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**Enhanced Salmon Production in British Columbia, Canada
1977 - 1997**

by

SEP - Program Coordination and Assessment Division

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ABSTRACT

SEP – Program Coordination and Assessment Division. An assessment of Canadian enhanced salmon production, 1977-1997. (NPAFC Doc. No. 322). 18 p. Dept. of Fisheries and Oceans, Habitat and Enhancement Branch, Vancouver, B.C. V6B 5G3.

The Salmonid Enhancement Program (SEP) in British Columbia, Canada was undertaken in 1977 to rebuild stocks and increase catch through the expanded use of enhancement technology. The program is now comprised of nearly 300 projects and produces chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), chum (*O. keta*), pink (*O. gorbuscha*), and sockeye salmon (*O. nerka*), as well as small numbers of steelhead salmon (*O. mykiss*) and cutthroat trout (*Salmo clarki*). Projects include hatcheries, fishways, spawning and rearing channels, habitat improvements, flow control works, lake fertilization, and small classroom incubators, and range in size from spawning channels releasing nearly 100 million juveniles annually, to schools with classroom incubators releasing fewer than one thousand.

This report tabulates release data for the program by species and stage as well as program contribution to commercial fisheries and recoveries by catch component. Egg and release production targets for 1997 by facility are appended. Steelhead and cutthroat data are not included in this report as their assessment is a provincial responsibility.

Introduction

The Salmonid Enhancement Program (SEP) in British Columbia, Canada was undertaken in 1977 to rebuild stocks and increase catch through the expanded use of enhancement technology. It incorporated three existing spawning channels built in the 1960's and five production hatcheries which had began operation in the early 1970's. The program is now comprised of nearly 300 projects throughout British Columbia (Figures 1a, 1b, 1c) and produces chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), chum (*O. keta*), pink (*O. gorbuscha*), and sockeye salmon (*O. nerka*), as well as small numbers of steelhead salmon (*O. mykiss*) and cutthroat trout (*Salmo clarki*). Projects include hatcheries, fishways, spawning and rearing channels, habitat improvements, flow control works, lake fertilization, and small classroom incubators, ranging in size from spawning channels releasing nearly 100 million juveniles annually to school classroom incubators releasing fewer than one thousand juveniles. Projects are operated by SEP staff or contracted community and native groups, as well as by volunteers with some SEP support. As many as 10,000 volunteers may participate in the program in any given year.

Regardless of project size, all production is assessed, with the assessment method dependent on the species and enhancement technology employed. Individual project production is aggregated to assess total program production. Assessment includes analysis of total production and contribution of enhanced fish to the fisheries and escapement. Egg to release survival trends by species are also analyzed within the hatchery and from release to recovery for selected projects. Assessment data are available for each species and release stage at a number of resolution levels (project, area, program) depending on the detail of analysis required.

This report tabulates release data for the program by species and stage and program contribution to fisheries and recoveries by catch component. Steelhead and cutthroat data are not included in this report as their assessment is a provincial responsibility.

Methods

The current method of choice for estimating production and survival rates of chinook, coho, and chum salmon enhancement projects is juvenile marking with adult recovery programs. Marking occurs at the project prior to release, while recovery takes place through coastwide sampling programs in the sport and commercial fisheries (Kuhn, 1988; Kuhn et al., 1988) and through dead recovery programs in the escapement or at the project. Sockeye and pinks are not currently marked although the latter were in the past.

Mark type is dependent on the species, with coded wire tags (CWT's) used for chinook, coho and some chum stocks, and finclips for other chum stocks. For large production groups, a proportion of the release group is marked and are assumed to represent the unmarked fish. Smaller experimental groups to assess various strategies within a project may have a greater proportion of the release marked but are not considered to represent production. Beginning in 1996, most coho from Southern B.C. facilities were marked with a fin clip to allow for the possibility of a selective hatchery mark fishery.

Figure 1a. Locations of selected projects for SEP, British Columbia, Canada.

