juv.-year. *Alosa sapidissima*	0	3	531	3,363	706	248	63	-	0	0	4,914
Eulachon *Thaleichthys pacificus*	102	10	0	0	0	0	0	-	0	0	112
Longfin Smelt *Spirinchus thaleichthys*	0	0	0	0	0	0	0	-	9	0	9
Starry flounder *Platichthys stellatus*	181	128	1,437	165	135	77	45	-	176	38	2,382
Carp *Cyprinus carpio*	7	89	170	61	39	17	3	-	5	0	389
Sucker *Catostomus sp.*	18	56	472	117	344	125	47	-	14	1	1,194
Crappie *Pomoxis sp.*	1	17	34	5	236	89	4	-	67	21	474
Largemouth bass *Micropterus salmonides*	0	0	0	3	6	22	5	-	7	43	86
Bluegill *Lepomis macrochirus*	0	0	1	0	0	0	0	-	0	1	2
Peamouth *Mylocheilus caurinus*	693	1,680	12,731	4,103	3,933	3,411	475	-	1,623	397	29,046
Northern squawfish *Ptychocheilus oregonensis*	1	9	270	293	469	238	135	-	2	0	1,417
Mountain whitefish *Prosopium williamsoni*	0	2	12	16	50	49	13	-	4	1	147
Sculpin *Cottus sp.*	26	90	46	187	231	31	6	-	32	46	695
Yellow perch *Perca florescens*	6	15	6	5	79	20	1	-	5	1	137
Redside shiner *Richardsonius balteatus*	0	0	0	7	6	0	0	-	0	0	13
Pacific lamprey *Lampetra tridentata*	0	1	2	4	0	0	0	-	1	1	9
Sand roller *Percopsis transmontana*	0	1	1	4	3	0	0	-	0	0	9
White sturgeon *Acipenser transmontanus*	0	0	4	23	101	19	0	-	0	0	147
Walleye *Stizostedion vitreum vitreum*	0	0	0	0	1	0	0	-	0	0	1
Chinook-adult *Oncorhynchus tshawytscha*	0	0	9	66	21	5	23	-	1	1	126
Chinook-jack *Oncorhynchus tshawytscha*	1	0	4	216	90	13	13	-	0	0	324
Coho-adult *Oncorhynchus kisutch*	0	0	0	0	0	0	12	-	0	2	14
Steelhead-adult *Salmo gairdneri*	4	15	56	67	29	11	2	-	1	1	186
Sockeye-adult *Oncorhynchus nerka*	0	0	0	73	57	0	0	-	0	0	130
American shad-adult *Alosa sapidissima*	0	0	30	20	9	1	0	-	0	0	60

Table B12.--Catch composition by month of purse seine samples at Jones Beach, Oregon (RKm 75), January through December, 1982.

Month	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Total
No. sets	6	45	146	129	64	31	19	0	77	33	550
Species											
Chinook-subyearling *Oncorhynchus tshawytscha*	39	121	3,389	11,219	5,424	980	1,045	-	1,596	155	23,968
Chinook-yearling *Oncorhynchus tshawytscha*	22	718	5,950	2,497	6	1	0	-	0	0	9,194
Coho-juvenile *Oncorhynchus kisutch*	0	102	18,415	8,610	187	3	0	-	0	0	27,317
Sockeye-juvenile *Oncorhynchus nerka*	0	9	2,338	1,639	407	2	0	-	2	0	4,397
Steelhead-juvenile *Salmo gairdneri*	0	250	12,471	3,048	43	0	0	-	4	0	15,816
Chum-juvenile *Oncorhynchus keta*	0	0	2	0	0	0	0	-	0	0	2
Coastal Cutthroat *Salmo clarki*	0	11	92	13	0	3	1	-	5	1	126
Threespine stickleback *Gasterosteus aculeatus*	0	4	31	82	212	56	51	-	738	51	1,225
American shad-juv.-suby. *Alosa sapidissima*	0	0	0	0	0	13	83	-	9,107	2,997	12,200
American shad-juv.-year. *Alosa sapidissima*	0	0	16	35	77	4	23	-	40	0	195
Eulachon *Thaleichthys pacificus*	3	2	1	1	0	0	0	-	0	0	7
Longfin smelt *Spirinchus thaleichthys*	0	0	0	0	0	0	0	-	290	7	297
Starry flounder *Platichthys stellatus*	0	4	3	2	1	0	0	-	6	1	17
Carp *Cyprinus carpio*	0	2	6	4	1	1	0	-	0	0	14
Sucker *Catostomus sp.*	0	0	55	17	2	0	0	-	0	0	74
Crappie *Pomoxis sp.*	0	0	0	1	1	1	0	-	1	2	6
Bluegill *Lepomis macrochirus*	0	0	0	1	0	0	0	-	0	0	1
Peamouth *Mylocheilus caurinus*	0	266	1,125	2,434	334	112	12	-	910	42	5,235
Northern squawfish *Ptychocheilus oregonensis*	0	1	7	6	25	10	7	-	0	0	56
Mountain whitefish *Prosopium williamsoni*	0	0	2	0	1	0	0	-	0	0	3
Redside shiner *Richardsonius balteatus*	0	0	0	0	0	1	0	-	0	0	1
Pacific lamprey *Lampetra tridentata*	0	1	4	2	0	0	1	-	3	53	64
White sturgeon *Acipenser transmontanus*	0	0	1	0	0	0	0	-	1	0	2
Chinook-adult *Oncorhynchus tshawytscha*	0	0	0	2	0	1	4	-	1	0	8
Chinook-jack *Oncorhynchus tshawytscha*	0	0	0	0	1	1	0	-	0	0	2
Coho-adult *Oncorhynchus kisutch*	0	0	0	0	0	0	4	-	1	0	5
Steelhead-adult *Salmo gairdneri*	0	4	37	19	0	0	0	-	1	2	63
American shad-adult *Alosa sapidissima*	0	2	40	33	56	3	0	-	1	2	137

APPENDIX C

METHOD FOR ESTIMATING NUMBER OF MARKED FISH TO RELEASE FOR GROUP COMPARISON STUDIES REQUIRING SAMPLING AT JONES BEACH

The data needed to determine the number of marked fish necessary for release to provide an adequate estuarine sample are: (1) the percent survival expected for one of the groups, (2) the size of the difference between groups that it is desirable to detect, and (3) the specified and statistical error levels.

1. Percent survival expected

a. Find and make a list of adjusted percent recoveries (beach and purse seine) and median recovery dates from Appendix D of this report and Appendix B of Dawley et al. (1982) for marked groups of fish which were released in past years near the month and day of the expected release date, and which were similar to the study group for fish size, treatment, and distance of migration including the number of dams encountered.

b. Adjust each of the recovery percentages (from Step a) to equate with each other at the river flow expected during migration period:

$\%_A + [(F - \hat{F}) \times 0.01 \times \%_A] = \%_F$--Percent recovery; comparable at lowest flow.

Where:

$\%_A$ = Percent recovery, for individual group. [(Total adjusted recovery/no. released) · 100]

F = River flow [Appendix Tables B3 (this report) and A6 (Dawley et al. 1982)] at date of median fish recovery for groups listed in step a.

$\hat{F}$ = Expected river flow at estimated date of median fish recovery for the study groups. Total flow at Bonneville Dam obtained from CofE Reservoir Control.

0.1 = 10% tentative adjustment factor for 1,000 m^3/s increase in river flow (Results section).

c. Select from Step b, the lowest percent recovery (lowest $\%_F$) then readjust for sampling effort expected at Jones Beach during the recovery period expected for study group.

$\%_F \times \hat{E} = \%_E$--Minimum expected % recovery of treatment fish.

Where: $\hat{E}$ = Expected daily effort for beach and purse seines. (To be provided by NMFS personnel at Jones Beach 503-728-3014.)

2. Detectable difference

The expected survival of the control group is P_1 and that of a test group is P_2 where $P_2 = P_1 - D$: D is a particular survival difference to be detected.

3. Statistical error levels

To test the hypothesis, $H_o{:}P_1 = P_2$ against the alternative that the control group has greater survival, $H_1{:}P_1 > P_2$, we need to stipulate the statistical error levels. Alpha (α), the Type I error, refers to the risk of rejecting H_o when it is true; e.g., concluding $P_1 > P_2$ when $P_1 = P_2$. This is expressed as reject H_o if $(2N)^{1/2}K \geq Z$. Where $K = \arcsin (P_1)^{1/2} - \arcsin (P_2)^{1/2}$, a normalizing transformation of the survival proportions. Z is a standard normal variate at the α level. Beta (β), the Type II error, refers to the risk of accepting H_o when it is false; e.g., concluding $P_1 = P_2$ when $P_1 > P_2$. The quantity $1-\beta$, which is the probability of rejecting H_o when it is false, is the power of the test. Now, we want to find N so that the probability is at least $1-\beta$ of rejecting H_o if, in fact, $P_1 = P$, $P \leq P_2$. This power requirement can be expressed as the probability $[(2N)^{1/2} K \geq Z \quad P_1=P] \geq 1-\beta$; algebraic manipulation of this expression gives the required numbers of fish released:

$$N = 1/2\left(\frac{Z \quad + Z}{K}\right)^2$$

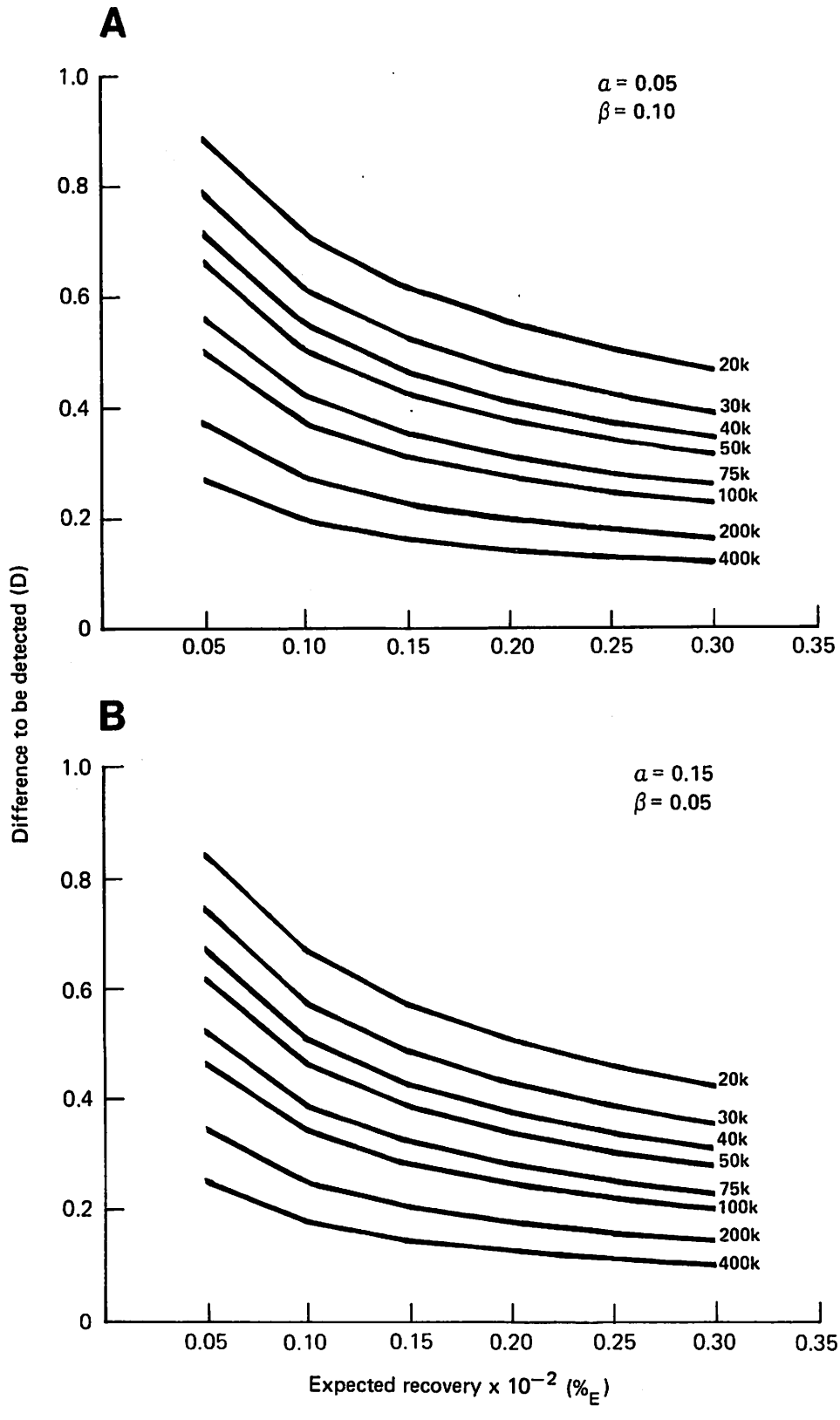
This expression has been programmed so that computer input for P_1, P_2 (or D), α, and β will yield the necessary numbers of fish to release to evaluate control vs test comparative trials. Examples of computation curves for various P_1, P_2, α, and β are provided in Appendix Figure C1.

In the application of significance testing to the comparison of different treatment groups in a research study, the investigator specifies the required Type I and Type II error levels.

For example, in the study of a survival difference between two groups, the investigator would be making a Type I error if he concluded there is a survival difference when there is not; the result would be to initiate an unnecessary corrective action. A type II error would result from concluding there is no survival difference when there is; this decision would eliminate corrective action when it is needed, resulting in a consequent loss of fish.

The investigator can balance the penalties of cost and loss of fish by choosing the sample size so that the Type I and Type II errors are small. Should the investigator desire to provide the greatest protection to reduce the cost of making changes in which case the Type I (α) error would be chosen smaller than the Type II (β) error; e.g., choosing an α of 0.05 and a β of 0.10 as shown in Appendix Figure C1 (Part A). If it is desireable to provide greater protection to the fish, then the Type II error would be chosen smaller than the the Type I error; e.g., choosing an α of 0.15 and a β of 0.05 as shown in Appendix Figure C1 (Part B).

Release population size may be obtained from the Burroughs Computer in Seattle, on request to Frank Ossiander (206) 442-7412, who can also provide the necessary programming steps.



Appendix Figure C1.--Numbers of fish necessary for release to estimate percent difference in survival between test and control group determined from catches at Jones Beach. A for $\alpha = 0.05$, $\beta = 0.10$ which relates to a power $(1-\beta)$ of 0.90; B for $\alpha = 0.15$ and $\beta = 0.05$ which relates to a power $(1-\beta)$ of 0.95.

Increased significance of differences between treatment and control groups can also be implemented by increasing sampling efforts at Jones Beach. If the daily fishing efforts of the beach seine or purse seine are doubled to 16 h/day instead of the standard 8 h per day, catch rates have been shown to increase by 80 to 90%. This manner of obtaining greater significance is possible, but the requesting agency must accept the burden of the increased cost of sampling.

