ANNUAL PROJECT REPORT

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OREGON

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PROJECT TITLE: McKenzie River Hatchery Evaluation

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CONTENTS

SUMMARY

The Willamette Salmon Studies project is divided into spring chinook and fall salmon studies. Fall salmon research in FY 1985 concentrated on fall chinook.

Objectives for the spring chinook studies in FY 1985 were (1) collect and tabulate freshwater recovery data from Ad+CWT adults returning in 1984 and 1985, (2) conduct preliminary analyses of data collected, and (3) continue evaluation of effects of growth-advancement techniques at Marion Forks Hatchery.

Spring Chinook Smolt Survival Study--South Santiam Hatchery

Findings in FY 1985

Tag returns from ocean fisheries closely paralleled the rates of recovery from freshwater fisheries. These results suggest that transporting smolts to below Willamette Falls for release increased survival.

Recommendations

Continue transporting smolts to below Willamette Falls for release.

Spring Chinook Stock Comparative Study--Marion Forks Hatchery

Findings in FY 1985

Data from tag returns sustain the conclusion that Carson chinook survive at lower rates than North Santiam stock chinook when reared at Marion Forks Hatchery. However, indicated survival rates for the North Santiam stock still remain unacceptably low.

Recommendations

Continue evaluation of effects of growth advancement of smolts at Marion Forks Hatchery. In addition, evaluate the feasibility of using the cold rearing water at Marion Forks as a a means of naturally retarding the growth of fingerlings to be transported to another hatchery for final rearing and release.

Oakridge-Dexter Hatchery Evaluation

Findings in FY 1985

All groups of smolts continue to yield adult returns. The observed pattern of survival rates appear reasonably consistent between years, and are the highest among the Willamette chinook hatcheries evaluated. Smolts released in the spring at about 9 fish/lb (50 g/fish) produced highest survival.

Recommendations

Schedule a higher proportion of smolt production for release in the spring at a target size of 9 fish/lb. Conduct a month-of-release test at Oakridge-Dexter to refine knowledge of efficient timing of smolt release. Produce more smolts at Oakridge-Dexter; consider reprogramming of Willamette Trout Hatchery to rear spring chinook.

McKenzie Hatchery Evaluation

Findings in FY 1985

Tagged adult returns continue to indicate low levels of survival for 1978, 1979 and 1980 brood smolts. Smolts of the 1981-brood which were fed therapeutic levels of antibiotics appear to exhibit increased survival.

Recommendations

Divide hatchery production equally between fall smolt releases (target size 8 fish/lb) and spring smolt releases (target size 9 fish/lb). Continue feeding of antibiotics to juveniles.

Fall Salmon Studies

Objectives for FY 1985

1) Estimate the relative abundance of pond-reared and wild fall chinook in the run that passed over Willamette Falls in 1984, 2) count chinook redds throughout the major spawning areas of the Willamette basin, and 3) compile and summarize release data (fish size, total number released, and Ad+CWT component) for juveniles from the fall chinook rearing program at Stayton Pond.

Findings in FY 1985

We calculated that fish released from Stayton Pond composed 72 percent of the 21,448 Willamette fall chinook that migrated upstream past Willamette Falls in 1984. In May 1985 we released 4,534,194 juvenile fall chinook from Stayton Pond. We estimated that 50 percent of this total were transported to Bonneville Hatchery for release. About 4 percent of the juvenile fall chinook released were coded-wire tagged.

Aerial surveys of spawning areas in the Willamette Basin in 1984 were substantially reduced due to budgetary contingencies. We counted 524 fall chinook redds in aerial surveys of 113.9 km of stream in October 1984.

Recommendations

Continue rearing fall chinook in Stayton Pond. Consider rearing spring chinook in this pond from June through early November.

INTRODUCTION

The purpose, scope, and goals of the Willamette Salmon Studies project and description of the methods used have been reported in Hansen and Williams (1979), Smith and Zakel (1981), and Smith et al. (1982, 1983).