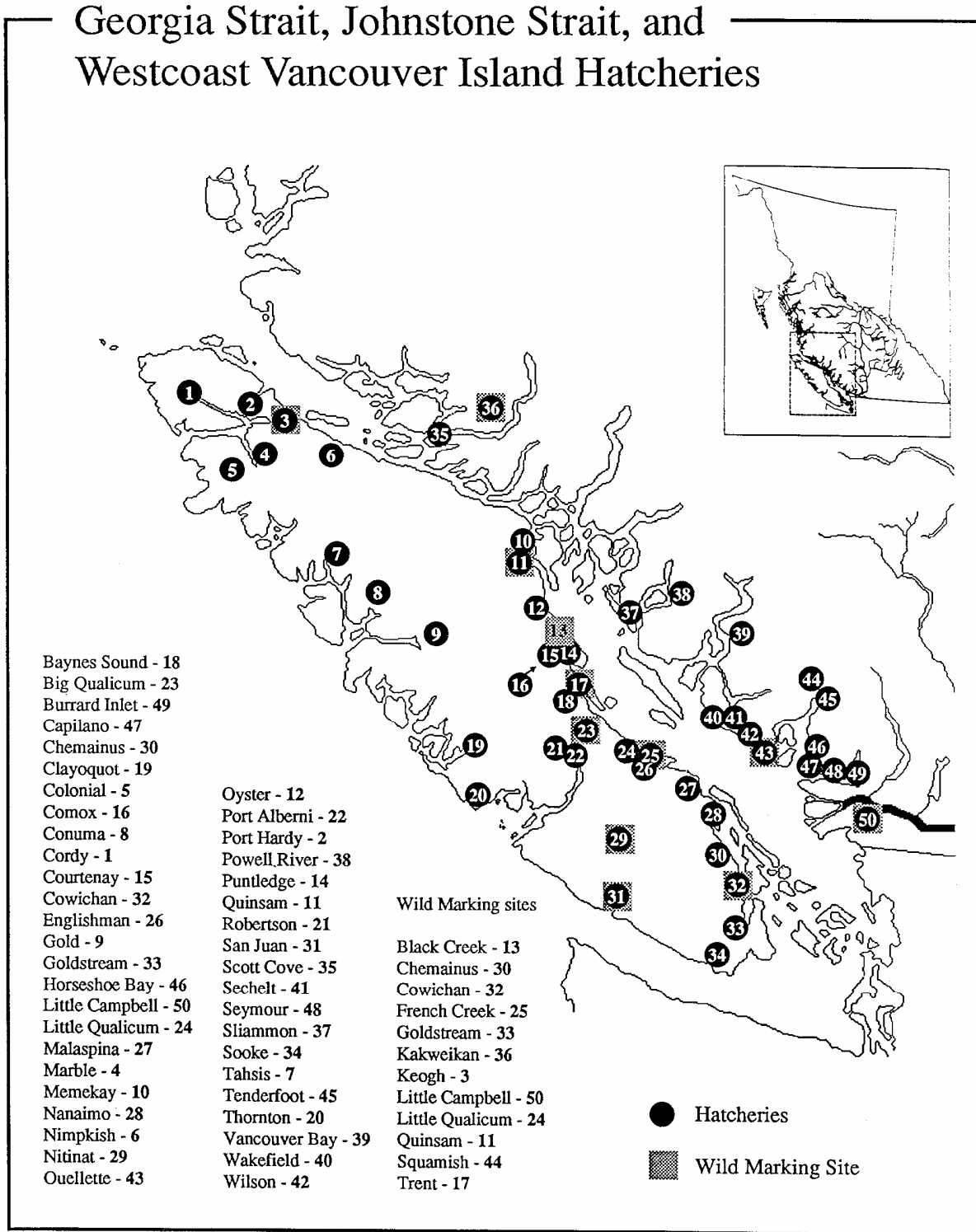


Figure 1b. Locations of selected projects for SEP, British Columbia, Canada.