APPENDIX D

MARK RELEASE AND CAPTURE INFORMATION
COLUMBIA RIVER ESTUARY,
JONES BEACH (RKM 75)
FOR 1982

Sockeye Salmon

Coho Salmon

Yearling Chinook Salmon

Steelhead

Subyearling Chinook Salmon

LEGEND

MARK - Binary wire tag: recaptures are listed with a six digit number, the first two digits being agency code; second two-data one; and third two-data two.
NO TAG: represents fish with excised adapose fin with no detectable tag.
LET GO: represents fish with excised adapose fin with a detectable tag.
BLNK TAG: represents fish with a blank tag.

Brand: the first two letters indicate location on fish, the next one or two characters indicate the configuration of the brand and the final number indicates rotation of the brand; e.g.: LA K 2. Codes for location, brand, and rotation are listed on the following page.

Clip: recaptures with clips exclusively are indicated by the common letter abbreviations listed on the following page.

*: Asterisk indicates that other marks are associated with this fish group and are listed in OTHER MARKS.

NO. MKD THOUS - thousands of fish released with observable mark.
RELEASE DATE - day, month, year
RECAPT. SITE LOCATION - example: C075.0S

C-Columbia River
075.0-Distance from mouth of River in km
S-South, Middle or North part of river cross section

GEAR CODE - B for beach seine; P for purse seine.
RECAPTURES - recapture number, ACTUAL and ADJUSTED (to represent 7 day/wk fishing effort, 10 sets/day for the beach seine and 5 sets/day for the purse seine). Recapture rates (%) = (RECAPT. NO./NO. MKD) x 100.
RECAPTURE DATE/MED. FISH - date on which the median fish was recaptured, using the adjusted catch figures.
AVG. LEN. - average fork length in mm of the fish captured on or within 3 days before and after the date of median fish recapture.
MVMT RATE - movement rate is the distance from release point to recapture point divided by the number of days from 1st day of release to date of median fish recapture.

OTHER MARKS - secondary marks on the same fish group will be listed but NO. MKD is only accurate for primary mark.

Abbreviations: abbreviated terms used in HATCH/ORIGIN, RELEASE SITE and PURPOSE OF RELEASE are listed on the following page.

LEGEND Cont.

TAGS

Color	Abbr.
Red	RD
Green	GN
Blue	BL
Gray	GY
Brown	BR
Yellow	YW
Oxide Yellow	XY
Oxide Red	XR
Light Blue	LB
Light Green	LG
Pink	PK
Purple	PU
Orange	OR
Tan	TN
White	WH
Black	BK
Oxide Brown	XB
Chrome Yellow	CY
Medium Green	MG
Gold	GD
Dark Green	DG
Dark Red	DR
Medium Orange	MO
Mixed	MX
Metallic Grey	GM

Rare Earth (element)	Abbr.
Cerium	CE
Dysprosium	DY
Erbium	ER
Gadolinium	GD
Holmium	HO
Lanthanum	LA
Neodymium	ND
Praseodymium	PR
Samarium	SM
Terbium	TB
Ytterbium	YB

BRANDS

Location	Abbr.
Left anterior	LA
Left dorsal	LD
Left posterior	LP
Right anterior	RA
Right dorsal	RD
Right posterior	RP

Brand	Abbr.
+	+
+O	+O
+F	+F
+J	+J
+K	+K
+L	+L
+N	+N
+P	+P
+R	+R
+T	+T
+U	+U
+Y	+Y
+Z	+Z
OO	OO
101	01
1-1	1-
10	10
12	12
13	13
17	17
2	2
2C	2C
2J	2J
2L	2L
2T	2T
2X	2X
3	3
3C	3C
3J	3J
3L	3L
3T	3T
3X	3X
4	4
5	5
52	52
9	9
	AN
	AR
	B1
	B2
	B4
	B8
	D
T	DT
E	E
C	EC
	EP
F	F

BRANDS

Brand	Abbr.
G	G
	GL
H	H
	HE
I+	I+
IC	IC
I△	ID
IF	IF
IH	IH
IJ	IJ
IK	IK
IL	IL
IM	IM
IN	IN
IR	IR
IS	IS
IT	IT
IU	IU
IV	IV
IX	IX
IY	IY
IZ	IZ
J	J
K	K
	KE
L	L
O	O
P	P
	PI
)(	PP
R	R
S	S
	SP
	SQ
	SU
T	T
	TI
	TT
U	U
U	UP
V	V
W	W
WG	WG
X3	X3
Y	Y
Z	Z

Rotation	Abbr.
0°-Upright	1
90° to right	2
180° to right	3
270° to right	4

CLIPS

Clips	Abbr.
Dorsal	DO
Adipose	AD
Anal	AN
Top Cau.	TC
Bottom Cau.	BC
Left Vent.	LV
Right Vent.	RV
Left Pect.	LP
Right Pect.	RP
Left Max.	LM
Right Max.	RM

ABBREVIATIONS FOR HATCH/ORIGIN, RELEASE SITE AND PURPOSE OF RELEASE

NOTE: use no periods
Above to Abv
Below to Blw
Bonneville to Bonn
Bridge to Brid
Channel to Ch
Chinook to Chin
Columbia to Col
Composition to Comp
Condition to Cond
Creek to Cr
Dam to D
East to E
Enteric Red Mouth to ERM
Entrance to Entr
Evaluation to Eval
Fall to F
Fork to Fk
Forks to Fks
Grading to Grad
Hatchery to Hat
Idaho to Id
Imprinting to Impr
Landing to Ld
Little to Lit
Lower to Lo
Mid-river to Mid R
Middle to M
Mouth to Mo
Niagara Springs Hatchery to Niagara Springs
North to N
Oregon to Ore
Oregon City Falls to OCF
Oregon Moist Pellet to OMP
Points to Pt
Priest to Pr
Production to Prod
Rapids to Rapid
Rearing to Rear
Release to Rel
Reservoir to Res
River to R
Round Butte to Rnd Butte
Salmon to Sal
Sportsman's Landing to Spt Ld
Salt Water to Sw
South to S
Spawning to Spaw
Springs to Spring
Stock to Stk
Survival to Surv
Tailrace to Tail
Transport to Trans
Vaccine to Vacc
Washington to Wash
West to W
Willamette to Willam

SOCKEYE SALMON

RELEASE AND RECAPTURE INFORMATION - COLUMBIA RIVER ESTUARY

REPORT DATE 1/14/82

SORT SEQUENCE : SPECIES,SOURCE,RELEASE KM(-),START RELEASE DATE,MARK, RECAPTURE SITE(-) (FINAL/SOURCE)

SPECIES: SOCKEYE

MARK	HATCH/ORIGIN PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE OTHER MARKS	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
LET GO		NO RELEASE INFO					C075.0M	P	1	0.000			09JN	09JN	09JN	0	
NO TAG		NO RELEASE INFO					C075.0M	P	1	0.000			13JN	13JN	13JN	130	

COHO SALMON

SPECIES: COHO

MARK	HATCH/ORIGIN / PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE / OTHER MARKS	SIZE AT RELEASE MM	SIZE AT RELEASE /LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	RECAPTURES ACTUAL %	RECAPTURES ADJUSTED NO.	RECAPTURES ADJUSTED %	RECAPTURE DATE 10% TILE	RECAPTURE DATE MED. FISH	RECAPTURE DATE 90% TILE	AVG LEN MM	MVMT RATE KM/DAY
072429	CASCADE HAT	TANNER CR	25MY82		18	27.7	C075.0S	B	9	0.032	10	0.035	28MY	30MY	31MY	134	31
	RELEASE SITE EVAL						C075.0M	P	16	0.058	17	0.061	29MY	01JN	15JN	139	22
072433	CASCADE HAT	TANNER CR	25MY82		18	28.2	C075.0S	B	12	0.043	13	0.046	28MY	30MY	31MY	133	31
	RELEASE SITE EVAL						C075.0M	P	18	0.064	19	0.067	28MY	01JN	06JN	133	22
632420	COWLITZ HAT	COWLITZ R@RM 50	03MY82		19	9.8	C075.0S	B	5	0.051	5	0.051	07MY	09MY	24MY	141	19
	DENSITY STUDY(20 LBS/GAL/MIN)						C075.0M	P	13	0.133	13	0.137	20MY	30MY	11JN	129	4
632421	COWLITZ HAT	COWLITZ R@RM 50	03MY82		19	9.9	C075.0S	B	3	0.030	3	0.031	08MY	15MY	23MY	133	10
	DENSITY STUDY(20 LBS/GAL/MIN)						C075.0M	P	12	0.122	12	0.123	14MY	23MY	10JN	136	6
632422	COWLITZ HAT	COWLITZ R@RM 50	03MY82		19	10.4	C075.0S	B	11	0.106	11	0.107	07MY	11MY	21MY	138	14
	DENSITY STUDY(20 LBS/GAL/MIN)						C075.0M	P	14	0.135	14	0.137	21MY	25MY	09JN	133	5
632423	COWLITZ HAT	COWLITZ R@RM 50	03MY82		19	10.3	C075.0S	B	10	0.097	10	0.098	08MY	15MY	28MY	136	10
	DENSITY STUDY(20 LBS/GAL/MIN)						C075.0M	P	8	0.078	8	0.081	10MY	23MY	07JN	146	6
632424	COWLITZ HAT	COWLITZ R@RM 50	03MY82		19	10.1	C075.0S	B	6	0.059	6	0.060	10MY	22MY	25MY	131	6
	DENSITY STUDY(20 LBS/GAL/MIN)						C075.0M	P	13	0.129	13	0.129	15MY	25MY	28MY	141	5
632425	COWLITZ HAT	COWLITZ R@RM 50	03MY82		18	10.5	C075.0S	B	6	0.057	6	0.058	05MY	22MY	14JN	130	6
	DENSITY STUDY(19.8 LBS/GAL/MIN)						C075.0M	P	7	0.066	7	0.069	17MY	24MY	02JN	138	5
632426	COWLITZ HAT	COWLITZ R@RM 50	03MY82		18	10.5	C075.0S	B	5	0.048	5	0.048	06MY	18MY	28MY	164	8
	DENSITY STUDY(19.8 LBS/GAL/MIN)						C075.0M	P	10	0.095	10	0.097	06MY	27MY	09JN	151	5
632427	COWLITZ HAT	COWLITZ R@RM 50	03MY82		18	10.4	C075.0S	B	4	0.038	4	0.038	06MY	14MY	15MY	135	10
	DENSITY STUDY(19.8 LBS/GAL/MIN)						C075.0M	P	11	0.106	11	0.107	14MY	28MY	10JN	135	5
632428	COWLITZ HAT	COWLITZ R@RM 50	03MY82		18	10.5	C075.0S	B	4	0.038	4	0.038	11MY	18MY	25MY	130	8
	DENSITY STUDY(19.8 LBS/GAL/MIN)						C075.0M	P	14	0.133	14	0.137	19MY	29MY	06JN	132	4
632429	COWLITZ HAT	COWLITZ R@RM 50	03MY82		18	10.4	C075.0S	B	2	0.019	2	0.020	15MY	24MY	25MY	113	5
	DENSITY STUDY(19.8 LBS/GAL/MIN)						C075.0M	P	9	0.086	9	0.087	13MY	23MY	12JN	140	6
632430	COWLITZ HAT	COWLITZ R@RM 50	03MY82		20	10.6	C075.0S	B	8	0.076	8	0.076	07MY	10MY	22MY	124	16
	DENSITY STUDY(11.6 LBS/GAL/MIN)						C075.0M	P	9	0.085	9	0.086	24MY	29MY	15JN	130	4
632431	COWLITZ HAT	COWLITZ R@RM 50	03MY82		20	10.6	C075.0S	B	5	0.047	5	0.048	11MY	17MY	25MY	121	8
	DENSITY STUDY(11.6 LBS/GAL/MIN)						C075.0M	P	8	0.076	8	0.077	15MY	08JN	12JN	117	3
632432	COWLITZ HAT	COWLITZ R@RM 50	03MY82		20	10.2	C075.0S	B	3	0.029	3	0.029	11MY	15MY	17MY	127	10
	DENSITY STUDY(11.6 LBS/GAL/MIN)						C075.0M	P	13	0.127	13	0.129	15MY	24MY	11JN	133	5
632433	COWLITZ HAT	COWLITZ R@RM 50	03MY82		20	10.4	C075.0S	B	9	0.086	9	0.086	10MY	13MY	23MY	122	11
	DENSITY STUDY(11.6 LBS/GAL/MIN)						C075.0M	P	8	0.077	8	0.077	17MY	23MY	10JN	128	6
632434	COWLITZ HAT	COWLITZ R@RM 50	03MY82		20	10.5	C075.0S	B	5	0.048	5	0.048	09MY	13MY	25MY	130	11
	DENSITY STUDY(11.6 LBS/GAL/MIN)						C075.0M	P	13	0.124	13	0.126	16MY	28MY	12JN	125	5
632435	COWLITZ HAT	COWLITZ R@RM 50	03MY82		19	10.3	C075.0S	B	5	0.048	5	0.048	07MY	10MY	12MY	132	16
	DENSITY STUDY(12.6 LBS/GAL/MIN)						C075.0M	P	13	0.126	13	0.128	13MY	17MY	26MY	140	8
632436	COWLITZ HAT	COWLITZ R@RM 50	03MY82		19	10.3	C075.0S	B	9	0.087	9	0.088	06MY	15MY	28MY	143	10
	DENSITY STUDY(12.6 LBS/GAL/MIN)						C075.0M	P	11	0.107	11	0.107	14MY	20MY	29MY	133	7
632437	COWLITZ HAT	COWLITZ R@RM 50	03MY82		19	10.1	C075.0S	B	8	0.079	8	0.079	05MY	10MY	15MY	141	16
	DENSITY STUDY(12.6 LBS/GAL/MIN)						C075.0M	P	9	0.089	9	0.090	18MY	23MY	31MY	141	6
632438	COWLITZ HAT	COWLITZ R@RM 50	03MY82		19	10.2	C075.0S	B	8	0.078	8	0.078	06MY	11MY	23MY	133	14
	DENSITY STUDY(12.6 LBS/GAL/MIN)						C075.0M	P	12	0.117	12	0.119	19MY	25MY	13JN	137	5
632439	COWLITZ HAT	COWLITZ R@RM 50	03MY82		19	10.3	C075.0S	B	6	0.058	6	0.058	06MY	10MY	17JN	123	16
	DENSITY STUDY(12.6 LBS/GAL/MIN)						C075.0M	P	11	0.106	12	0.111	18MY	23MY	21JN	138	6
632440	COWLITZ HAT	COWLITZ R@RM 50	03MY82		18	10.6	C075.0S	B	14	0.132	14	0.133	06MY	12MY	23MY	136	1?
	DENSITY STUDY(12.7 LBS/GAL/MIN)																