RESULTS AND DISCUSSION--SPRING CHINOOK STUDIES

Smolt Survival Study--South Santiam Hatchery

Combined freshwater recovery data for all broods tested indicated that smolts transported below Willamette Falls for release provided more adults to freshwater fisheries (Smith et al. 1983). We hypothesized that this increase in freshwater fishery contribution resulted from confused migration which delayed adults in the area of intensive lower river fisheries. However, rates of offshore catch closely paralleled the combined freshwater catch ratios (Figure 1), suggesting that smolts released below Willamette Falls actually sustained improved survival compared to their upstream-released counterparts. We used the ratios of offshore catch:hatchery return for above-falls smolt group to estimate unaccounted escapements of below-falls treatments, since we know downstream-transported smolts strayed to many unmonitored tributaries upon return.

Stock Comparative Study--Marion Forks Hatchery

Adult returns are essentially complete (Figure 2). Survival rates, although generally low, appear to favor the North Santiam stock over the Carson stock.

Overall low survival rates of the North Santiam stock dictate a need to find some way to improve adult returns from smolts reared at Marion Forks Hatchery. Hypothesizing that increased smolt size would benefit survival,

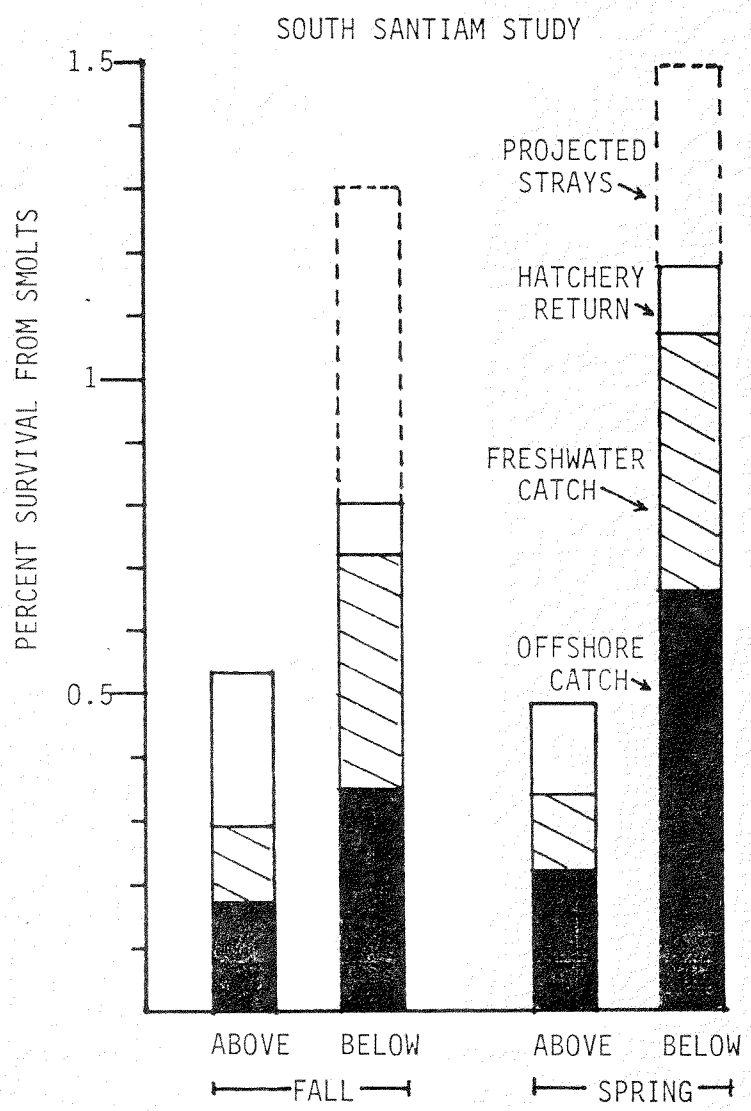

Figure 1. Relative types of recovery, 1975-1978 brood spring chinook (combined), South Santiam smolt survival study.