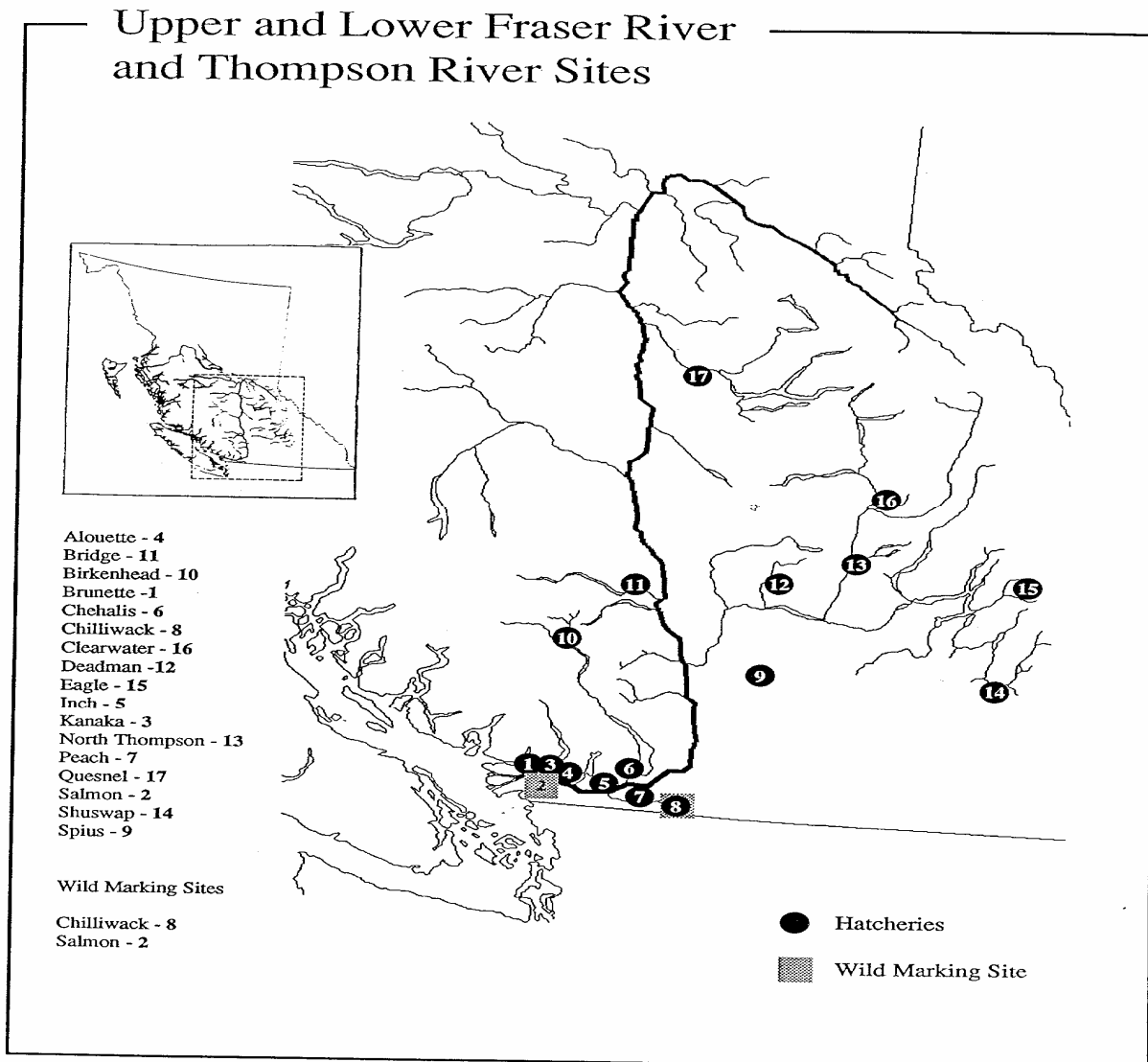
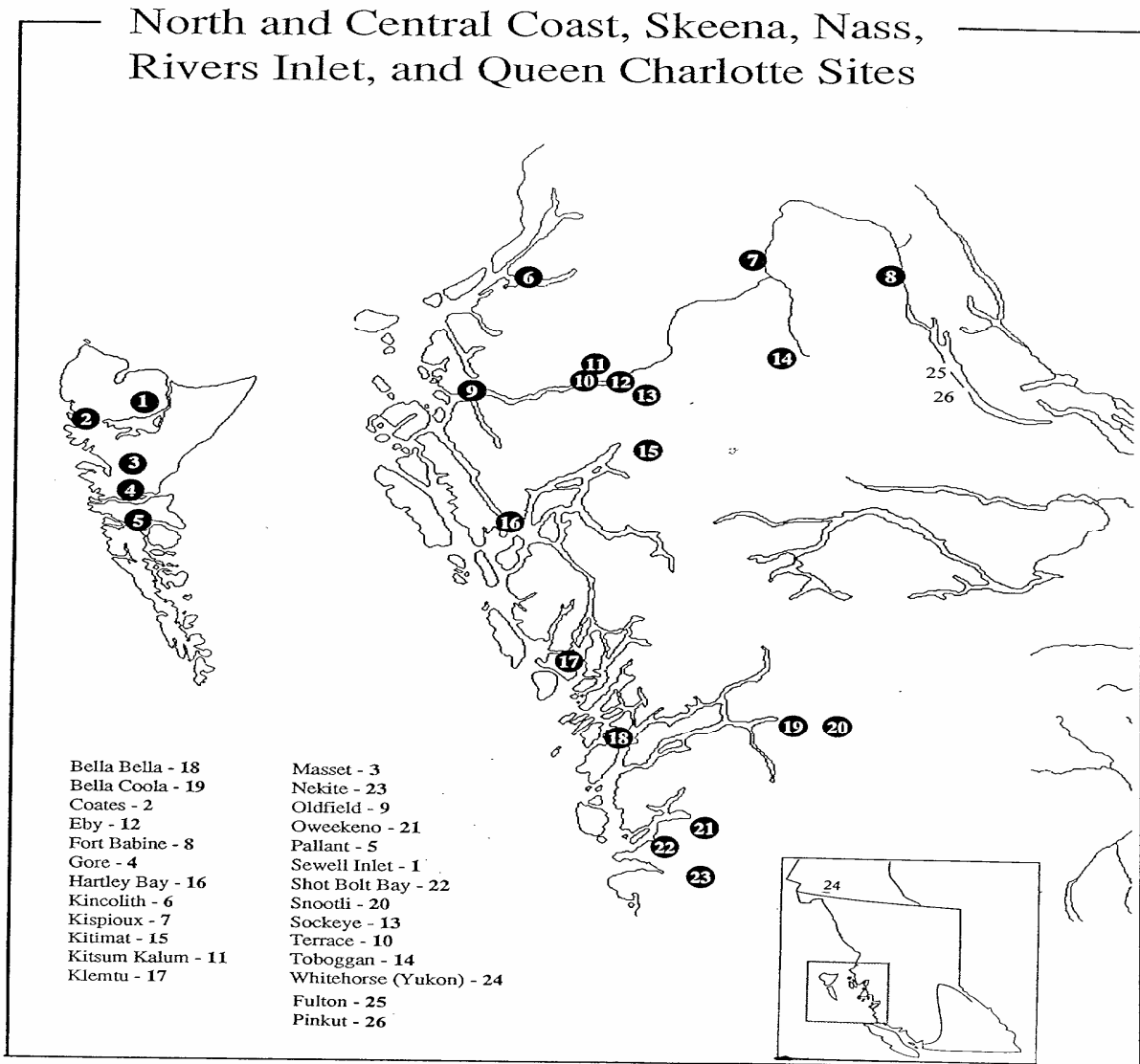


Figure 1c. Locations of selected projects for SEP, British Columbia, Canada.