SPECIES: COHO

MARK	HATCH/ORIGIN / PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE / OTHER MARKS	SIZE AT RELEASE MM	SIZE AT RELEASE /LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	RECAPTURES ACTUAL %	RECAPTURES ADJUSTED NO.	RECAPTURES ADJUSTED %	RECAPTURE DATE 10% TILE	RECAPTURE DATE MED. FISH	RECAPTURE DATE 90% TILE	AVG LEN MM	MVMT RATE KM/DAY
632440	COWLITZ HAT	COWLITZ R@RM 50	03MY82		18	10.6	C075.0M	P	10	0.095	10	0.096	14MY	22MY	18JN	141	6
	DENSITY STUDY(12.7 LBS/GAL/MIN)																
632441	COWLITZ HAT	COWLITZ R@RM 50	03MY82		18	10.7	C075.0S	B	7	0.066	7	0.066	05MY	08MY	27MY	142	23
	DENSITY STUDY(12.7 LBS/GAL/MIN)						C075.0M	P	9	0.084	9	0.085	15MY	23MY	19JN	130	6
632442	COWLITZ HAT	COWLITZ R@RM 50	03MY82		18	10.7	C075.0S	B	7	0.066	7	0.066	08MY	13MY	22MY	128	11
	DENSITY STUDY(12.7 LBS/GAL/MIN)						C075.0M	P	10	0.094	10	0.095	08MY	19MY	06JN	152	7
632443	COWLITZ HAT	COWLITZ R@RM 50	03MY82		18	10.5	C075.0S	B	14	0.134	14	0.134	07MY	13MY	24MY	132	11
	DENSITY STUDY(12.7 LBS/GAL/MIN)						C075.0M	P	8	0.076	9	0.082	11MY	17MY	07JN	141	8
632444	COWLITZ HAT	COWLITZ R@RM 50	03MY82		18	10.7	C075.0S	B	11	0.102	11	0.102	05MY	10MY	16MY	133	16
	DENSITY STUDY(12.7 LBS/GAL/MIN)						C075.0M	P	11	0.102	11	0.104	12MY	19MY	07JN	144	7
632445	COWLITZ HAT	COWLITZ R@RM 50	03MY82		16	10.3	C075.0S	B	5	0.049	5	0.049	05MY	08MY	10MY	145	23
	DENSITY STUDY(12.2 LBS/GAL/MIN)						C075.0M	P	11	0.107	11	0.108	13MY	18MY	24MY	134	8
632446	COWLITZ HAT	COWLITZ R@RM 50	03MY82		16	10.4	C075.0S	B	11	0.106	11	0.107	05MY	09MY	24MY	139	19
	DENSITY STUDY(12.2 LBS/GAL/MIN)						C075.0M	P	10	0.096	10	0.098	20MY	25MY	31MY	138	5
632447	COWLITZ HAT	COWLITZ R@RM 50	03MY82		16	10.6	C075.0S	B	9	0.085	9	0.085	06MY	10MY	23MY	142	16
	DENSITY STUDY(12.2 LBS/GAL/MIN)						C075.0M	P	15	0.142	15	0.146	20MY	25MY	08JN	136	5
632448	COWLITZ HAT	COWLITZ R@RM 50	03MY82		16	10.3	C075.0S	B	6	0.058	6	0.058	08MY	13MY	18MY	140	11
	DENSITY STUDY(12.2 LBS/GAL/MIN)						C075.0M	P	9	0.087	9	0.089	13MY	23MY	30MY	144	6
632449	COWLITZ HAT	COWLITZ R@RM 50	03MY82		16	10.1	C075.0S	B	7	0.070	7	0.070	06MY	12MY	27MY	136	13
	DENSITY STUDY(12.2 LBS/GAL/MIN)						C075.0M	P	12	0.119	12	0.121	13MY	22MY	12JN	134	6
051035	EAGLE CR HAT	CLACKAMAS R	06MY82	149	14	20.0	C075.0M	P	29	0.145	31	0.153	25MY	29MY	15JN	0	7
	DENSITY STUDY(0.15 LB/CU FT/IN LN)																
051036	EAGLE CR HAT	CLACKAMAS R	06MY82	150	13	19.1	C075.0M	P	42	0.220	46	0.238	24MY	31MY	06JN	144	7
	DENSITY STUDY 0.15(LB/CU FT/IN LN)																
051037	EAGLE CR HAT	CLACKAMAS R	06MY82	148	15	42.6	C075.0S	B	2	0.005	2	0.005	22MY	25MY	26MY	147	9
	DENSITY STUDY 0.30(LB/CU FT/IN LN)						C075.0M	P	66	0.155	72	0.169	24MY	31MY	16JN	144	7
051038	EAGLE CR HAT	CLACKAMAS R	06MY82	145	16	42.4	C075.0M	P	71	0.167	77	0.182	26MY	31MY	16JN	142	7
	DENSITY STUDY 0.30(LB/CU FT/IN LN)																
051039	EAGLE CR HAT	CLACKAMAS R	06MY82	143	16	68.3	C075.0S	B	2	0.003	2	0.003	18JN	20JN	22JN	141	4
	DENSITY STUDY 0.45(LB/CU FT/IN LN)						C075.0M	P	112	0.164	117	0.172	24MY	31MY	15JN	140	7
051040	EAGLE CR HAT	CLACKAMAS R	06MY82	143	16	66.6	C075.0S	B	1	0.002	1	0.002	24JN	24JN	24JN	140	4
	DENSITY STUDY 0.45(LB/CU FT/IN LN)						C075.0M	P	114	0.171	120	0.180	25MY	01JN	14JN	140	7
632304	LEWIS R HAT	SPEELYAI	04MY82		19	51.2	C075.0S	B	80	0.156	80	0.156	07MY	10MY	13MY	138	20
	INDEX NORMAL REL						C075.0M	P	22	0.043	23	0.044	11MY	21MY	24MY	135	7
632305	LEWIS R HAT	SPEELYAI	02JN82		17	51.3	C075.0S	B	2	0.004	2	0.004	12JN	14JN	14JN	143	10
	INDEX DELAYED REL						C075.0M	P	102	0.199	106	0.207	06JN	10JN	16JN	146	15
632303	LO KALAMA HAT	KALAMA R@RM 6	03MY82		17	52.8	C075.0S	B	40	0.076	40	0.076	07MY	10MY	21MY	145	7
	DENSITY STUDY						C075.0M	P	49	0.093	51	0.097	10MY	19MY	08JN	139	3
RD 3 4	MCNARY D	PORT KELLY ORE	26MY82			0.2	C075.0M	P	1	0.448	1	0.459	02JN	02JN	02JN	130	61
	MCNARY EFFICIENCY																
072549	SANDY HAT	SANDY R	30AP82		19	24.0	C075.0S	B	11	0.046	11	0.046	09MY	12MY	18MY	141	13
	DIET(PC-6)																

SPECIES: COHO

MARK	HATCH/ORIGIN PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE OTHER MARKS	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
072549	SANDY HAT DIET(PC-6)	SANDY R	30AP82		19	24.0	C075.0M	P	20	0.083	21	0.086	11MY	18MY	24MY	140	9
072550	SANDY HAT DIET(OMP2)	SANDY R	30AP82		18	26.4	C075.0S	B	16	0.061	16	0.061	08MY	10MY	14MY	139	16
							C075.0M	P	34	0.129	36	0.135	09MY	16MY	21MY	140	10
072551	SANDY HAT DIET(OMP4)	SANDY R	30AP82		19	27.3	C075.0S	B	5	0.018	5	0.018	07MY	11MY	22MY	136	15
							C075.0M	P	29	0.106	29	0.108	13MY	17MY	24MY	136	9
072552	SANDY HAT DIET(ABERNATHY)	SANDY R	30AP82		18	26.9	C075.0S	B	11	0.041	11	0.041	07MY	12MY	19MY	140	13
							C075.0M	P	25	0.093	25	0.094	12MY	16MY	22MY	141	10
072553	SANDY HAT DIET(PC-4)	SANDY R	30AP82		18	26.0	C075.0S	B	9	0.035	9	0.035	08MY	11MY	18MY	136	15
							C075.0M	P	16	0.062	17	0.064	10MY	16MY	20MY	142	10
072554	SANDY HAT DIET(OMP4)	SANDY R	30AP82		19	27.6	C075.0S	B	12	0.043	12	0.043	09MY	12MY	18MY	132	13
							C075.0M	P	34	0.123	35	0.127	10MY	17MY	25MY	139	9
072555	SANDY HAT DIET(PC-4)	SANDY R	30AP82		18	28.3	C075.0S	B	7	0.025	7	0.025	08MY	11MY	19MY	139	15
							C075.0M	P	26	0.092	26	0.093	13MY	17MY	21MY	142	9
072556	SANDY HAT DIET(ABERNATHY)	SANDY R	30AP82		18	27.6	C075.0S	B	12	0.043	12	0.043	07MY	10MY	20MY	141	16
							C075.0M	P	31	0.112	31	0.114	14MY	17MY	21MY	144	9
072557	SANDY HAT DIET(PC-6)	SANDY R	30AP82		19	28.1	C075.0S	B	15	0.053	15	0.053	08MY	10MY	13MY	137	16
							C075.0M	P	38	0.135	39	0.140	11MY	17MY	24MY	137	9
072558	SANDY HAT DIET(OMP2)	SANDY R	30AP82		18	27.9	C075.0S	B	7	0.025	7	0.025	06MY	09MY	12MY	139	18
							C075.0M	P	29	0.104	30	0.106	11MY	17MY	21MY	139	9
LA S 4	TURTLE ROCK PD CHELAN PUD	ROCK ISLAND D	13AP82			3.1	C075.0M	P	1	0.032	1	0.032	16MY	16MY	16MY	143	20
LA S 3	TURTLE ROCK PD CHELAN PUD	ROCK ISLAND D	14AP82			3.1	C075.0S	B	1	0.032	1	0.032	12MY	12MY	12MY	162	23
							C075.0M	P	1	0.032	1	0.032	26MY	26MY	26MY	136	15
LA S 2	TURTLE ROCK PD CHELAN PUD	ROCK ISLAND D	19MY82			3.8	C075.0M	P	1	0.026	1	0.026	28MY	28MY	28MY	149	72
632513	WASHOUGAL HAT DENSITY STUDY(13.63 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.2	C075.0S	B	4	0.039	4	0.041	30MY	02JN	05JN	127	18
							C075.0M	P	5	0.049	5	0.053	30MY	01JN	06JN	135	21
632514	WASHOUGAL HAT DENSITY STUDY(13.63 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	9.9	C075.0S	B	4	0.041	4	0.044	29MY	30MY	03JN	132	29
							C075.0M	P	5	0.051	5	0.053	31MY	01JN	13JN	136	21
632515	WASHOUGAL HAT DENSITY STUDY(13.63 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.3	C075.0S	B	3	0.029	3	0.031	29MY	02JN	03JN	129	18
							C075.0M	P	11	0.107	11	0.110	31MY	03JN	09JN	128	16
632516	WASHOUGAL HAT DENSITY STUDY(13.63 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	9.9	C075.0S	B	1	0.010	1	0.011	30MY	30MY	30MY	139	29
							C075.0M	P	5	0.050	5	0.052	29MY	02JN	10JN	132	18
632517	WASHOUGAL HAT DENSITY STUDY(13.63 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	9.8	C075.0S	B	3	0.030	3	0.034	30MY	01JN	03JN	123	21
							C075.0M	P	3	0.030	3	0.031	01JN	04JN	11JN	135	15
632518	WASHOUGAL HAT DENSITY STUDY(12.13 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.1	C075.0S	B	2	0.020	2	0.020	01JN	03JN	05JN	126	16
							C075.0M	P	4	0.040	4	0.041	02JN	08JN	19JN	129	10
632519	WASHOUGAL HAT DENSITY STUDY(12.13 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.1	C075.0S	B	1	0.010	1	0.011	30MY	30MY	30MY	141	29
							C075.0M	P	7	0.069	7	0.071	03JN	09JN	13JN	135	10
632520	WASHOUGAL HAT DENSITY STUDY(12.13 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.1	C075.0M	P	4	0.040	4	0.044	30MY	01JN	11JN	135	21
632521	WASHOUGAL HAT DENSITY STUDY(12.13 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.2	C075.0S	B	1	0.010	1	0.010	02JN	02JN	02JN	128	18