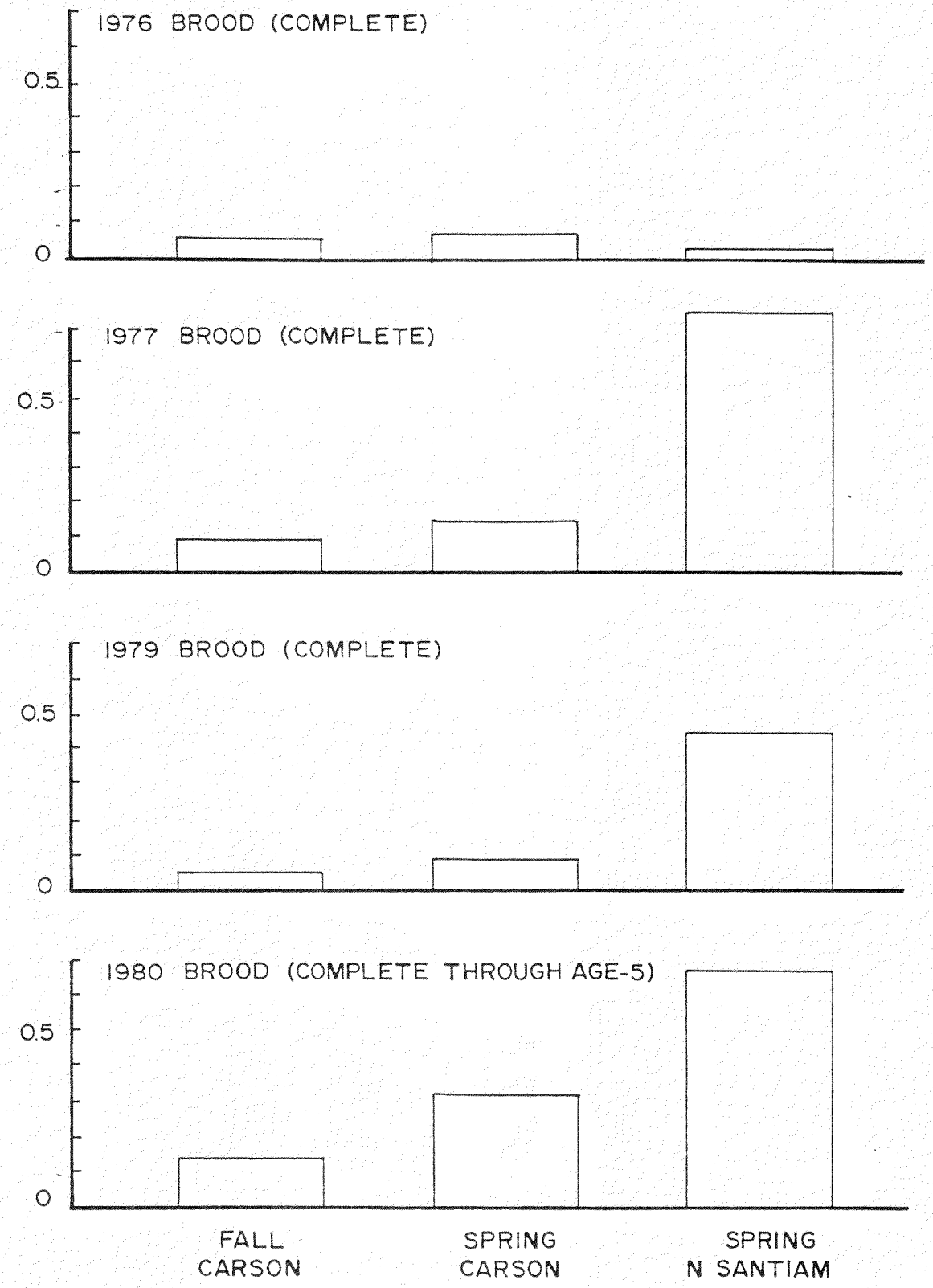

Figure 2. Returns to freshwater through 1985 of four broods of spring chinook, Marion Forks Hatchery, stock comparative study.