Attempts are made to assess all stocks routinely, using the method of choice, but some enhancement projects and species are rarely or never assessed directly because of their small size or logistical constraints. For chinook, coho, and chum, only a few projects produce more than 10,000 adults, while most produce fewer than 2,000 (Figure 2). The former are consistently assessed directly through marking, the latter rarely. For chinook, most juveniles released are represented by a marked group while for coho, marking for some release stages or at some of the smaller hatcheries or channels is infrequently or never done. For chum, most stocks released from major facilities are represented by marked fish but smaller projects are often not marked. For chinook, chum, and coho sites without consistent marking, indirect methods are used to estimate contribution, usually using data from marked sites to estimate parameters. Data quality depends on the assessment method used.

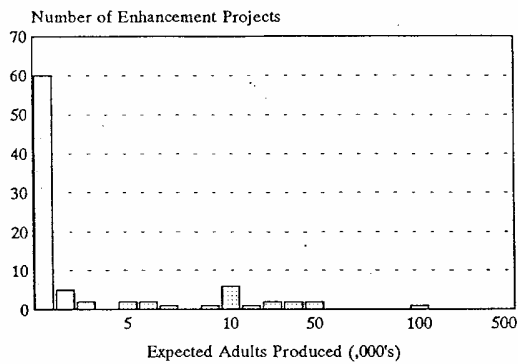
There are fewer projects enhancing sockeye and pink salmon but a greater percentage of them produce more than 10,000 adults (58% and 44% respectively). Because neither species is now marked, production is estimated using run reconstruction or average predicted survival rates.

Release data are used for both production and survival rate analyses. Juveniles are reared to various release stages depending on the species and enhancement technology employed. Chum and pinks are released either unfed after emergence or as fed fry after one month of feeding. Coho are released as fed fry after 3 to 5 months of rearing or as smolts after one year of rearing. The majority of sockeye are released as unfed fry after emergence from channels, although a small number are hatchery incubated and short-term reared. Sockeye releases also include juveniles estimated to be incremental due to lake fertilization programs. For chinook, coastal stocks are released after 3 to 4 months of rearing, while interior stocks are frequently reared for one year to the yearling stage. The latter are a very small part of the chinook program and releases are not tabulated separately in this report. For the other species, releases are tabulated by release stage.

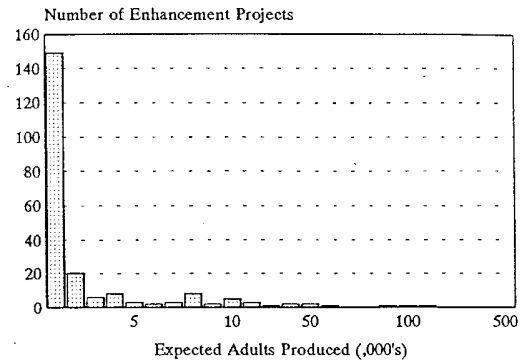
Annual egg and release targets are set pre-season for each stock, in consultation with project managers, stock assessment biologists and harvest management biologists. Factors such as potential adult production (based on previous average survival rates), species interactions, effect on existing stocks, harvest concerns, habitat capacity and project capacity are taken into account. Production targets for 1997 for facilities operated by SEP staff or under contract to native or community groups are shown in Appendix 1.

Figure 2. Enhancement projects vs expected adult production for SEP, British Columbia, Canada