SPECIES: COHO

MARK	HATCH/ORIGIN PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE OTHER MARKS	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
632521	WASHOUGAL HAT DENSITY STUDY(12.13 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.2	C075.0M	P	3	0.029	3	0.030	30MY	02JN	13JN	139	18
632522	WASHOUGAL HAT DENSITY STUDY(12.13 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.3	C075.0S	B	4	0.039	4	0.042	30MY	01JN	03JN	127	21
							C075.0M	P	8	0.078	8	0.083	30MY	02JN	16JN	136	18
632523	WASHOUGAL HAT DENSITY STUDY(9.8 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		22	10.2	C075.0S	B	1	0.010	1	0.011	31MY	31MY	31MY	132	24
							C075.0M	P	6	0.059	6	0.063	30MY	02JN	10JN	132	18
632524	WASHOUGAL HAT DENSITY STUDY(9.8 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		22	10.1	C075.0S	B	2	0.020	2	0.022	29MY	30MY	30MY	144	29
							C075.0M	P	2	0.020	2	0.021	30MY	01JN	05JN	135	21
632525	WASHOUGAL HAT DENSITY STUDY(9.8 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		22	10.1	C075.0S	B	2	0.020	2	0.021	30MY	01JN	03JN	128	21
							C075.0M	P	3	0.030	3	0.030	02JN	08JN	09JN	134	10
632526	WASHOUGAL HAT DENSITY STUDY(9.8 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		22	10.2	C075.0S	B	1	0.010	1	0.011	30MY	30MY	30MY	140	29
							C075.0M	P	6	0.059	7	0.065	29MY	03JN	11JN	135	16
632527	WASHOUGAL HAT DENSITY STUDY(9.8 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		22	10.1	C075.0S	B	2	0.020	2	0.022	29MY	31MY	31MY	175	24
							C075.0M	P	7	0.069	7	0.071	31MY	02JN	06JN	128	18
632528	WASHOUGAL HAT DENSITY STUDY(8.64 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.1	C075.0S	B	2	0.020	2	0.021	29MY	31MY	03JN	130	24
							C075.0M	P	7	0.069	7	0.072	30MY	04JN	14JN	136	15
632529	WASHOUGAL HAT DENSITY STUDY(8.64 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.2	C075.0S	B	4	0.039	4	0.043	29MY	31MY	02JN	132	24
							C075.0M	P	8	0.079	8	0.082	31MY	01JN	03JN	131	21
632530	WASHOUGAL HAT DENSITY STUDY(8.64 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.1	C075.0S	B	3	0.030	3	0.032	28MY	30MY	30MY	135	29
							C075.0M	P	7	0.069	7	0.073	30MY	03JN	15JN	132	16
632531	WASHOUGAL HAT DENSITY STUDY(8.64 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	10.0	C075.0M	P	4	0.040	4	0.041	30MY	01JN	06JN	139	21
632532	WASHOUGAL HAT DENSITY STUDY(8.64 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	9.9	C075.0M	P	3	0.030	3	0.031	31MY	05JN	16JN	134	13
632533	WASHOUGAL HAT DENSITY STUDY(6.64 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	9.7	C075.0S	B	3	0.031	3	0.034	29MY	31MY	02JN	127	24
							C075.0M	P	5	0.052	5	0.053	29MY	04JN	13JN	137	15
632534	WASHOUGAL HAT DENSITY STUDY(6.64 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	9.6	C075.0S	B	2	0.021	2	0.022	29MY	31MY	02JN	125	24
							C075.0M	P	7	0.073	7	0.075	31MY	05JN	12JN	135	13
632535	WASHOUGAL HAT DENSITY STUDY(6.64 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	9.7	C075.0S	B	3	0.031	3	0.034	30MY	01JN	02JN	136	21
							C075.0M	P	2	0.021	2	0.021	06JN	16JN	17JN	134	7
632536	WASHOUGAL HAT DENSITY STUDY(6.64 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	9.6	C075.0S	B	2	0.021	2	0.022	31MY	02JN	03JN	129	18
							C075.0M	P	5	0.052	5	0.057	30MY	01JN	12JN	134	21
632537	WASHOUGAL HAT DENSITY STUDY(6.64 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		21	9.7	C075.0S	B	3	0.031	3	0.034	29MY	31MY	02JN	125	24
							C075.0M	P	8	0.083	9	0.089	29MY	04JN	12JN	139	15
632538	WASHOUGAL HAT DENSITY STUDY(5.39 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		20	8.0	C075.0S	B	3	0.037	3	0.041	28MY	30MY	01JN	138	29
							C075.0M	P	5	0.062	5	0.067	30MY	01JN	04JN	139	21
632539	WASHOUGAL HAT DENSITY STUDY(5.39 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		20	7.9	C075.0S	B	3	0.038	3	0.041	28MY	30MY	30MY	137	29
							C075.0M	P	5	0.063	5	0.068	30MY	01JN	04JN	132	21
632540	WASHOUGAL HAT DENSITY STUDY(5.39 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		20	8.1	C075.0S	B	1	0.012	1	0.013	02JN	02JN	02JN	125	18
							C075.0M	P	1	0.012	1	0.012	07JN	07JN	07JN	148	11
632541	WASHOUGAL HAT DENSITY STUDY(5.39 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		20	8.1	C075.0S	B	2	0.025	2	0.027	29MY	31MY	01JN	130	24
							C075.0M	P	2	0.025	2	0.028	29MY	31MY	17JN	145	24
632542	WASHOUGAL HAT DENSITY STUDY(5.39 LBS/GAL/MIN)	WASHOUGAL R@RM 15	25MY82		20	8.0	C075.0M	P	7	0.088	8	0.097	29MY	31MY	03JN	143	24
LET GO		NO RELEASE INFO					C075.0M	P	22	0.000			29MY	30MY	30MY	141	

SORT SEQUENCE : SPECIES,SOURCE,RELEASE KM(-),START RELEASE DATE,MARK, RECAPTURE SITE(-) (FINAL/SOURCE)

SPECIES: COHO

MARK	HATCH/ORIGIN PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE OTHER MARKS	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
NO TAG		NO RELEASE INFO					C075.0S	B	43	0.000			07MY	14MY	11JN	142	
							C075.0M	P	113	0.000			19MY	23JN	25JN	137	

YEARLING CHINOOK SALMON

RELEASE AND RECAPTURE INFORMATION - COLUMBIA RIVER ESTUARY

SORT SEQUENCE : SPECIES,SOURCE,RELEASE KM(-),START RELEASE DATE,MARK, RECAPTURE SITE(-) (FINAL/SOURCE)

SPECIES: YEARLING CHINOOK

MARK	HATCH/ORIGIN / PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE / OTHER MARKS	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
072138	BONNEVILLE HAT	TANNER CR	09NO81		11	51.5	C075.0S	B	5	0.010	16	0.031	07MR	28MR	07AP	155	0
	WELL WATER TULE																
072139	BONNEVILLE HAT	TANNER CR	09NO81		9	50.1	C075.0S	B	4	0.008	25	0.051	14MR	22MR	25MR	159	0
	HAT EVAL TULE																
072141	BONNEVILLE HAT	TANNER CR	09NO81		9	49.8	C075.0S	B	1	0.002	8	0.017	25MR	26MR	26MR	184	0
	HAT EVAL BRIGHTS																
072142	BONNEVILLE HAT	TANNER CR	09NO81		11	50.7	C075.0S	B	1	0.002	3	0.006	28MR	29MR	29MR	181	0
	WELL WATER BRIGHTS																
072140	BONNEVILLE HAT	TANNER CR	17MR82		7	51.9	C075.0S	B	51	0.098	222	0.427	23MR	26MR	05AP	178	17
	WELL WATER TULE						C075.0M	P	1	0.002	4	0.008	05AP	06AP	06AP	193	8
072143	BONNEVILLE HAT	TANNER CR	17MR82		7	50.6	C075.0S	B	48	0.095	191	0.378	21MR	24MR	05AP	180	22
	WELL WATER BRIGHTS																
++++++++++																	
632156	COWLITZ HAT	COWLITZ R@RM 50	27JN81-28JN81		86	153.2	C075.0S	B	1	0.001	1	0.001	22AP	22AP	22AP	128	0
	5% EVAL																
632134	COWLITZ HAT	COWLITZ R@RM 50	01AP82		8	24.0	C075.0S	B	9	0.037	13	0.052	02AP	09AP	14AP	150	14
	ERYTHROMYCIN CONTROL																
632309	COWLITZ HAT	COWLITZ R@RM 50	01AP82		8	23.9	C075.0S	B	15	0.063	20	0.083	04AP	12AP	13MY	138	10
	EYRTHROMYCIN TREATMENT						C075.0M	P	1	0.004	1	0.004	16MY	16MY	16MY	167	3
632310	COWLITZ HAT	COWLITZ R@RM 50	01AP82		8	23.3	C075.0S	B	5	0.021	5	0.024	12AP	13AP	16AP	145	10
	EYRTHROMYCIN TREATMENT						C075.0M	P	1	0.004	1	0.005	04MY	04MY	04MY	207	3
632311	COWLITZ HAT	COWLITZ R@RM 50	01AP82		8	24.4	C075.0S	B	9	0.037	12	0.051	04AP	11AP	17AP	166	11
	EYRTHROMYCIN CONTROL						C075.0M	P	2	0.008	5	0.021	05AP	06AP	05MY	161	23
++++++++++																	
072237	DEXTER PD	M FK WILLAM@DEXTER	05NO81		4	29.4	C075.0M	P	1	0.003	3	0.011	28MR	28MR	29MR	137	1
	GRADING(UNGRADED)																
++++++++++																	
RA IJ 3	DWORSHAK HAT	N FK CLEARWATER	06AP82			0.1	C075.0M	P	1	1.000	1	1.190	21JN	21JN	21JN	172	10
	UNIV OF IDAHO																
LA IJ 3	DWORSHAK HAT	N FK CLEARWATER	05MY82			0.1	C075.0M	P	1	1.000	1	1.190	11MY	11MY	11MY	126	122
	UNIV OF IDAHO																
LD 2T 1	DWORSHAK HAT	LO GRANITE D	09AP82			2.0	C075.0S	B	2	0.100	2	0.100	03MY	05MY	07MY	131	24
	UNIV OF IDAHO																
++++++++++																	
072102	JOHN DAY R	M FK JOHN D@RM 62	28MY81-19JN81		210	3.9	C075.0M	P	2	0.052	2	0.059	02MY	04MY	05MY	115	1
	WILD STOCK EVAL																
RA IY 1	JOHN DAY R	JOHN DAY R@RM 22	08MR82-12MR82			0.0	C075.0M	P	2	#.###	2	#.###	17MY	19MY	28MY	138	4
*	WILD STOCK EVAL		(072658)														
LD IY 3	JOHN DAY R	JOHN DAY R@RM 22	18AP82-24AP82			0.0	C075.0M	P	13	#.###	13	#.###	16MY	25MY	02JN	138	8
*	WILD STOCK EVAL		(072658)														
++++++++++																	
050530	KOOSKIA HAT	CLEAR CR	16AP82		21	54.2	C075.0S	B	3	0.006	3	0.006	06MY	10MY	21MY	135	33
*	SIZE RELEASE		(RDIU1)														

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SPECIES: YEARLING CHINOOK

MARK	HATCH/ORIGIN / PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE / OTHER MARKS	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
050530	KOOSKIA HAT	CLEAR CR	16AP82		21	54.2	C075.0M	P	11	0.020	11	0.021	24MY	02JN	20JN	144	17
*	SIZE RELEASE		(RDIU1)														
050659	KOOSKIA HAT	CLEAR CR	16AP82		9	49.5	C075.0S	B	4	0.008	4	0.008	30AP	08MY	09MY	165	36
*	SIZE RELEASE		(RDIU3)				C075.0M	P	15	0.030	18	0.037	27AP	04MY	15MY	168	44
RD IU 1	KOOSKIA HAT	CLEAR CR	16AP82		21	6.1	C075.0M	P	3	0.049	3	0.050	26MY	01JN	02JN	164	17
*	SIZE AT RELEASE		(050530)														
RD IU 3	KOOSKIA HAT	CLEAR CR	16AP82		9	5.3	C075.0S	B	1	0.019	1	0.019	28AP	28AP	28AP	166	66
*	SIZE AT RELEASE		(050659)				C075.0M	P	4	0.076	4	0.080	09MY	18MY	01JN	151	25
++++++++++																	
LD IL 1	LEAVENWORTH	PATEROS FERRY	22AP82			55.4	C075.0M	P	21	0.038	21	0.038	14MY	21MY	29MY	142	26
	SYSTEMS TEST																
LD IL 3	LEAVENWORTH	PATEROS FERRY	26AP82			54.1	C075.0M	P	19	0.035	19	0.035	19MY	23MY	05JN	138	28
	SYSTEMS TEST																
LD IZ 1	LEAVENWORTH	PATEROS FERRY	30AP82			55.3	C075.0M	P	17	0.031	17	0.031	21MY	28MY	05JN	138	27
	SYSTEMS TEST																
LD IZ 3	LEAVENWORTH	PATEROS FERRY	04MY82			55.7	C075.0M	P	36	0.065	36	0.065	22MY	29MY	05JN	140	31
	SYSTEMS TEST																
051061	LEAVENWORTH	YAKIMA R@ELLENSBUR	19AP82-29AP82		19	43.5	C075.0M	P	15	0.034	15	0.035	21MY	30MY	12JN	146	17
	CONTRIBUTION																
LD IY 1	LEAVENWORTH	ROCK ISLAND D	28AP82			28.1	C075.0S	B	1	0.004	1	0.004	25MY	25MY	25MY	147	24
	SYSTEMS TEST						C075.0M	P	17	0.061	17	0.062	16MY	29MY	02JN	137	21
LD IV 1	LEAVENWORTH	ROCK ISLAND D	06MY82			28.1	C075.0M	P	10	0.036	10	0.036	20MY	29MY	05JN	142	28
	SYSTEMS TEST																
LD IV 3	LEAVENWORTH	ROCK ISLAND D	08MY82			28.2	C075.0M	P	20	0.071	20	0.072	22MY	28MY	04JN	132	33
	SYSTEMS TEST																
LD IN 1	LEAVENWORTH	PR RAPID RES	03MY82			10.1	C075.0M	P	2	0.020	2	0.020	16MY	18MY	19MY	142	38
	SYSTEMS TEST																
LD IN 3	LEAVENWORTH	PR RAPID RES	05MY82			10.1	C075.0M	P	5	0.049	5	0.049	22MY	03JN	07JN	130	19
	SYSTEMS TEST																
LD IK 1	LEAVENWORTH	PR RAPID RES	07MY82-09MY82			9.5	C075.0M	P	11	0.116	11	0.119	12MY	24MY	31MY	130	33
	SYSTEMS TEST																
LD IK 3	LEAVENWORTH	PR RAPID RES	09MY82			10.0	C075.0M	P	7	0.070	7	0.070	23MY	26MY	30MY	139	33
	SYSTEMS TEST																
LD IX 1	LEAVENWORTH	PR RAPID RES	11MY82			9.7	C075.0M	P	4	0.041	4	0.042	22MY	01JN	04JN	141	27
	SYSTEMS TEST																
LD IR 1	LEAVENWORTH	PR RAPID RES	13MY82			10.0	C075.0M	P	7	0.070	7	0.072	28MY	01JN	04JN	145	30
	SYSTEMS TEST																
LD IX 3	LEAVENWORTH	PR RAPID RES	15MY82			9.9	C075.0M	P	14	0.142	14	0.144	28MY	02JN	07JN	138	31
	SYSTEMS TEST																
LD IR 3	LEAVENWORTH	PR RAPID RES	17MY82			10.1	C075.0M	P	9	0.089	9	0.090	27MY	05JN	10JN	142	30
	SYSTEMS TEST																
RD IX 1	LEAVENWORTH	PORT KELLY WASH	04MY82			1.6	C075.0M	P	1	0.062	1	0.062	16MY	16MY	16MY	135	36
	SYSTEMS TEST/MCNARY EFFICIENCY																
RD IN 1	LEAVENWORTH	PORT KELLY WASH	06MY82			1.6	C075.0M	P	2	0.128	2	0.129	23MY	28MY	29MY	146	19
	SYSTEMS TEST/MCNARY EFFICIENCY																
RD IK 1	LEAVENWORTH	PORT KELLY WASH	08MY82			1.5	C075.0M	P	5	0.324	5	0.326	13MY	21MY	27MY	125	33
	SYSTEMS TEST/MCNARY EFFICIENCY																