Northwest Region personnel installed electrically-heated incubation and early rearing facilities at Marion Forks (Stickell 1982), which resulted in markedly larger smolts and a tripling of production costs. Four consecutive broods of heat-advanced smolts have been marked or tagged prior to release to evaluate effects of this expensive production mode. Annual test liberations have included heat-advanced treatments released in fall and spring plus a control group of normal-production smolts released in the spring.

Oakridge-Dexter Hatchery Evaluation

The pattern of survival rates from this four-brood test appear reasonably consistent between years (Figure 3). Combined results indicate the probable benefit of releasing more smolts in the spring and fewer in the fall (Figure 4).

Consistent patterns of return and relatively high rates of survival from the Oakridge-Dexter tests contrast markedly with erratic returns observed from comparable smolts released simultaneously at other Willamette spring chinook stations. We infer from these observations that in-hatchery conditions, not post-release environmental factors, likely have major effects upon survival of smolts reared at McKenzie and South Santiam hatcheries.

McKenzie Hatchery Evaluation

Based on adult returns through 1985, no consistent pattern of survival is evident (Figure 5). We suggest that recurring epidemics of bacterial kidney disease reduced survival of 1978, 1979 and 1980 brood smolts. The 1981 brood smolts were twice fed therapeutic levels of erythromycin during their rearing phase, except that one ungraded control group was released in spring 1983 without benefit of antibiotic feeding (indicated as * in Figure 5) as an evaluation of this disease-control measure.