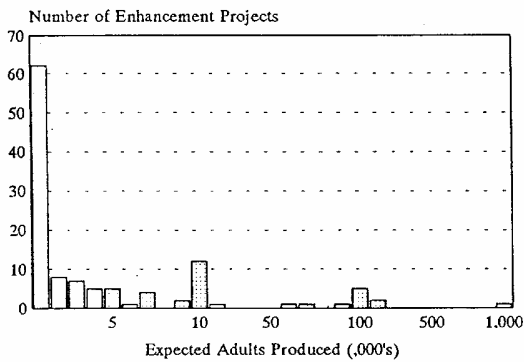
Chinook



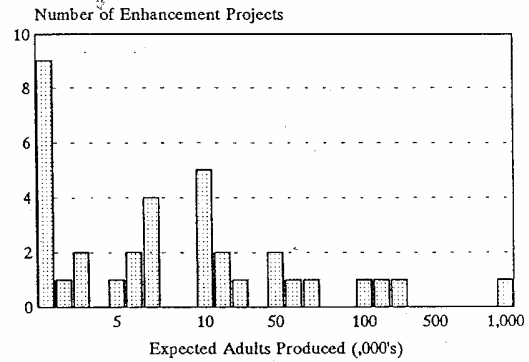
Coho



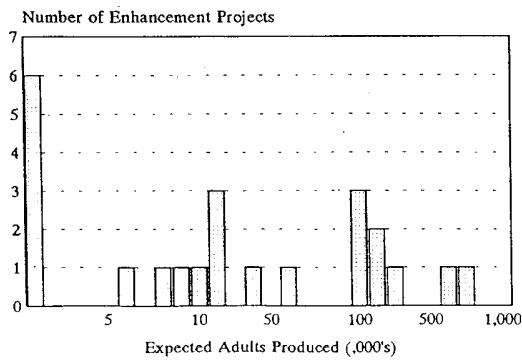
Chum



Pink



Sockeye



Results

Table 1 shows SEP program releases for 1977 - 1996 brood years. Total releases approximately doubled between 1977 and 1988 brood years, with the largest numerical increase for chum fry. Fed chum fry releases averaged 93.1 million for brood years 1992 to 1996, while unfed chum releases averaged 122.6 million. Full production for chinook, coho smolt and sockeye releases was reached in the early to mid 1980s and releases have been relatively stable since that time, averaging 53.2 million, 11.0 million and 252 million respectively for the last five complete brood years. Unfed pink releases fluctuate from year to year because of the natural cycles in the Fraser River and the phasing in and out of pink projects since the 1988 brood year. Pink fed fry releases peaked in 1985 at more than 5 million but have since declined because of reduced emphasis on this strategy.

For 1996, the most recent brood year for which releases are complete for all species, sockeye accounted for 52.3% of the releases and chum 29.1%. Pink and chinook releases amounted to 3.1% and 11.9% respectively, and coho 3.6%.

Contribution by recovery component for the program is indicated in Table 2. Contribution by SEP projects has increased substantially since the program began. Analytical methods for sockeye are being reviewed, and are not included in this report. The largest individual contribution to catch was for chum, averaging 30.2% of the total commercial catch for the last five years. The commercial catch of coho remained stable at 11.4% from 1992 to 1996, largely due to catch ceilings in targeted fisheries. Commercial catches declined in 1997 because of fishing closures. The sport catch of coho varies, dependent on whether coho remain inside Georgia Strait or migrate off the west coast of Vancouver Island. The commercial catch of chinook averaged 12.9% from 1994 to 1997. Recent declines in survival, in part due to El Niño events in 1992 to 1994, as well as fishing closures, contributed to the declining chinook catch beginning in 1994. Pink catches fluctuate because of natural Fraser River cycles.

Summary

Production and survival rate assessment methods are described for each species. Data are presented for releases by brood year, species and release stage for the program and for contribution by catch year and species for the program. Other levels of detail, although not shown, are available.

Table 1: Releases of juveniles from SEP facilities in British Columbia Canada.

Brood Year	Chinook	Chum		Coho		Pink		Sockeye*
		Unfed	Fed	Fry	Smolt	Unfed	Fed	
1977	13,620,370	52,127,027	1,904,625	12,203,819	2,984,462	31,029,220	0	191,179,000
1978	14,347,154	50,256,253	5,535,566	8,852,071	3,747,251	750	0	133,739,000
1979	16,435,330	83,210,748	9,191,947	14,742,120	4,980,154	26,145,904	358,639	209,679,521
1980	19,850,845	108,820,896	29,684,300	10,432,539	5,270,862	4,705,834	1,859,631	191,071,400
1981	17,456,317	119,416,304	68,980,710	26,506,824	4,932,174	33,113,088	492,034	192,414,370
1982	24,863,904	105,019,858	69,365,130	26,269,298	6,944,312	2,510,301	423,038	202,854,919
1983	29,390,941	170,812,179	85,579,589	24,310,533	13,635,453	27,341,916	1,521,896	128,964,333
1984	34,864,768	74,427,945	103,779,630	30,062,337	12,059,350	3,783,368	2,296,285	238,128,975
1985	42,769,123	105,027,086	102,464,677	18,749,494	9,801,246	26,207,597	5,057,021	166,576,930
1986	54,302,501	144,272,982	85,842,800	17,093,709	10,201,914	14,215,312	4,509,098	201,675,175
1987	63,778,101	132,247,363	75,979,591	29,322,813	9,554,873	44,781,230	4,807,689	139,888,889
1988	66,758,120	221,577,236	88,028,664	28,924,284	11,333,223	14,845,623	2,827,349	218,578,786
1989	64,096,999	124,609,669	92,855,759	18,191,074	11,886,268	49,190,180	2,884,163	220,954,672
1990	66,473,863	173,308,481	94,759,699	41,420,813	12,330,585	22,837,839	1,023,076	231,145,390
1991	59,770,014	108,008,381	96,839,355	49,522,080	10,942,374	53,919,698	1,584,525	241,267,374
1992	57,988,721	162,996,171	88,780,879	32,901,132	10,636,220	19,309,561	1,781,339	253,151,119
1993	51,094,315	148,531,607	91,597,661	20,052,945	11,017,804	39,740,354	1,576,168	181,089,518
1994	54,276,102	165,890,470	103,998,196	14,194,200	10,870,603	10,919,240	1,981,042	159,235,488
1995	45,370,507	88,639,787	87,678,726	17,350,948	11,562,309	34,777,878	2,001,615	115,212,893
1996	57,483,942	46,992,542	93,246,134	6,066,253	11,021,037	13,307,005	1,472,567	252,059,228

* includes lake enrichment projects

Table 2. SEP production recovery components and percent contribution to commercial fisheries in British Columbia, Canada.