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SPECIES: YEARLING CHINOOK

MARK	HATCH/ORIGIN / PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE / OTHER MARKS	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
RD IR 1	LEAVENWORTH SYSTEMS TEST/MCNARY EFFICIENCY	PORT KELLY WASH	10MY82			1.6	C075.0M	P	1	0.063	1	0.063	17MY	17MY	17MY	131	61
RD IV 1	LEAVENWORTH SYSTEMS TEST/MCNARY EFFICIENCY	PORT KELLY WASH	17MY82			1.5	C075.0M	P	1	0.065	1	0.065	28MY	28MY	28MY	135	39
RD IZ 1	LEAVENWORTH SYSTEMS TEST/MCNARY EFFICIENCY	PORT KELLY WASH	23MY82			1.6	C075.0M	P	1	0.063	1	0.066	30MY	30MY	30MY	134	61
RD IL 1	LEAVENWORTH SYSTEMS TEST/MCNARY EFFICIENCY	PORT KELLY WASH	26MY82			1.6	C075.0M	P	4	0.256	4	0.261	01JN	04JN	15JN	139	47
072523	MARION FKS HAT STOCK COMP	N SANTIAM@MINTO	03NO81	25		41.4	C075.0M	P	2	0.005	2	0.006	02MY	04MY	07MY	143	0
072524	MARION FKS HAT STOCK COMP	N SANTIAM@MINTO	03NO81	23		50.9	C075.0M	P	5	0.010	7	0.013	25AP	02MY	23MY	168	0
072525	MARION FKS HAT STOCK COMP CARSON	N SANTIAM@MINTO	15MR82	16		50.6	C075.0S	B	3	0.006	3	0.006	21AP	29AP	01MY	158	8
							C075.0M	P	9	0.018	10	0.019	02MY	10MY	19MY	142	7
072526	MARION FKS HAT STOCK COMP CARSON	N SANTIAM@MINTO	16MR82	17		50.7	C075.0S	B	3	0.006	4	0.007	22AP	26AP	27AP	142	9
							C075.0M	P	10	0.020	13	0.026	22AP	02MY	10MY	139	8
072527	MARION FKS HAT STOCK COMP CARSON	N SANTIAM@MINTO	17MR82	15		49.5	C075.0S	B	1	0.002	1	0.002	27AP	27AP	27AP	142	9
							C075.0M	P	25	0.051	32	0.065	26AP	05MY	15MY	145	8
072528	MARION FKS HAT STOCK COMP SANTIAM	N SANTIAM@MINTO	18MR82	14		50.0	C075.0S	B	2	0.004	3	0.005	18AP	20AP	27AP	120	11
							C075.0M	P	12	0.024	20	0.040	18AP	27AP	12MY	156	9
072529	MARION FKS HAT STOCK COMP SANTIAM	N SANTIAM@MINTO	19MR82	17		49.5	C075.0S	B	4	0.008	6	0.011	01AP	16AP	27AP	132	13
							C075.0M	P	18	0.036	26	0.052	21AP	01MY	09MY	147	9
072530	MARION FKS HAT STOCK COMP SANTIAM	N SANTIAM@MINTO	22MR82	15		49.2	C075.0S	B	7	0.014	9	0.017	17AP	22AP	29AP	138	12
							C075.0M	P	13	0.026	17	0.035	26AP	04MY	13MY	143	9
102412 *	MCCALL HAT VIBRIO VACCINATION	S FK SALMON R	08AP82-10AP82 (RDSU4)	18		40.8	C075.0M	P	12	0.029	12	0.030	30MY	12JN	19JN	148	17
102413 *	MCCALL HAT VIBRIO VACCINATION CONTROL	S FK SALMON R	08AP82-10AP82 (RDSU2)	18		40.5	C075.0S	B	2	0.005	2	0.005	03MY	25MY	26MY	153	23
							C075.0M	P	17	0.042	17	0.043	18MY	03JN	18JN	161	19
RD SU 2 *	MCCALL HAT TIMING	S FK SALMON R	08AP82-10AP82 (102413)	18		12.7	C075.0M	P	6	0.047	6	0.050	04MY	26MY	02JN	147	22
RD SU 4 *	MCCALL HAT TIMING	S FK SALMON R	08AP82-10AP82 (102412)	18		8.5	C075.0S	B	1	0.012	1	0.012	05MY	05MY	05MY	121	40
							C075.0M	P	3	0.035	3	0.039	29AP	20MY	24MY	199	26
072519	MCKENZIE HAT GRADING(MEDIUM)	MCKENZIE@LEABURG	05NO81	18		36.8	C075.0M	P	2	0.005	7	0.018	28MR	29MR	29MR	149	1
072054	MCKENZIE HAT SIZE GRADING (Ungraded)	MCKENZIE@LEABURG	15MR82	4		32.5	C075.0M	P	4	0.012	10	0.031	28MR	05AP	08MY	260	20
072516	MCKENZIE HAT SIZE GRADING (Large)	MCKENZIE@LEABURG	15MR82	3		36.3	C075.0M	P	2	0.006	4	0.010	23AP	25AP	29AP	245	10
072518	MCKENZIE HAT SIZE GRADING (Medium)	MCKENZIE@LEABURG	15MR82	11		34.2	C075.0M	P	2	0.006	3	0.008	29AP	01MY	03MY	154	9
LA AN 1	MCNARY D MCNARY EFFICIENCY	PORT KELLY WASH	29AP82			0.5	C075.0M	P	1	0.203	1	0.203	14JN	14JN	14JN	147	9

SORT SEQUENCE : SPECIES,SOURCE,RELEASE KM(-),START RELEASE DATE,MARK, RECAPTURE SITE(-) (FINAL/SOURCE)

SPECIES: YEARLING CHINOOK

MARK	HATCH/ORIGIN / PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE / OTHER MARKS	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
LA 3 2	MCNARY D MCNARY EFFICIENCY	PORT KELLY WASH	30AP82			1.5	C075.0M	P	1	0.068	1	0.082	09MY	09MY	09MY	139	47
LA AN 3	MCNARY D MCNARY EFFICIENCY	PORT KELLY WASH	01MY82			1.3	C075.0S	B	1	0.080	1	0.081	17JN	17JN	17JN	197	9
							C075.0M	P	1	0.080	1	0.081	13MY	13MY	13MY	170	36
LA AN 4	MCNARY D MCNARY EFFICIENCY	PORT KELLY WASH	02MY82			1.6	C075.0M	P	1	0.063	1	0.063	14MY	14MY	14MY	186	36
LA I+ 1	MCNARY D MCNARY EFFICIENCY	PORT KELLY ORE	03MY82			1.2	C075.0M	P	1	0.086	1	0.108	10MY	10MY	10MY	135	61
LA ID 3	MCNARY D MCNARY EFFICIENCY	PORT KELLY ORE	04MY82			1.4	C075.0M	P	2	0.139	2	0.141	12MY	13MY	14MY	138	47
RA 3 1	MCNARY D MCNARY EFFICIENCY	PORT KELLY ORE	05MY82			1.5	C075.0M	P	1	0.066	1	0.066	14MY	14MY	14MY	121	47
RA AN 1	MCNARY D MCNARY EFFICIENCY	PORT KELLY WASH	05MY82			1.5	C075.0S	B	1	0.066	1	0.066	15MY	15MY	15MY	121	43
							C075.0M	P	1	0.066	1	0.066	20MY	20MY	20MY	130	28
RA 3 3	MCNARY D MCNARY EFFICIENCY	PORT KELLY ORE	09MY82			1.5	C075.0M	P	1	0.066	1	0.083	10MY	10MY	10MY	136	426
RA I+ 1	MCNARY D MCNARY EFFICIENCY	PORT KELLY WASH	11MY82			0.9	C075.0M	P	1	0.115	1	0.115	19MY	19MY	19MY	122	53
RD IK 3	MCNARY D MCNARY EFFICIENCY	PORT KELLY WASH	14MY82			1.5	C075.0M	P	1	0.067	1	0.067	21MY	21MY	21MY	135	61
LD I+ 1	MCNARY D MCNARY EFFICIENCY	PORT KELLY WASH	19MY82			0.5	C075.0M	P	3	0.598	3	0.619	11MY	26MY	27MY	142	61
RD AN 2	MCNARY D MCNARY EFFICIENCY	PORT KELLY WASH	24MY82			0.2	C075.0M	P	1	0.433	1	0.575	30AP	30AP	30AP	122	-17
RD AN 3	MCNARY D MCNARY EFFICIENCY	PORT KELLY WASH	25MY82			0.1	C075.0M	P	1	0.763	1	0.782	29MY	29MY	29MY	159	107
RD AN 4	MCNARY D MCNARY EFFICIENCY	PORT KELLY ORE	26MY82			0.1	C075.0M	P	1	0.709	1	0.709	20MY	20MY	20MY	137	-70
RA +T 1	MCNARY D SLUICEWAY BYPASS EFFICIENCY@THE DA	JOHN DAY TAIL	22MY82	13		0.6	C075.0M	P	1	0.174	1	0.174	26MY	26MY	26MY	140	68
051041	NILE SP PD CONTRIBUTION	NACHES R@NILE SP	21AP82	14		21.8	C075.0M	P	7	0.032	7	0.033	06MY	14MY	22MY	158	30
LD PI 1	OAKRIDGE HAT MCKENZIE MORTALITY	MCKENZIE R@RM 44	29MR82	10		30.8	C075.0S	B	2	0.006	2	0.007	11AP	13AP	28AP	218	29
							C075.0M	P	12	0.039	13	0.043	01MY	05MY	16MY	146	12
LD PI 4	OAKRIDGE HAT MCKENZIE MORTALITY	MCKENZIE ABV LEABU	29MR82	11		32.3	C075.0S	B	2	0.006	3	0.008	18AP	20AP	23AP	186	19
							C075.0M	P	3	0.009	5	0.015	26AP	29AP	01MY	163	13
LD PI 3	OAKRIDGE HAT MCKENZIE MORTALITY	MCKENZIE@LEABURG	29MR82	11		31.3	C075.0S	B	1	0.003	1	0.004	27AP	27AP	27AP	144	14
							C075.0M	P	6	0.019	9	0.030	20AP	29AP	05MY	153	13
072308	OAKRIDGE HAT GRADING(UNGRADED)	M FK WILLAM@DEXTER	05NO81	9		29.7	C075.0S	B	3	0.010	18	0.060	12MR	14MR	16MR	214	1
							C075.0M	P	2	0.007	5	0.018	31MR	02AP	01MY	173	1
072423	OAKRIDGE HAT GRADING(MEDIUM)	M FK WILLAM@DEXTER	05NO81	19		31.7	C075.0S	B	3	0.009	13	0.041	14MR	15MR	03AP	145	1
072419	OAKRIDGE HAT SIZE GRADING (Large)	M FK WILLAM@DEXTER	15MR82	5		30.7	C075.0S	B	3	0.010	6	0.020	31MR	05AP	06AP	216	20

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SPECIES: YEARLING CHINOOK

MARK	HATCH/ORIGIN	RELEASE SITE	RELEASE DATE	SIZE AT RELEASE MM	SIZE AT RELEASE /LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	RECAPTURES ACTUAL %	RECAPTURES ADJUSTED NO.	RECAPTURES ADJUSTED %	RECAPTURE DATE 10% TILE	RECAPTURE DATE MED. FISH	RECAPTURE DATE 90% TILE	AVG LEN MM	MVMT RATE KM/DAY
	PURPOSE OF RELEASE		OTHER MARKS														
072419	OAKRIDGE HAT	M FK WILLAM@DEXTER	15MR82		5	30.7	C075.0M	P	5	0.016	21	0.069	01AP	09AP	18AP	218	17
	SIZE GRADING (Large)																
072420	Dexter Pond	M FK WILLAM@DEXTER	15MR82		14	29.5	C075.0M	P	6	0.020	13	0.043	18AP	22AP	30AP	152	11
	SIZE GRADING (Small)																
072422	Dexter Pond	M FK WILLAM@DEXTER	15MR82-16MR82		9	30.9	C075.0S	B	2	0.006	3	0.008	09AP	11AP	20AP	165	15
	SIZE GRADING (Medium)						C075.0M	P	3	0.010	7	0.022	19AP	22AP	23AP	166	11
072513	OAKRIDGE HAT	M FK WILLAM@DEXTER	15MR82		7	27.4	C075.0S	B	2	0.007	10	0.037	25MR	27MR	01AP	246	35
	SIZE GRADING (Ungraded)						C075.0M	P	5	0.018	12	0.045	28MR	02AP	30AP	229	23
RD PI 2	OAKRIDGE HAT	MCKENZIE R@RM 26	29MR82		11	30.9	C075.0S	B	4	0.013	6	0.019	17AP	25AP	26AP	154	15
	MCKENZIE MORTALITY						C075.0M	P	10	0.032	17	0.054	08AP	24AP	09MY	151	16
RD PI 1	OAKRIDGE HAT	MCKENZIE R@RM 24	29MR82		13	31.2	C075.0S	B	4	0.013	5	0.016	16AP	18AP	05MY	144	20
	MCKENZIE MORTALITY						C075.0M	P	10	0.032	14	0.045	22AP	01MY	11MY	154	12
072137	OXBOW HAT	TANNER CR	17MR82		7	48.1	C075.0S	B	43	0.089	158	0.329	23MR	26MR	09AP	173	17
	HAT EVAL BRIGHTS																
RA 5 1	PR RAPID SPAW C	ROCK ISLAND D	12AP82			5.6	C075.0M	P	2	0.035	2	0.037	11MY	13MY	24MY	162	21
	CHELAN PUD																
RA 5 4	PR RAPID SPAW C	ROCK ISLAND D	13AP82			4.1	C075.0M	P	3	0.074	3	0.074	16MY	18MY	26MY	169	19
	CHELAN PUD																
RA 5 3	PR RAPID SPAW C	ROCK ISLAND D	14AP82			4.1	C075.0S	B	1	0.025	1	0.025	01MY	01MY	01MY	139	38
	CHELAN PUD						C075.0M	P	2	0.049	2	0.061	30AP	01MY	01MY	200	38
RA 5 2	PR RAPID SPAW C	ROCK ISLAND D	19MY82			2.4	C075.0M	P	5	0.204	5	0.210	28MY	01JN	03JN	161	50
	CHELAN PUD																
102414	RAPID R HAT	RAPID R HAT	27MR82		28	42.1	C075.0S	B	1	0.002	1	0.002	22AP	22AP	22AP	124	34
*	VIBRIO VACCINATION CONTROL		(RD41)				C075.0M	P	10	0.024	12	0.029	29AP	01MY	15MY	118	25
102415	RAPID R HAT	RAPID R HAT	27MR82		28	41.4	C075.0M	P	15	0.036	19	0.047	27AP	01MY	23MY	119	25
*	VIBRIO VACCINATION		(RD41)														
RD 4 1	RAPID R HAT	RAPID R HAT	27MR82		28	11.1	C075.0S	B	1	0.009	1	0.009	29AP	29AP	29AP	110	27
*	TIMING TO LO GRANITE DAM		(102414;102415)				C075.0M	P	4	0.036	6	0.053	21AP	30AP	12MY	129	26
072349	RND BUTTE HAT	DESCHUTES R@RM 100	05OC81		11	26.9	C075.0M	P	1	0.004	1	0.004	05MY	05MY	05MY	139	0
	HATCHERY EVAL-SLOW INCUBATION																
072348	RND BUTTE HAT	DESCHUTES R@RM 100	02MR82-07MY82		6	26.4	C075.0S	B	13	0.049	22	0.082	26MR	22AP	02JN	155	8
	VOLITIONAL REL-SLOW INCUBATION						C075.0M	P	5	0.019	6	0.024	25AP	10MY	18MY	163	6
072350	RND BUTTE HAT	DESCHUTES R@RM 100	23MR82		5	24.4	C075.0S	B	5	0.020	7	0.028	04AP	25AP	03JN	192	13
	HATCHERY EVAL-SLOW INCUBATION						C075.0M	P	3	0.012	7	0.029	07AP	09AP	30AP	240	24
632251	WASHOUGAL HAT	WASHOUGAL R@RM 15	26JN81-30JN81	83	71	277.3	C075.0S	B	1	0.000	0	0.000	02MY	02MY	02MY	133	0
	5% EVAL																
632148	WASHOUGAL HAT	WASHOUGAL R@RM 15	06JL81-01SE81		81	25.4	C075.0S	B	1	0.004	1	0.004	19MR	19MR	19MR	111	0
	5% EVAL-DELAYED RELEASE																