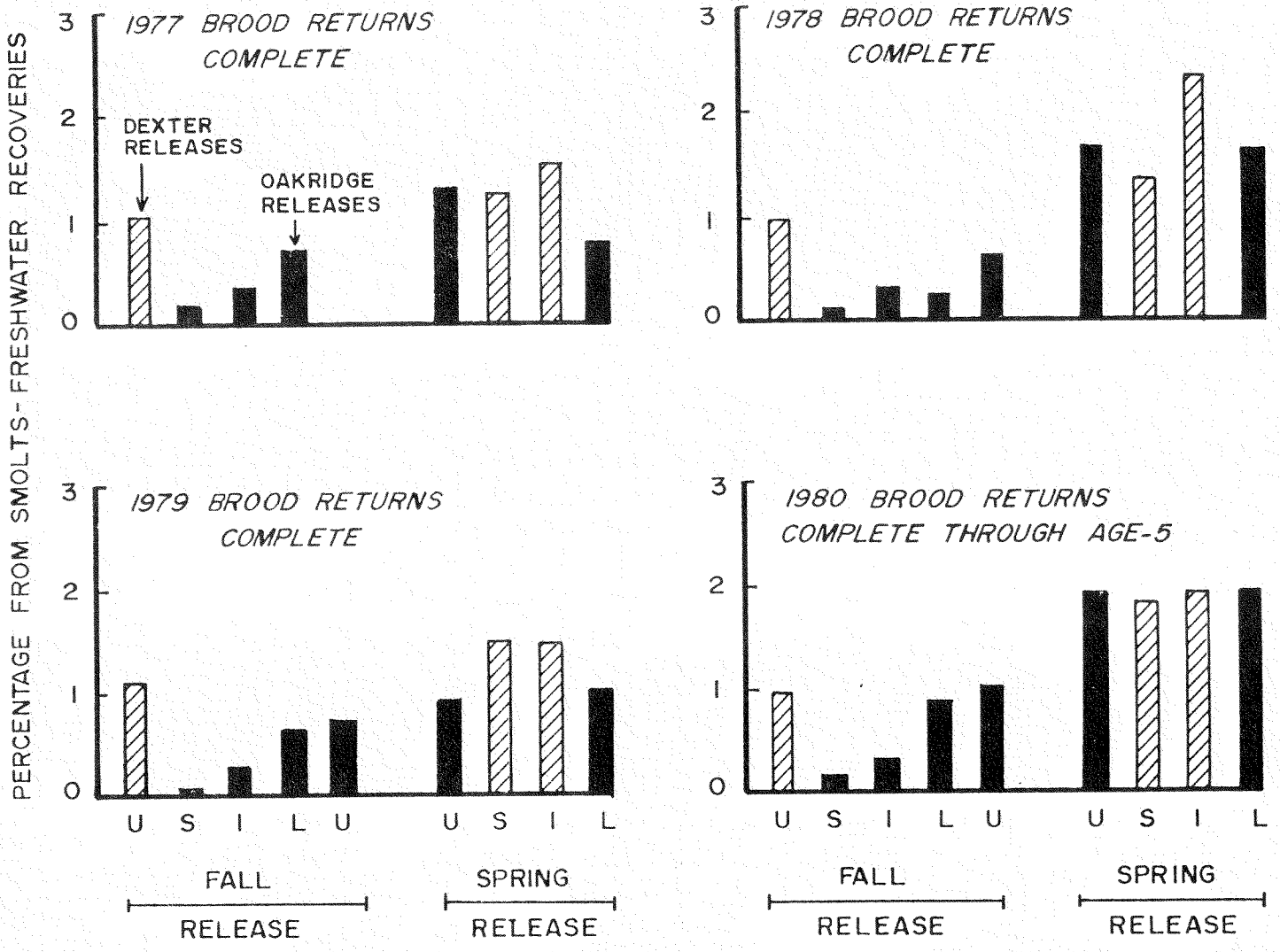

Figure 3. Returns to freshwater through 1985 of 1977-1980 brood spring chinook, Oakridge-Dexter Evaluation. Smolt size designations refer to body length category at time of grading in the fall; Abbreviations used: U = ungraded, S = small (>120 mm), I = intermediate (120-150mm), L = Large (<150 mm).