Catch Year	COHO					CHINOOK				
	Commercial Number	% of Catch	Sport	Escapement	U.S.	Commercial Number	% of Catch	Sport	Escapement	U.S.
82	171,230	5.4	91,507	123,784	17,409	109,125	8.9	26,100	30,679	54,645
83	239,622	5.8	97,750	148,845	10,088	102,511	10.8	30,294	30,814	59,981
84	208,990	5.8	91,613	162,863	11,296	97,583	9.7	64,211	37,491	47,279
85	277,213	9.4	239,456	221,834	36,573	61,536	7.1	42,484	55,809	34,489
86	388,827	7.9	206,865	273,086	57,881	64,714	8.0	46,869	57,182	26,265
87	379,199	11.3	309,779	328,376	49,791	47,145	6.1	42,125	88,038	29,839
88	312,649	11.4	408,592	295,984	36,117	57,531	8.0	46,881	130,450	41,096
89	352,702	10.3	215,343	293,071	60,418	101,727	15.7	82,656	156,045	64,176
90	334,706	8.7	213,773	247,213	46,652	139,448	21.0	68,054	223,940	104,054
91	398,226	11.4	59,264	294,876	80,860	175,094	27.4	96,238	224,915	120,373
92	369,934	12.5	218,572	285,385	44,173	196,181	28.9	86,362	262,743	111,128
93	230,989	12.2	250,167	248,986	34,625	169,836	27.4	108,978	245,309	90,715
94	289,033	11.3	100,611	NC	27,950	70,791	16.0	68,929	NC	63,055
95	192,383	10.2	24,768	NC	29,804	25,394	12.1	42,704	NC	36,996
96	154,784	10.9	38,571	NC	25,244	7,193	10.3	39,931	NC	20,520
97	14,581	6.4	29,795	NC	11,507	27,875	13.1	57,605	NC	57,640

Catch Year	CHUM					PINKS				
	Commercial Number	% of Catch	Sport	Escapement	U.S.	Commercial Number	% of Catch	Sport	Escapement	U.S.
82	255,354	8.6	0	313,933	0	45,931	1.7	339	31,141	0
83	135,357	13.5	0	407,723	0	438,811	1.8	2,199	236,172	78,913
84	415,771	22.6	0	476,991	0	50,304	0.7	1,511	20,957	0
85	1,892,829	34.6	0	1,384,648	0	378,113	1.9	3,637	262,114	138,365
86	1,328,907	23.8	316	893,761	0	292,780	1.6	1,612	236,606	0
87	839,894	37.0	1,375	600,108	0	616,560	4.6	10,983	382,565	92,757
88	2,385,804	38.7	419	830,038	0	345,313	1.5	3,055	332,018	0
89	655,584	36.2	2,224	915,541	0	1,735,978	10.2	12,894	662,945	165,117
90	1,028,577	32.9	887	997,858	0	1,697,837	9.8	6,283	911,547	0
91	734,160	31.3	1,575	844,792	NC	1,566,090	6.5	24,565	844,792	278,838
92	1,524,739	38.1	2,997	923,420	NC	1,791,329	17.5	14,563	923,420	0
93	1,549,672	36.7	1,023	1,528,094	NC	1,455,459	14.4	19,198	1,163,381	81,100
94	1,525,984	35.2	NC	1,239,048	NC	199,147	9.0	6,755	405,157	0
95	487,952	19.7	NC	850,185	NC	1,181,700	10.2	NC	858,526	118,825
96	329,004	24.1	NC	994,545	NC	323,299	5.5	NC	171,624	NC
97	665,068	35.2	NC	NC	NC	650,284	10.0	NC	620,651	NC

NC - Not complete

LITERATURE CITED

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Appendix 1. 1997 BROOD PRODUCTION TARGETS