SORT SEQUENCE : SPECIES,SOURCE,RELEASE KM(-),START RELEASE DATE,MARK, RECAPTURE SITE(-) (FINAL/SOURCE)

SPECIES: YEARLING CHINOOK

MARK	HATCH/ORIGIN	RELEASE SITE	RELEASE DATE	SIZE AT RELEASE MM	SIZE AT RELEASE /LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	RECAPTURES ACTUAL %	RECAPTURES ADJUSTED NO.	RECAPTURES ADJUSTED %	RECAPTURE DATE 10% TILE	RECAPTURE DATE MED. FISH	RECAPTURE DATE 90% TILE	AVG LEN MM	MVMT RATE KM/DAY
	PURPOSE OF RELEASE		OTHER MARKS														
LA IL 1		NO RELEASE INFO					C075.0M	P	1	0.000			23MY	23MY	23MY	143	
LD 1Z 3		NO RELEASE INFO					C075.0M	P	1	0.000			26MY	26MY	26MY	138	
NO TAG		NO RELEASE INFO					C075.0S	B	21	0.000			29MR	05AP	05MY	190	
							C075.0M	P	25	0.000			25AP	15MY	23MY	142	
RD 5 2		NO RELEASE INFO					C075.0M	P	1	0.000			31MY	31MY	31MY	159	
RD PI 4		NO RELEASE INFO					C075.0M	P	1	0.000			26AP	27AP	27AP	207	

STEELHEAD

SPECIES: STEELHEAD

MARK	HATCH/ORIGIN PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE OTHER MARKS	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
LA S 1	CHELAN HAT CHELAN PUD	ROCK ISLAND D	13AP82			3.1	C075.0M	P	3	0.096	3	0.100	04MY	12MY	21MY	249	22
LA S 3	CHELAN HAT CHELAN PUD	ROCK ISLAND D	14AP82			3.1	C075.0M	P	5	0.159	5	0.169	05MY	13MY	31MY	218	22
LA S 2	CHELAN HAT CHELAN PUD	ROCK ISLAND D	19MY82			2.7	C075.0M	P	4	0.146	4	0.149	29MY	31MY	04JN	182	54
621908	COWLITZ TROUT H STOCK EVAL	COWLITZ R@RM 47	27AP82-18MY82			11.3	C075.0M	P	11	0.097	11	0.097	15MY	18MY	29MY	195	5
051026	DWORSHAK HAT	S FK CLEARWATER	05MY82-06MY82		9	42.2	C075.0M	P	67	0.159	67	0.160	16MY	20MY	26MY	198	62
*	RELEASE SITE COMP		(RDSU1)														
RD SU 1	DWORSHAK HAT	S FK CLEARWATER	05MY82-06MY82		9	11.8	C075.0M	P	10	0.085	10	0.087	11MY	20MY	22MY	208	62
*	RELEASE SITE COMP		(051026)														
051024	DWORSHAK HAT	CLEAR CR	03MY82		7	41.4	C075.0M	P	26	0.063	26	0.063	15MY	20MY	03JN	190	47
*	SYSTEM 1-CONTRIBUTION		(RDIU1)														
LD IJ 1	DWORSHAK HAT UNIV OF IDAHO	N FK CLEARWATER	22MR82			0.1	C075.0M	P	1	1.000	1	1.000	28MY	28MY	28MY	204	11
230606	DWORSHAK HAT	N FK CLEARWATER	19AP82	179	8	29.8	C075.0M	P	4	0.011	4	0.012	10MY	22MY	12JN	190	22
*	HOMING CONTROL #1		(230606;LAK3)														
LA K 3	DWORSHAK HAT	N FK CLEARWATER	19AP82	179	8	29.8	C075.0M	P	9	0.025	10	0.027	30AP	06MY	25MY	202	43
*	HOMING CONTROL #1		(230606;LAK3)														
RA IJ 3	DWORSHAK HAT UNIV OF IDAHO	N FK CLEARWATER	20AP82			0.1	C075.0M	P	2	2.000	2	2.000	26MY	27MY	27MY	210	20
231604	DWORSHAK HAT	N FK CLEARWATER	30AP82	186	7	31.0	C075.0M	P	9	0.026	9	0.027	13MY	21MY	16JN	192	35
*	HOMING CONTROL #2		(231604;LAK2)														
LA K 2	DWORSHAK HAT	N FK CLEARWATER	30AP82	186	7	31.0	C075.0M	P	12	0.035	13	0.037	10MY	19MY	24MY	195	39
*	HOMING CONTROL #2		(231604;LAK2)														
051025	DWORSHAK HAT	N FK CLEARWATER	03MY82		7	42.5	C075.0M	P	55	0.129	56	0.132	13MY	20MY	29MY	206	43
*	SYSTEM 3-CONTRIBUTION		(RDIU3)														
RD IU 1	DWORSHAK HAT	N FK CLEARWATER	03MY82		7	11.3	C075.0M	P	5	0.044	5	0.044	14MY	19MY	26MY	202	46
*	SYSTEM 1-CONTRIBUTION AND TIMING		(051024)														
RD IU 3	DWORSHAK HAT	N FK CLEARWATER	03MY82		7	11.2	C075.0M	P	8	0.071	8	0.074	10MY	18MY	31MY	205	49
*	SYSTEM 3-CONTRIBUTION AND TIMING		(051025)														
051027	DWORSHAK HAT	N FK CLEARWATER	05MY82-06MY82		5	39.2	C075.0M	P	22	0.056	23	0.059	14MY	20MY	17JN	213	49
*	SYSTEM 2-CONTRIBUTION		(051027;LDSU1)														
LD SU 1	DWORSHAK HAT	N FK CLEARWATER	05MY82-06MY82		5	39.2	C075.0M	P	32	0.082	32	0.083	13MY	19MY	26MY	200	52
*	SYSTEM 2-CONTRIBUTION		(051027;LDSU1)														
231602	DWORSHAK HAT	N FK CLEARWATER	19MY82	186	8	31.7	C075.0M	P	14	0.041	14	0.042	25MY	29MY	03JN	195	73
*	HOMING CONTROL #3		(231602;LAK1)														
LA K 1	DWORSHAK HAT	N FK CLEARWATER	19MY82	186	8	31.7	C075.0M	P	95	0.276	98	0.284	25MY	29MY	03JN	193	73
*	HOMING CONTROL #3		(231602;LAK1)														
230607	DWORSHAK HAT	Skamania Light	22 AP82	184	8	32.2	C075.0S	B	2	0.005	3	0.008	25AP	26AP	26AP	173	36
*	HOMING TRUCKED #1		(230607;RAL3)														
230608	DWORSHAK HAT	Skamania Light	22 AP82	180	8	33.0	C075.0M	P	4	0.010	6	0.017	23AP	25AP	13MY	202	48
*	HOMING TRUCKED #1A		(230608;RAL4)														

SPECIES: STEELHEAD

MARK	HATCH/ORIGIN PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE OTHER MARKS	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
RA L 3	DWORSHAK HAT	Skamania Light	22 AP82	184	8	32.2	C075.0S	B	3	0.008	4	0.010	24AP	26AP	28AP	176	36
*	HOMING TRUCKED #1		(230607;RAL3)				C075.0M	P	10	0.027	18	0.051	23AP	25AP	04MY	178	48
RA L 4	DWORSHAK HAT	Skamania Light	22 AP82	180	8	33.0	C075.0S	B	3	0.008	4	0.011	24AP	25AP	27AP	198	48
*	HOMING TRUCKED #1A		(230608;RAL4)				C075.0M	P	6	0.016	13	0.033	23AP	24AP	24AP	180	72
231605	DWORSHAK HAT	Skamania Light	03 My82	189	7	32.9	C075.0S	B	1	0.003	1	0.003	06MY	06MY	06MY	215	48
*	HOMING TRUCKED #2		(231605;RAL2)				C075.0M	P	5	0.014	5	0.014	04MY	06MY	30MY	184	48
RA L 2	DWORSHAK HAT	Skamania Light	03 My82	189	7	32.9	C075.0S	B	1	0.003	1	0.003	06MY	06MY	06MY	218	48
*	HOMING TRUCKED #2		(231605;RAL2)				C075.0M	P	7	0.019	7	0.020	04MY	05MY	12MY	192	72
231603	DWORSHAK HAT	Skamania Light	22 MY82	185	8	29.5	C075.0M	P	11	0.033	11	0.033	22MY	23MY	24MY	192	144
*	HOMING TRUCKED #3		(231603;RAPP1)														
RA PP 1	DWORSHAK HAT	Skamania Light	22 MY82	185	8	29.5	C075.0M	P	58	0.175	58	0.175	22MY	23MY	24MY	194	144
*	HOMING TRUCKED #3		(231603;RAPP1)														
231601	DWORSHAK HAT	Skamania Light	03 Jn82	181	8	31.9	C075.0S	B	1	0.003	1	0.003	05JN	05JN	05JN	221	72
*	HOMING TRUCKED #4		(231601;RAL1)				C075.0M	P	16	0.046	16	0.046	03JN	04JN	05JN	193	144
RA L 1	DWORSHAK HAT	Skamania Light	03 Jn82	181	8	31.9	C075.0M	P	109	0.311	109	0.312	03JN	04JN	05JN	193	72
051020	HAGERMAN HAT STOCK COMP A	PAHSIMEROI R	07AP82		2	59.0	C075.0M	P	121	0.205	124	0.211	20MY	30MY	12JN	263	23
051021	HAGERMAN HAT STOCK COMP B	PAHSIMEROI R	07AP82		4	56.5	C075.0M	P	72	0.127	73	0.129	18MY	26MY	05JN	224	25
RD 4 1	HAGERMAN HAT TIMING TO LO GRANITE DAM	PAHSIMEROI R	10MY82		3	7.0	C075.0M	P	5	0.072	5	0.075	02JN	09JN	19JN	248	41
LA F 2	LO GRANITE D LO GRANITE EFFICIENCY	CLARKSTON WASH	03MY82			5.3	C075.0M	P	7	0.132	7	0.137	10MY	14MY	22MY	190	61
RA F 2	LO GRANITE D LO GRANITE EFFICIENCY	CLARKSTON WASH	04MY82			4.7	C075.0M	P	4	0.085	4	0.085	19MY	20MY	23MY	205	42
LA F 3	LO GRANITE D LO GRANITE EFFICIENCY	CLARKSTON WASH	10MY82			4.5	C075.0M	P	14	0.313	14	0.313	16MY	18MY	23MY	200	83
RA F 3	LO GRANITE D LO GRANITE EFFICIENCY	CLARKSTON WASH	11MY82			5.6	C075.0M	P	16	0.284	16	0.285	18MY	23MY	28MY	202	56
LA F 4	LO GRANITE D LO GRANITE EFFICIENCY	CLARKSTON WASH	18MY82			3.1	C075.0M	P	11	0.358	11	0.365	23MY	27MY	01JN	197	74
LA F 1	LO GRANITE D LO GRANITE EFFICIENCY	LO GRANITE RES	26AP82			7.2	C075.0S	B	1	0.014	1	0.014	09MY	09MY	09MY	190	48
							C075.0M	P	8	0.112	8	0.114	05MY	13MY	20MY	196	37
RA F 1	LO GRANITE D LO GRANITE EFFICIENCY	LO GRANITE RES	27AP82			2.9	C075.0M	P	2	0.070	2	0.070	15MY	17MY	19MY	180	31
LA 2 1	LO GRANITE D LO GRANITE EFFICIENCY	LIT GOOSE TAIL	28AP82			2.8	C075.0M	P	5	0.177	5	0.189	06MY	12MY	18MY	194	40
RA 2 1	LO GRANITE D LO GRANITE EFFICIENCY	LIT GOOSE TAIL	29AP82			5.6	C075.0M	P	10	0.178	11	0.198	06MY	09MY	13MY	183	56
LA 2 2	LO GRANITE D LO GRANITE EFFICIENCY	LIT GOOSE TAIL	05MY82			4.7	C075.0M	P	10	0.213	10	0.218	12MY	17MY	29MY	260	47
RA 2 2	LO GRANITE D LO GRANITE EFFICIENCY	LIT GOOSE TAIL	06MY82			3.6	C075.0M	P	6	0.171	6	0.171	16MY	22MY	04JN	212	35