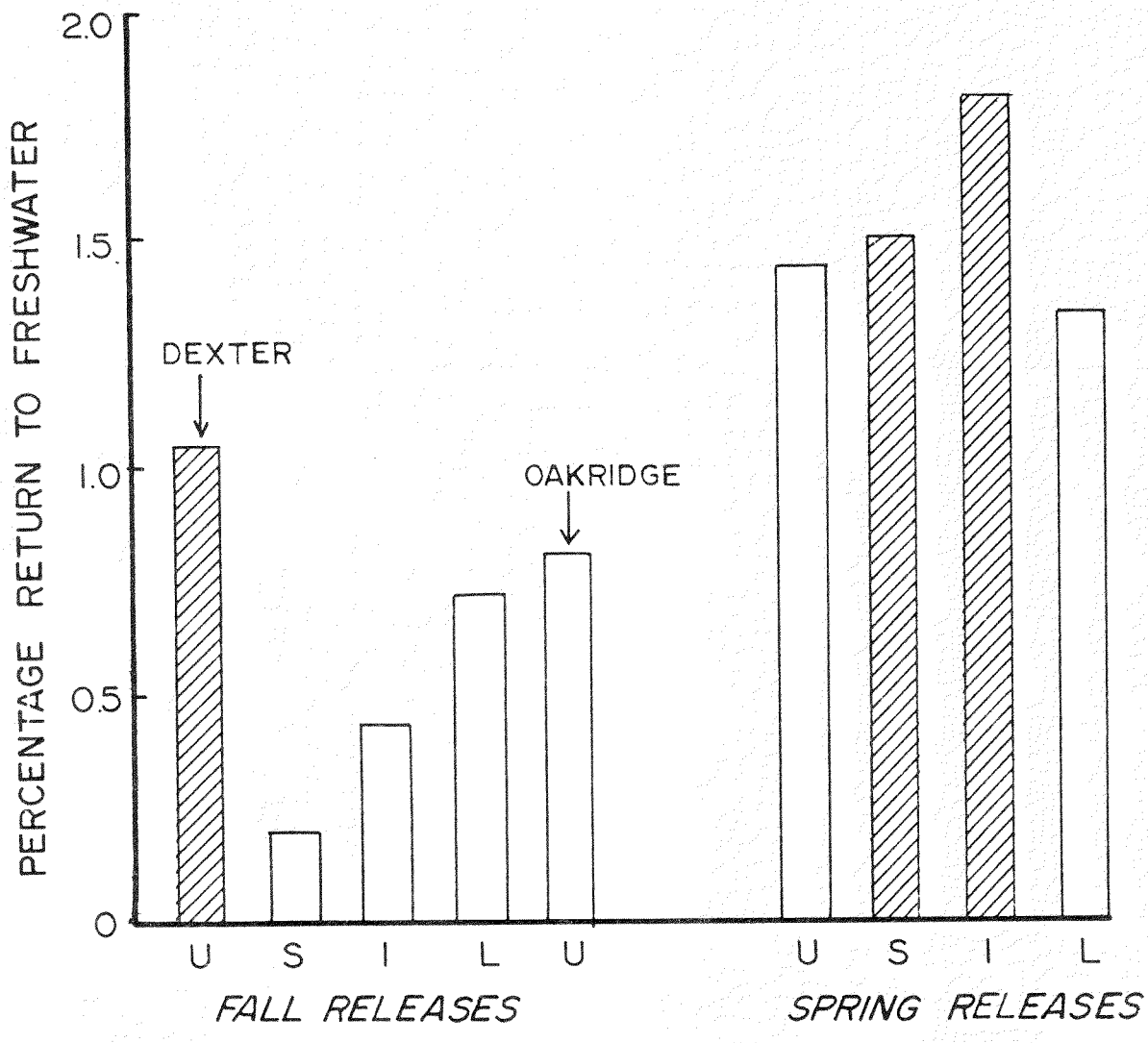

Figure 4. Combined data, returns to freshwater through 1985 of 1977-1980 brood spring chinook, Oakridge-Dexter evaluation. Smolt size designations refer to body length category at time of grading in the fall; abbreviations used: U = ungraded; S = small (>120 mm); I = intermediate (120-150 mm); L = Large (<150 mm).