07-Oct-98

Project	Species	Stock	Run	Stage	Eggs	Release	ExpAdults		
Community Economic Development									
Bella Bella CDP	Chum	Bullock Chan	Fall	Fed Fry	250,000	180,000	4,248		
		Kwakusdis Cr	Fall	Fed Fry	250,000	180,000	4,248		
		McLaughlin Bay	Fall	Fed Fry	1,000,000	720,000	16,992		
	Coho	McLaugh Bay Cr	Fall	Smolts	100,000	67,500	2,342		
		McLaughlin Bay	Fall	Smolts	0	0	0		
Clayoquot CDP	Chinook	Kennedy R Low	Fall	Smolts	450,000	324,000	4,763		
Cowichan River CDP	Chinook	Cowichan R	Fall	Smolts	3,500,000	2,100,000	42,800		
				Spr Fry		475,000	9,975		
	Chum	Cowichan R	Fall	Fed Fry	1,000,000	720,000	10,584		
Deadman River CDP	Coho	Cowichan R	Fall	Spr Fry	200,000	165,000	2,393		
				Chinook	Deadman R	Spring	Yearling Smolts	80,000	54,000
	Coho	Deadman R	Fall	Smolts	50,000	30,000	1,518		
Fort Babine CDP	Chinook	Babine R	Summer	Yearling Smolts	100,000	80,000	2,088		
			Fall	Smolts	200,000	80,000	2,320		
	Coho	Babine R		Spr Fry		80,000	800		
Hartley Bay CDP	Coho	Hartley Bay Cr	Fall	Fall Fry	300,000	173,300	3,137		
				Smolts		40,000	1,492		
				Chinook	Kitkiata Cr.	Fall	Spr Fry	200,000	162,000
Kincolith CDP	Chinook	Kincolith R	Spring	Yearling Smolts	240,000	162,000	2,673		
				Chum	Kincolith R	Fall	Fed Fry	150,000	108,000
	Coho	Kincolith R	Fall	Smolts	0	0	0		
Klemtu CDP	Chum	Kitasoo Cr	Fall	Fed Fry	1,250,000	900,000	21,240		
				Coho	Kitasoo Cr	Fall	Smolts	60,000	40,500
Masset CDP	Chinook	Yakoun R	Summer	Smolts	300,000	216,000	2,052		
			Fall	Smolts	40,000	27,000	859		
Nanaimo River CDP	Chinook	Nanaimo R	Summer	Smolts	250,000	180,000	3,276		
			Fall	Smolts	450,000	324,000	5,897		
	Chum	Nanaimo R	Fall	Fed Fry	1,000,000	720,000	10,584		
	Coho	Millstone R	Fall	Spr Fry	50,000	40,500	587		
				Nanaimo R	Fall	Smolts	650,000	150,000	8,535
Nimpkish CDP	Chinook	Woss R		Spr Fry		350,000	5,075		
			Fall	Smolts	500,000	360,000	2,664		
			Chum	Nimpkish R Low	Fall	Fed Fry	2,200,000	1,900,000	32,300
Oweekeno CDP	Coho	Nimpkish R	Fall	Smolts	200,000	135,000	10,301		
			Chinook	Neechanz R	Summer	Spr Fry	60,000	50,000	125
					Summer	Smolts	400,000	288,000	864
P.Hardy/Stephens CDP	Chinook	Marble R	Fall	Smolts	725,000	520,000	8,892		
				Chum	Stephens Cr	Fall	Unfed Fry	67,000	60,000
	Coho	Coetkwaus Cr	Fall	Spr Fry	19,000	15,000	339		
				Marble R	Fall	Spr Fry	0	180,000	4,068
				Stephens Cr	Fall	Spr Fry	250,000	200,000	4,520
				Wanokana Cr	Fall	Spr Fry	25,000	20,000	452
				Washlawlis R	Fall	Spr Fry	125,000	100,000	2,260
				Waukwaas Cr	Fall	Spr Fry	185,000	150,000	3,390
Penny CDP	Chinook	Dome Cr	Spring	Spr Fry	200,000	100,000	310		
				Yearling Smolts		55,000	215		

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07-Oct-98

Project	Species	Stock	Run	Stage	Eggs	Release	ExpAdults
Powell River CDP	Chinook	Lang Cr	Fall	Smolts	625,000	450,000	2,250
	Chum	Lang Cr	Fall	Fed Fry	2,400,000	900,000	15,300
				Unfed Fry		224,000	1,568
San Juan River CDP	Coho	Kelly Cr	Fall	Smolts	15,000	10,100	745
		Lang Cr	Summer	Smolts	75,000	55,000	4,059
	Chinook	San Juan R	Fall	Smolts	1,000,000	720,000	5,760
Sechelt CDP	Chum	San Juan R	Fall	Fed Fry	50,000	36,000	612
	Coho	San Juan R	Fall	Smolts	755,000	30,375	1,698
					Spr Fry		575,000
Seymour River CDP	Chinook	Lang Cr	Fall	Smolts	0	108,000	540
	Chum	Maclean Bay	Fall	Fed Fry	900,000	650,000	11,050
	Coho	Capilano Cr	Fall	Smolts	0	100,000	11,900
		Maclean Bay	Fall	Smolts	0	0	0
Siammon River CDP	Chinook	Chilliwack R	Fall	Smolts	0	100,000	500
	Chum	Indian R	Fall	Fed Fry	50,000	36,000	612
				Unfed Fry		0	0
	Coho	Seymour R	Fall	Smolts	114,000	60,000	6,840
				Spr Fry		20,000	398
				Smolts	6,000	2,000	200
	Pink	Indian R	Fall	Unfed Fry	500,000	400,000	15,080
Smolts				38,000	20,000	600	
Steelhead	Seymour R	Summer	Smolts	20,000	10,000	400	
Thompson R N CDP	Chinook	Lang Cr	Fall	Smolts	0	130,000	650
	Chum	Siammon R	Fall	Fed Fry	1,250,000	500,000	8,500
				Unfed Fry		500,000	3,500
Thornton Cr CDP	Coho	Siammon R	Fall	Fall Fry	100,000	35,000	2,062
				Smolts		25,000	1,240
				Smolts	30,000	20,000	1,712
	Lemieux Cr	Fall	Smolts	Spr Fry		0	0
				Smolts	30,000	20,000	1,712
				Spr Fry		0	0
Louis Cr	Fall	Smolts	Smolts	30,000	20,000	1,712	
			Spr Fry		0	0	
			Smolts	0	360,000	5,292	
Toboggan Cr CDP	Chinook	Nitinat R	Fall	Smolts	0	360,000	5,292
		Thornton Cr	Fall	Smolts	300,000	216,000	3,175
		Toquart R	Fall	Smolts	80,000	57,600	847
	Chum	Salmon Cr	Fall	Unfed Fry	500,000	400,000	2,800
				Spr Fry	100,000	81,000	1,725
	Coho	Kennedy R Upp	Fall	Spr Fry	100,000	81,000	1,725
				Smolts	60,000	40,500	2,264
Toboggan Cr CDP	Chinook	Bulkley R Upp	Spring	Yearling Smolts	100,000	67,500	1,114
	Coho	Bulkley R Upp	Summer	Smolts	175,000	35,000	917
				Spr Fry		100,000	1,000
				Smolts	0	0	0
	Morice R	Summer	Smolts	0	0	0	
	Toboggan Cr	Summer	Smolts	60,000	35,000	917	
				Spr Fry		15,000	150