SPECIES: STEELHEAD

MARK	HATCH/ORIGIN	RELEASE SITE	RELEASE DATE	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	RECAPTURES ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
	PURPOSE OF RELEASE		OTHER MARKS														
LA 2 3	LO GRANITE D	LIT GOOSE TAIL	12MY82			4.1	C075.OM	P	6	0.146	6	0.146	19MY	20MY	21MY	206	70
	LO GRANITE EFFICIENCY																
RA 2 3	LO GRANITE D	LIT GOOSE TAIL	13MY82			4.2	C075.OM	P	5	0.120	5	0.120	19MY	21MY	24MY	195	70
	LO GRANITE EFFICIENCY																
LA 2 4	LO GRANITE D	LIT GOOSE TAIL	19MY82			4.0	C075.OM	P	8	0.199	8	0.203	26MY	28MY	31MY	233	62
	LO GRANITE EFFICIENCY																
RA 2 4	LO GRANITE D	LIT GOOSE TAIL	26MY82			2.0	C075.OM	P	2	0.100	2	0.102	31MY	02JN	03JN	202	80
	LO GRANITE EFFICIENCY																
LA IS 1	LO GRANITE D	PORT KELLY ORE	30AP82			2.0	C075.OM	P	1	0.050	1	0.051	05MY	05MY	05MY	198	85
	LO GRANITE EFFICIENCY																
RA IS 1	LO GRANITE D	PORT KELLY WASH	30AP82			2.0	C075.OM	P	4	0.196	4	0.209	04MY	06MY	09MY	182	71
	LO GRANITE EFFICIENCY																
LA IS 2	LO GRANITE D	PORT KELLY WASH	07MY82			2.8	C075.OM	P	1	0.036	1	0.036	15MY	15MY	15MY	272	53
	LO GRANITE EFFICIENCY																
RA IS 2	LO GRANITE D	PORT KELLY ORE	07MY82			2.3	C075.OM	P	3	0.131	3	0.131	14MY	17MY	21MY	192	43
	LO GRANITE EFFICIENCY																
LA IS 3	LO GRANITE D	PORT KELLY WASH	14MY82			2.1	C075.OM	P	1	0.047	1	0.047	20MY	20MY	20MY	194	71
	LO GRANITE EFFICIENCY																
RA IS 3	LO GRANITE D	PORT KELLY ORE	14MY82			2.1	C075.OM	P	3	0.141	3	0.141	18MY	21MY	23MY	223	61
	LO GRANITE EFFICIENCY																
LA IS 4	LO GRANITE D	PORT KELLY WASH	21MY82			2.1	C075.OM	P	2	0.095	2	0.095	25MY	26MY	27MY	184	85
	LO GRANITE EFFICIENCY																
RA IS 4	LO GRANITE D	PORT KELLY ORE	21MY82			1.9	C075.OM	P	6	0.317	6	0.320	25MY	28MY	01JN	229	61
	LO GRANITE EFFICIENCY																
LP IS 1	LO GRANITE D	PORT KELLY WASH	27MY82			2.1	C075.OM	P	4	0.189	4	0.192	01JN	02JN	03JN	206	71
	LO GRANITE EFFICIENCY																
RP IS 1	LO GRANITE D	PORT KELLY ORE	27MY82			2.0	C075.OM	P	7	0.343	7	0.347	01JN	03JN	03JN	210	61
	LO GRANITE EFFICIENCY																
LA 3 2	MCNARY D	PORT KELLY WASH	30AP82			0.7	C075.OM	P	1	0.147	1	0.175	09MY	09MY	09MY	155	47
	MCNARY EFFICIENCY																
LA 3 3	MCNARY D	PORT KELLY ORE	01MY82			0.4	C075.OM	P	2	0.494	2	0.547	04MY	08MY	09MY	124	61
	MCNARY EFFICIENCY																
LA I+ 1	MCNARY D	PORT KELLY ORE	03MY82			0.5	C075.OM	P	2	0.399	2	0.409	04MY	05MY	05MY	190	213
	MCNARY EFFICIENCY																
RA 3 1	MCNARY D	PORT KELLY ORE	05MY82			0.5	C075.OM	P	1	0.185	1	0.190	05MY	05MY	05MY	139	426
	MCNARY EFFICIENCY																
RA AN 1	MCNARY D	PORT KELLY WASH	05MY82			0.5	C075.OM	P	1	0.189	1	0.189	20MY	20MY	20MY	233	28
	MCNARY EFFICIENCY																
RA I+ 1	MCNARY D	PORT KELLY WASH	11MY82			0.4	C075.OM	P	2	0.562	2	0.562	15MY	17MY	18MY	204	71
	MCNARY EFFICIENCY																
RA AN 2	MCNARY D	PORT KELLY WASH	13MY82			0.5	C075.OM	P	1	0.199	1	0.199	21MY	21MY	21MY	220	53
	MCNARY EFFICIENCY																
LD 3 2	MCNARY D	PORT KELLY ORE	16MY82			0.6	C075.OM	P	2	0.336	2	0.336	21MY	22MY	23MY	198	71
	MCNARY EFFICIENCY																
LD AN 3	MCNARY D	PORT KELLY ORE	17MY82			0.3	C075.OM	P	1	0.353	1	0.370	07MY	07MY	07MY	226	-42
	MCNARY EFFICIENCY																

SPECIES: STEELHEAD

MARK	HATCH/ORIGIN	RELEASE SITE	RELEASE DATE	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	RECAPTURES ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
	PURPOSE OF RELEASE		OTHER MARKS														
LD 3 4	MCNARY D	PORT KELLY ORE	18MY82			0.4	C075.OM	P	1	0.276	1	0.276	26MY	26MY	26MY	212	53
	MCNARY EFFICIENCY																
LD ID 1	MCNARY D	PORT KELLY ORE	19MY82			0.6	C075.OM	P	1	0.177	1	0.177	26MY	26MY	26MY	250	61
	MCNARY EFFICIENCY																
RD 3 1	MCNARY D	PORT KELLY ORE	23MY82			0.4	C075.OM	P	2	0.545	2	0.577	29MY	31MY	31MY	237	53
	MCNARY EFFICIENCY																
RD AN 1	MCNARY D	PORT KELLY WASH	23MY82			0.4	C075.OM	P	1	0.267	1	0.274	13MY	13MY	13MY	252	-42
	MCNARY EFFICIENCY																
051060	NELSON SP PD	NACHES R@NEL SP	14AP82-04MY82		6	29.0	C075.OM	P	17	0.059	17	0.059	15MY	19MY	30MY	220	19
	CONTRIBUTION																
102404	NIAGARA SPRINGS	PAHSIMEROI R	09AP82		3	40.2	C075.OM	P	56	0.139	57	0.143	15MY	25MY	07JN	237	27
	VIBRIO VACCINATION																
102450	NIAGARA SPRINGS	PAHSIMEROI R	09AP82		3	40.5	C075.OS	B	1	0.002	1	0.002	13MY	13MY	13MY	260	36
	VIBRIO VACCINATION CONTROL						C075.OM	P	52	0.128	53	0.131	15MY	30MY	07JN	260	24
621608	TUCANNON HAT	GRAND RONDE R	04MY81-15MY81		7	106.8	C075.OM	P	1	0.001	1	0.001	05MY	05MY	05MY	291	1
*	IDENT BROOD STK FOR NEW LYONS FERR (621608;LAT2)																
621650	TUCANNON HAT	GRAND RONDE R	07MY82-20MY82			66.0	C075.OM	P	7	0.011	7	0.011	20MY	21MY	31MY	176	51
*	WASHINGTON STATE		(LA IJ 1,3)														
LA IJ 1	TUCANNON HAT	GRAND RONDE R	07MY82-14MY82			36.0	C075.OM	P	38	0.106	39	0.108	21MY	27MY	31MY	170	36
*	WASHINGTON STATE		(621650)														
LA IJ 3	TUCANNON HAT	LYONS FERRY	18MY82-20MY82			30.0	C075.OM	P	22	0.073	22	0.074	22MY	25MY	02JN	179	75
*	WASHINGTON STATE		(621650)														
LA IH 3	TURTLE ROCK PD	ROCKY REACH RES	13AP82-22AP82			14.2	C075.OM	P	6	0.042	6	0.043	26MY	30MY	06JN	200	15
*	SYSTEMS TEST		(WH8LLA;LAIH3)														
072202	WALLOWA HAT	WALLOWA HAT	03AP81-08AP81		5	55.2	C075.OM	P	1	0.002	1	0.002	17MY	17MY	17MY	253	1
	STOCK EVAL																
050729	WARM SPRING HAT	WM SP R@HWY 26	01AP81-02AP81	110	54	98.0	C075.OM	P	3	0.003	3	0.003	26MY	09JN	12JN	263	0
	CONTRIBUTION																
RA IV 1	WELLS SPAW CH	METHOW R@RM 28	19AP82-23AP82			25.0	C075.OM	P	16	0.064	17	0.066	11MY	20MY	28MY	214	26
*	SYSTEMS TEST		(WH8LWH;RAIV1)														
WH8LWH	WELLS SPAW CH	METHOW R@RM 28	19AP82-23AP82			25.0	C075.OM	P	7	0.028	7	0.028	16MY	18MY	21MY	216	28
*	SYSTEMS TEST		(WH0LWH;RAIV1)														
RA IR 1	WELLS SPAW CH	BLW PR RAPID D	20AP82-24AP82			24.9	C075.OM	P	24	0.096	26	0.104	03MY	08MY	24MY	224	31
*	SYSTEMS TEST		(WH0LOR;RAIR1)														

SORT SEQUENCE : SPECIES,SOURCE,RELEASE KM(-),START RELEASE DATE,MARK, RECAPTURE SITE(-) (FINAL/SOURCE)

SPECIES: STEELHEAD

MARK	HATCH/ORIGIN	RELEASE SITE	RELEASE DATE	SIZE AT RELEASE MM	/LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	%	ADJUSTED NO.	%	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
	PURPOSE OF RELEASE		OTHER MARKS														
WHBLOR	WELLS SPAW CH	BLW PR RAPID D	20AP82-24AP82			24.9	C075.0M	P	1	0.004	1	0.005	02MY	02MY	02MY	222	47
*	SYSTEMS TEST		(WHBLOR;RAIR1)														
LA L 1		NO RELEASE INFO					C075.0M	P	2	0.000			12MY	14MY	04JN	180	
LA Y 1		NO RELEASE INFO					C075.0M	P	1	0.000			26MY	26MY	26MY	207	
NO TAG		NO RELEASE INFO					C075.0S	B	3	0.000			25AP	23MY	23MY	128	
							C075.0M	P	79	0.000			17MY	23MY	07JN	211	
WH BL		NO RELEASE INFO					C075.0M	P	1	0.000			13MY	13MY	13MY	225	
WHBLPU		NO RELEASE INFO					C075.0M	P	2	0.000			15MY	01JN	02JN	223	

SUBYEARLING CHINOOK SALMON

SPECIES: SUB-YEAR CHINOOK

MARK	HATCH/ORIGIN PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE OTHER MARKS	SIZE AT RELEASE MM	SIZE AT RELEASE /LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	ACTUAL %	ADJUSTED NO.	ADJUSTED %	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
051058	ABERNATHY SCDC CONTRIBUTION	ABERNATHY CR	20AP82-01JN82			90.6	C075.0S	B	72	0.079	73	0.081	01MY	03JN	06JN	91	0
							C075.0M	P	21	0.023	21	0.024	19MY	02JN	06JN	92	0
051059	ABERNATHY SCDC CONTRIBUTION	ABERNATHY CR	20AP82-01JN82			29.8	C075.0S	B	32	0.107	32	0.108	02MY	03JN	06JN	91	0
							C075.0M	P	4	0.013	5	0.016	25MY	07JN	25JN	95	0
072663	BONNEVILLE HAT UP RIVER RELEASE	UMATILLA R@RM 2	14AP82-20AP82		92	102.4	C075.0S	B	120	0.117	122	0.120	29AP	05MY	11MY	82	19
							C075.0M	P	17	0.017	18	0.017	16MY	11JN	19JN	119	7
LD T 1	BONNEVILLE HAT BONN POWERHOUSE EVAL	BONN NEW P H	23AP82	72		51.8	C075.0S	B	221	0.427	223	0.431	28AP	01MY	09MY	75	20
RD T 1	BONNEVILLE HAT BONN POWERHOUSE EVAL	BONN NEW P H	23AP82	72		54.4	C075.0S	B	199	0.366	200	0.368	28AP	01MY	09MY	76	20
LD T 2	BONNEVILLE HAT BONN POWERHOUSE EVAL	BONN TAIL	23AP82	72		52.9	C075.0S	B	215	0.406	217	0.411	28AP	01MY	09MY	74	20
RD T 2	BONNEVILLE HAT BONN POWERHOUSE EVAL	BONN TAIL	23AP82	72		49.9	C075.0S	B	156	0.313	156	0.314	28AP	02MY	09MY	76	17
							C075.0M	P	3	0.006	4	0.007	29AP	01MY	14MY	78	20
072407	BONNEVILLE HAT HAT EVAL-WELL WATER	TANNER CR	23AP82		80	105.9	C075.0S	B	256	0.242	259	0.245	28AP	01MY	07MY	82	20
							C075.0M	P	6	0.006	10	0.009	26AP	28AP	05MY	84	31
072408	BONNEVILLE HAT HAT EVAL-TANNER CR WATER	TANNER CR	21MY82-04JN82		80	96.8	C075.0S	B	171	0.177	174	0.179	28MY	03JN	07JN	81	12
							C075.0M	P	11	0.011	12	0.013	30MY	08JN	13JL	88	9
072425	BONNEVILLE HAT HAT EVAL	TANNER CR	01JN82		51	100.1	C075.0S	B	80	0.080	80	0.080	04JN	06JN	08JN	94	31
							C075.0M	P	24	0.024	24	0.024	04JN	05JN	08JN	94	39
072414	BONNEVILLE HAT DIET(OMP2)	TANNER CR	04JN82		97	51.6	C075.0S	B	27	0.052	27	0.053	06JN	08JN	15JN	74	39
							C075.0M	P	7	0.014	7	0.014	06JN	07JN	07JN	83	52
072415	BONNEVILLE HAT DIET(OMP2)	TANNER CR	04JN82		85	52.5	C075.0S	B	41	0.078	41	0.079	06JN	08JN	13JN	80	39
							C075.0M	P	9	0.017	9	0.017	06JN	08JN	12JN	85	39
072416	BONNEVILLE HAT DIET(PRESSCAKE)	TANNER CR	04JN82		83	52.5	C075.0S	B	36	0.069	36	0.069	07JN	09JN	15JN	79	31
							C075.0M	P	9	0.017	13	0.024	07JN	09JN	19JL	87	31
072417	BONNEVILLE HAT DIET(PRESSCAKE)	TANNER CR	04JN82		83	54.1	C075.0S	B	36	0.067	37	0.068	07JN	10JN	16JN	80	26
							C075.0M	P	10	0.018	10	0.019	06JN	07JN	09JN	84	52
072424	BONNEVILLE HAT HAT EVAL BRIGHTS	TANNER CR	04JN82		79	105.0	C075.0S	B	193	0.184	196	0.187	09JN	13JN	19JN	80	17
							C075.0M	P	20	0.019	29	0.028	13JN	27JN	03JL	95	7
072426	BONNEVILLE HAT BRIGHTS WELL WATER	TANNER CR	03AU82		40	105.0	C075.0S	B	75	0.071	137	0.130	08AU	11AU	06SE	104	20
							C075.0M	P	16	0.015	72	0.069	08AU	14AU	23AU	107	14
RD U 2	BONNEVILLE HAT SURVIVAL AND EFFICIENCY	PRESCOTT ORE	30AP82-03MY82	80		52.5	C075.0S	B	208	0.396	208	0.396	01MY	03MY	06MY	83	13
							C075.0M	P	11	0.021	13	0.024	01MY	03MY	04MY	86	13
LD U 1	BONNEVILLE HAT SURVIVAL AND EFFICIENCY	PRESCOTT ORE	01JN82-04JN82	79		52.2	C075.0S	B	154	0.295	155	0.297	02JN	04JN	06JN	77	13
							C075.0M	P	5	0.010	5	0.010	02JN	05JN	08JN	82	10
632032	COWLITZ HAT 5% PROD EVAL	COWLITZ R@RM 50	24JN82-29JN82		98	41.3	C075.0S	B	134	0.324	209	0.506	08JL	26JL	25AU	74	4
							C075.0M	P	2	0.005	8	0.020	12JL	12SE	13SE	89	1
632462	COWLITZ HAT 5% PROD	COWLITZ R@RM 50	24JN82-08JL82		90	199.2	C075.0S	B	481	0.241	601	0.302	06JL	14JL	09AU	81	6
							C075.0M	P	42	0.021	102	0.051	27JN	14JL	11AU	89	6
LD L 3	HAGERMAN HAT UNIV OF IDAHO	N FK CLEARWATER	18MY82			0.1	C075.0S	B	1	1.000	1	1.000	18MY	18MY	18MY	81	734
LD J 1	HAGERMAN HAT UNIV OF IDAHO	N FK CLEARWATER	15JN82			0.1	C075.0M	P	1	1.000	1	1.190	07JL	07JL	07JL	102	33