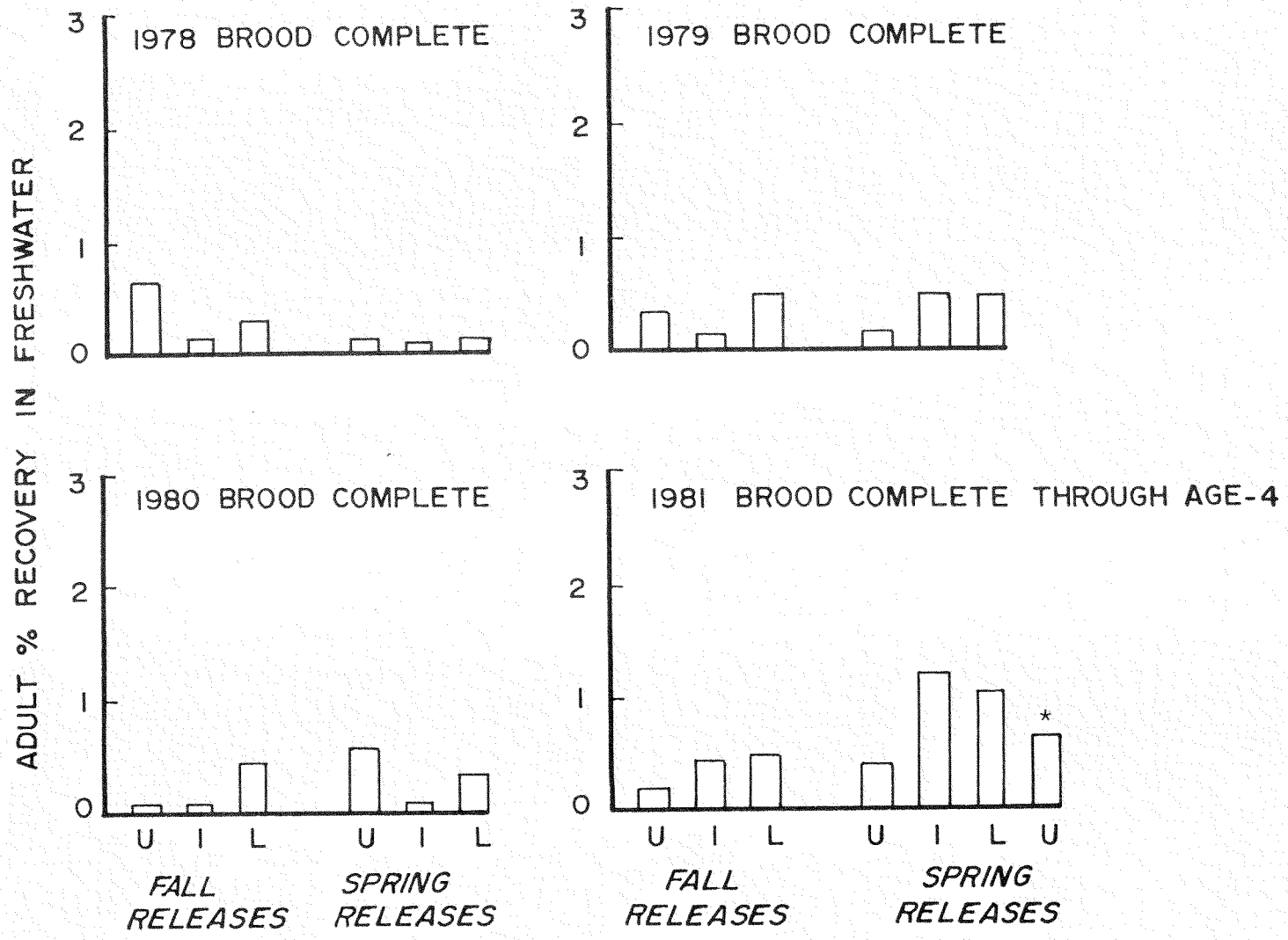

Figure 5. Returns to freshwater through 1984 of 1978-1981 brood spring chinook, McKenzie Hatchery evaluation. Smolt size designation refers to body length category at time of grading in the fall; abbreviations used: U = ungraded, I = intermediate (>150mm), L = large (<150 mm).

Clackamas Hatchery Evaluation

Clackamas Hatchery has produced fall-released smolts each year since 1979. None of these releases bore identifying fin marks or tags. We coded-wire tagged 60,000 of the 1984-brood smolts that were released into the Clackamas River in fall 1985. Adult returns from these releases will provide the first indications of survival rate from smolts produced at this relatively new hatchery.

RESULTS AND DISCUSSION--FALL SALMON STUDIES

We estimated that about 4.5 million juvenile fall chinook were released from Stayton Pond in May 1985. This total included 180,563 fish marked Ad+CWT (Table 1). Approximately half of these fish were transferred to Bonneville Hatchery for release.

Table 1. Summary of juvenile fall chinook released from Stayton Pond, 1978-1984 brood.