SPECIES: SUB-YEAR CHINOOK

MARK	HATCH/ORIGIN PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE OTHER MARKS	SIZE AT RELEASE MM	SIZE AT RELEASE /LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	ACTUAL %	ADJUSTED NO.	ADJUSTED %	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
051022	HAGERMAN HAT * RELEASE SITE COMP	ASOTIN WASH	01JN82-03JN82 (RDX1)		37	78.3	C075.0M	P	84	0.107	130	0.166	21JN	29JN	13JL	128	24
RD X 1	HAGERMAN HAT * RELEASE SITE COMP	ASOTIN WASH	01JN82-03JN82 (051022)			10.0	C075.0M	P	1	0.010	0	0.000	20JN	20JN	12JN	135	36
051023	HAGERMAN HAT * RELEASE SITE COMP	LO GRANITE RES	01JN82-03JN82 (LDX1)		38	80.4	C075.0S	B	7	0.009	7	0.009	08JN	11JN	13JN	101	62
							C075.0M	P	97	0.121	146	0.182	18JN	29JN	08JL	127	22
LD X 1	HAGERMAN HAT * RELEASE SITE COMP	LO GRANITE RES	01JN82-03JN82 (051023)			10.9	C075.0S	B	1	0.009	1	0.009	12JN	12JN	12JN	113	57
632460	KALAMA FALLS HA 5% PROD	KALAMA R@RM 15	10JN82-02JL82		130	163.2	C075.0S	B	172	0.105	228	0.139	14JN	07JL	21AU	73	2
							C075.0M	P	13	0.008	23	0.014	15JN	07JL	30AU	86	2
632157	KLICKITAT HAT 5% PROD EVAL	KLICKITAT R	04JN82		83	204.1	C075.0S	B	167	0.082	169	0.083	03JN	13JN	19JN	80	31
							C075.0M	P	47	0.023	58	0.028	09JN	14JN	17JL	89	28
LD U 3	KLICKITAT HAT SURVIVAL AND EFFICIENCY	PRESCOTT ORE	14JN82-17JN82	84		51.7	C075.0S	B	39	0.075	40	0.077	13JN	14JN	17JN	84	40
							C075.0M	P	15	0.029	15	0.029	13JN	14JN	14JN	85	40
050435	LIT WH SAL HAT HAT EVAL & CONTRIBUTION	LIT WH SAL R@RM 2	02JN82-03JN82		93	101.3	C075.0S	B	105	0.104	106	0.105	07JN	11JN	17JN	77	21
							C075.0M	P	16	0.016	18	0.018	06JN	10JN	12JL	82	23
050436	LIT WH SAL HAT HAT EVAL & CONTRIBUTION	LIT WH SAL R@RM 2	02JN82-03JN82		93	98.5	C075.0S	B	120	0.122	121	0.123	07JN	11JN	15JN	78	21
							C075.0M	P	26	0.026	26	0.027	06JN	08JN	13JN	82	31
LD U 2	LIT WH SAL HAT SURVIVAL AND EFFICIENCY	PRESCOTT ORE	07JN82-10JN82	76		52.7	C075.0S	B	74	0.141	74	0.141	07JN	11JN	14JN	76	10
							C075.0M	P	9	0.017	9	0.018	08JN	10JN	12JN	81	13
632463	LO KALAMA HAT 5% PROD	KALAMA R@RM 6	13JN82-25JN82		117	139.4	C075.0S	B	168	0.120	199	0.143	15JN	26JN	17AU	70	4
							C075.0M	P	23	0.016	26	0.019	14JN	16JN	27JN	77	17
LA H 1	MCNARY D * TRANSPORTATION CONTROL	MCNARY TAIL	24JN82 (231609)			2.4	C075.0M	P	1	0.042	4	0.174	25JL	26JL	26JL	122	12
LA IC 1	MCNARY D * TRANSPORTATION CONTROL	MCNARY TAIL	06JL82 (231611)			0.5	C075.0M	P	1	0.217	4	0.904	25JL	26JL	26JL	121	20
LA IC 3	MCNARY D * TRANSPORTATION CONTROL	MCNARY TAIL	13JL82 (231611)			3.1	C075.0M	P	1	0.033	4	0.136	25JL	26JL	26JL	116	30
LA IM 1	MCNARY D * TRANSPORTATION CONTROL	MCNARY TAIL	15JL82 (231611)			4.3	C075.0M	P	1	0.023	4	0.096	25JL	26JL	26JL	112	36
LA IF 4	MCNARY D * TRANSPORTATION CONTROL	MCNARY TAIL	22JL82 (231611)			2.0	C075.0M	P	1	0.050	4	0.207	01AU	02AU	02AU	114	36
LA IC 2	MCNARY D * TRANSPORTATION CONTROL	MCNARY TAIL	27JL82 (231613)			3.3	C075.0M	P	2	0.061	8	0.255	08AU	09AU	09AU	121	30
LA +Y 1	MCNARY D * JOHN DAY EFFICIENCY	MCNARY TAIL	10AU82 (231615)			3.0	C075.0M	P	2	0.067	19	0.639	18AU	03SE	03SE	126	16
LA +U 1	MCNARY D * JOHN DAY EFFICIENCY	MCNARY TAIL	17AU82 (231615)			3.5	C075.0M	P	1	0.029	5	0.145	14SE	15SE	15SE	142	14
231610	MCNARY D * TRANSPORTATION STUDY	BONN TAIL	25JN82-02JL82 (231610;RAV1)			5.4	C075.0M	P	2	0.037	3	0.057	27JN	29JN	01JL	85	39
RA V 1	MCNARY D * TRANSPORTATION STUDY	BONN TAIL	25JN82-02JL82 (231610;RAV1)			5.4	C075.0S	B	2	0.037	2	0.038	28JN	30JN	01JL	81	31

SPECIES: SUB-YEAR CHINOOK

MARK	HATCH/ORIGIN PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE OTHER MARKS	SIZE AT RELEASE MM	SIZE AT RELEASE /LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	ACTUAL %	ADJUSTED NO.	ADJUSTED %	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
RA V 1	MCNARY D	BONN TAIL	25JN82-02JL82			5.4	C075.0M	P	3	0.056	5	0.087	30JN	02JL	02JL	98	22
*	TRANSPORTATION STUDY		(231610;RAV1)														
231612	MCNARY D	BONN TAIL	12JL82-21JL82			18.8	C075.0M	P	1	0.005	3	0.018	15JL	16JL	16JL	112	39
*	TRANSPORTATION STUDY		(231612;RAV2)														
RA V 2	MCNARY D	BONN TAIL	12JL82-21JL82			18.8	C075.0M	P	7	0.037	30	0.162	17JL	19JL	25JL	106	22
*	TRANSPORTATION STUDY		(231612;RAV2)														
231614	MCNARY D	BONN TAIL	26JL82-06AU82			15.5	C075.0S	B	1	0.006	2	0.010	29JL	29JL	29JL	106	52
*	TRANSPORTATION STUDY		(231614;RAV3)				C075.0M	P	1	0.006	4	0.027	29JL	30JL	30JL	113	39
RA V 3	MCNARY D	BONN TAIL	26JL82-06AU82			15.5	C075.0M	P	6	0.039	22	0.145	28JL	08AU	11AU	118	12
*	TRANSPORTATION STUDY		(231614;RAV3)														
072330	OXBOW HAT	TANNER CR	04JN82-25JN82		78	52.4	C075.0S	B	36	0.069	37	0.071	11JN	22JN	30JN	82	9
	HAT EVAL						C075.0M	P	9	0.017	12	0.024	19JN	28JN	01JL	88	7
072411	OXBOW HAT	TANNER CR	04JN82-25JN82		78	52.5	C075.0S	B	32	0.061	33	0.063	07JN	21JN	28JN	79	9
	HAT EVAL						C075.0M	P	15	0.029	19	0.037	08JN	21JN	28JL	84	9
632252	PR RAPID SPAW C	PR RAPID SPAW CH	18MY82-16JN82		87	262.2	C075.0M	P	93	0.035	191	0.073	23JN	04JL	26JL	101	12
	5% PROD EVAL																
632456	PR RAPID SPAW C	PR RAPID SPAW CH	18MY82		67	48.7	C075.0M	P	35	0.072	47	0.097	12JN	23JN	04JL	114	16
	5% PROD																
050851	SPRING CR HAT	UMATILLA R@RM 2	08AP82-13AP82		79	46.7	C075.0S	B	44	0.094	44	0.094	30AP	04MY	10MY	83	15
	UPPER RIVER RELEASE(TRUCK)						C075.0M	P	4	0.009	4	0.009	01MY	17MY	16JN	96	10
051057	SPRING CR HAT	UMATILLA R@RM 2	08AP82-13AP82		79	102.3	C075.0S	B	95	0.093	96	0.094	29AP	04MY	10MY	83	15
	UPPER RIVER RELEASE(TRUCK)						C075.0M	P	11	0.011	12	0.012	04MY	01JN	21JN	109	7
051050	SPRING CR HAT	SPRING CR HAT	25MR82-26MR82		110	151.4	C075.0S	B	99	0.065	142	0.094	23MR	12AP	06MY	74	11
	HAT EVAL & CONTRIBUTION						C075.0M	P	7	0.005	7	0.005	16MY	24MY	15JN	119	3
051051	SPRING CR HAT	SPRING CR HAT	15AP82		77	38.9	C075.0S	B	81	0.208	93	0.239	21AP	25AP	08MY	82	19
	HAT EVAL						C075.0M	P	2	0.005	2	0.005	15MY	17MY	24MY	100	6
051053	SPRING CR HAT	SPRING CR HAT	15AP82		72	43.2	C075.0S	B	66	0.153	74	0.170	20AP	25AP	04MY	85	19
	DIET(CONTROL)						C075.0M	P	2	0.005	3	0.007	22AP	24AP	18MY	93	22
051054	SPRING CR HAT	SPRING CR HAT	15AP82		68	48.5	C075.0S	B	70	0.144	82	0.168	20AP	24AP	06MY	85	22
	DIET(CONTROL)						C075.0M	P	1	0.002	1	0.002	06MY	06MY	06MY	100	9
051055	SPRING CR HAT	SPRING CR HAT	15AP82		73	41.3	C075.0S	B	72	0.174	83	0.201	20AP	24AP	07MY	85	22
	DIET(7% SALT)																
051056	SPRING CR HAT	SPRING CR HAT	15AP82		74	48.3	C075.0S	B	61	0.126	69	0.143	20AP	23AP	08MY	85	24
	DIET(7% SALT)						C075.0M	P	3	0.006	4	0.009	21AP	23AP	01JN	79	24
051052	SPRING CR HAT	SPRING CR HAT	20MY82		49	58.3	C075.0S	B	56	0.096	58	0.099	23MY	25MY	28MY	95	39
	HAT EVAL & CONTRIBUTION						C075.0M	P	17	0.029	17	0.029	22MY	24MY	26MY	97	49
RD T 3	SPRING CR HAT	PRESCOTT ORE	09AP82-12AP82	75		48.0	C075.0S	B	53	0.110	58	0.120	10AP	13AP	15AP	73	10
	SURVIVAL STUDY																
RD U 1	SPRING CR HAT	PRESCOTT ORE	26AP82	85		53.8	C075.0S	B	137	0.254	145	0.270	26AP	29AP	05MY	81	13
	SURVIVAL AND EFFICIENCY						C075.0M	P	4	0.007	9	0.016	26AP	27AP	27AP	77	40
RD U 3	SPRING CR HAT	PRESCOTT ORE	24MY82-27MY82	96		53.7	C075.0S	B	87	0.162	90	0.167	24MY	26MY	28MY	93	20
	SURVIVAL AND EFFICIENCY																

SPECIES: SUB-YEAR CHINOOK

MARK	HATCH/ORIGIN PURPOSE OF RELEASE	RELEASE SITE	RELEASE DATE OTHER MARKS	SIZE AT RELEASE MM	SIZE AT RELEASE /LB	NO. MKD THOUS	RECAPT. SITE R. KM	GEAR CODE	RECAPTURES ACTUAL NO.	ACTUAL %	ADJUSTED NO.	ADJUSTED %	RECAPTURE DATE 10% TILE	MED. FISH	90% TILE	AVG LEN MM	MVMT RATE KM/DAY
RD U 3	SPRING CR HAT	PRESCOTT ORE	24MY82-27MY82	96		53.7	C075.0M	P	3	0.006	3	0.006	24MY	25MY	25MY	90	40
	SURVIVAL AND EFFICIENCY																
072662	STAYTON PD	VAR WILLAM R & TRI	03MY82-21MY82		88	265.8	C075.0S	B	108	0.041	108	0.041	13MY	16MY	26MY	78	7
	EVAL & CONTRIB						C075.0M	P	96	0.036	106	0.040	13MY	13JN	28JN	105	2
632461	WASHOUGAL HAT	WASHOUGAL R@RM 15	28JN82		90	167.9	C075.0S	B	410	0.244	590	0.351	03JL	13JL	17AU	79	10
	5% PROD						C075.0M	P	17	0.010	37	0.022	29JN	04JL	06AU	83	24
RD U 4	WASHOUGAL HAT	PRESCOTT ORE	05JL82-09JL82	79		51.6	C075.0S	B	95	0.184	114	0.221	06JL	10JL	07AU	76	8
	SURVIVAL AND EFFICIENCY						C075.0M	P	2	0.004	4	0.007	05JL	05JL	06JL	81	40
LA U 3		NO RELEASE INFO					C075.0M	P	1	0.000			14JN	14JN	14JN	93	
NO TAG		NO RELEASE INFO					C075.0S	B	210	0.000			26AP	18JN	08AU	77	
							C075.0M	P	47	0.000			27AP	27AP	15SE	85	
RA PI 4		NO RELEASE INFO					C075.0M	P	2	0.000			22SE	23SE	23SE	117	

APPENDIX E

ITEMS PURCHASED COSTING MORE THAN $500.00

	Company	Item	Cost
1.	Outboard Marine Corp.	outboard motor parts	$ 638.38
2.	Mercury Marine Inc.	outboard motor parts	$2,266.14
3.	Consolidated Net & Twine Co.	net material	$2,450.05