Brood year	Date of release	Mean size (g/fish)	Number released	Percentage marked Ad+CWT
1978	05/07-29/79	6.8	4,691,601	6.3
1979	03/28-06/21/80	5.2	6,348,695	4.5
1980	04/28-06/15/81	6.1	5,902,559	4.3
1981	04/03-05/21/82	5.2	6,750,813	4.0
1982	04/25-05/19/83	5.8	6,912,074	2.4
1983	05/08-05/31/84	7.8	5,170,607	2.9
1984	05/14-05/31/85	8.6	4,534,194	4.0

Observers counted 21,144 chinook past Willamette Falls fishway from 1 August to 31 October 1984, and recorded them as fall chinook. We removed and killed an additional 396 Ad+CWT chinook from the fishway during this period.

Through analyses of tags recovered we estimated that 92 of the chinook counted were either late-entering spring chinook or fall chinook of other origins that strayed into the Willamette. We calculated that 72 percent of the actual fall chinook run in 1984 originated from the rearing program at Stayton Pond (Table 2). Similar data for the 1985 run of Willamette fall chinook are in process.

Table 2. Estimated components of the fall chinook run that passed Willamette Falls, 1981-1984 run years (preliminary data pending adoption of standard calculation methodology).

Run year	Counts at viewing window [a]	Estimated run components			
		Pond reared		Wild reared	
		Number	%	Number	%
1981	17,775	9,020	51	8,625	49
1982	26,883	19,759	73	7,308	27
1983	13,733	11,152	84	2,180	16
1984	21,144	15,607	72	5,841	27

[a] *Some of these were spring chinook and marked stray fall chinook, and we removed some additional fish from the fishway for sample and spawning purposes.*

Aerial surveys of fall chinook spawning grounds in 1984 were restricted to total sampling of 113.9 km (70.8 mi) of stream segments of the Clackamas River, Molalla River, and Mill Creek. This sampling represented about 20 percent of the standard 594.1 km (369 mi) transect flown in 1982 and 1983. Based on comparable survey segments, fall chinook spawning in 1984 appeared reduced in the Clackamas and Molalla rivers and increased substantially in the Mill Creek-Shelton Ditch area (Table 3). No spawning surveys were conducted in 1985.

Table 3. Chinook redds counted in aerial surveys of sample stream sections in the Willamete River Basin, 1982, 1983 and 1984. Abbreviations used: Ave. = Avenue; Br. = Bridge; Cr. = Creek; Hwy. = Highway; Rd. = Road; SPRR = Southern Pacific Railroad.

River	Survey section: Reference points	Km surveyed	Redds/km: 1982	1983	1984
Clackamas	Mouth to 82nd Ave. Br.	2.0	20.5	18.5	1.0
	82nd Ave. Br. to Carver Br.	11.2	14.1	7.5	4.8
	Carver Br. to Barton Br.	9.0	9.8	4.8	0.9
	Barton Br. to Eagle Cr.	5.6	11.4	3.2	3.4
	Eagle Cr. to River Mill Dam	10.2	2.0	3.8	0.2
	Total below-falls surveys	38.0	9.8	5.8	2.2
Molalla R.	Mouth to Hwy. 99E Br.	5.8	6.6	5.3	0.0
	Hwy. 99E Br. to Goods Br.	3.9	24.1	13.0	0.3
	Goods Br. to SPRR Br.	6.6	50.0	20.5	4.7
	SPRR Br. to Hwy. 213 Br.	6.9	54.9	16.4	2.9
	Hwy. 213 Br. to Feyrer Park	6.7	34.3	43.2	0.1
	Feyrer Park to Collins Rd.	3.4	1.5	0.7	0.0
	Collins Rd. to N. Fork Molalla	9.3	0.1	0.2	0.0
	Total	42.6	25.3	11.1	1.5
Mill Cr.	Mouth to Stayton Ditch	28.5	1.6	1.6	2.6
	Total	28.5	1.6	1.6	2.6
Shelton Ditch	Mouth to Diversion Dam	4.8	28.5	26.2	63.3
	Total	4.8	28.5	26.2	63.3
	Total, Above Falls surveys	75.9	16.6	8.5	5.8
	Total, Basinwide (sample) Surveys	113.9	14.3	7.6	4.6

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