Designated Public Involvement

Appendix 1. 1997 BROOD PRODUCTION TARGETS

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Project	Species	Stock	Run	Stage	Eggs	Release	ExpAdults	
Chapman Creek	Chinook	Lang Cr	Fall	Smolts	0	108,000	540	
	Chum	Chapman Cr	Fall	Unfed Fry	900,000	800,000	5,600	
	Coho	Chapman Cr	Fall	Smolts	75,000	55,000	2,365	
Goldstream R PIP	Chinook	Wilson Cr	Fall	Smolts	50,000	35,000	1,505	
		Cowichan R	Fall	Smolts	0	150,000	1,200	
	Coho	Gold.+ Shawn.	Fall	Spr Fry	50,000	40,500	243	
		Nitinat R	Fall	Smolts	110,000	100,000	800	
L. Campbell R PIP	Coho	Gold.+ Shawn.	Fall	Smolts	120,000	81,000	4,609	
	Chinook	L. Campbell R	Fall	Smolts	60,000	43,200	372	
		Coho	L. Campbell R	Fall	Smolts	75,000	30,375	3,271
	Cutthroat	L. Campbell R			Spr Fry		24,300	423
			Fall	Smolts	15,000	10,100	1,010	
Steelhead	L. Campbell R	Winter	Smolts	15,000	10,100	404		
Enhancement Operations								
Big Qualicum River	Chinook	B. Qualicum R	Fall	Smolts	4,500,000	3,750,000	17,250	
	Chum	B. Qualicum R	Fall	Unfed Fry	125,000,000	54,000,000	405,000	
	Coho	B. Qualicum R	Fall	Fall Fry	2,500,000	200,000	3,840	
				Smolts		1,250,000	59,125	
	Cutthroat	L. Qualicum R	Fall	Smolts	0	15,000	1,500	
Capilano River	Steelhead	B. Qualicum R	Winter	Fed Fry	45,000	10,000	100	
			Smolts		20,000	800		
	Chinook	Capilano R	Fall	Smolts	736,000	560,000	3,752	
	Chum	Brother Cr	Fall	Fed Fry	50,000	42,500	723	
	Coho	Capilano R	Fall	Smolts	810,000	525,000	62,475	
				Spr Fry		40,000	796	
				Fed Fry	15,000	5,000	50	
	Steelhead	Capilano R	Summer	Smolts		5,000	150	
				Winter	Fed Fry	25,000	8,000	80
				Smolts		10,000	400	
Smolts				500,000	225,000	450		
Yearling Smolts					40,000	556		
Chehalis River/BC	Chinook	Chehalis R	Summer	Smolts		2,600,000	52,520	
				Yearling Smolts	3,800,000	2,600,000	52,520	
	Chum	Chehalis R	Fall	Fed Fry	9,000,000	7,800,000	100,620	
				Smolts	1,300,000	1,007,000	116,510	
	Coho	Chehalis R	Fall	Smolts	42,000	24,000	2,400	
	Cutthroat	Fraser R Low	Fall	Smolts	43,000	25,000	750	
				Winter	Smolts	76,000	40,000	1,600
				Summer	Smolts	43,000	24,000	720
	Steelhead	Chehalis R	Winter	Fed Fry	0	0	0	
				Smolts				
Chemainus River	Chinook	Chemainus R	Fall	Smolts	250,000	200,000	7,820	
	Coho	Chemainus R	Fall	Spr Fry	75,000	50,000	725	
Chilliwack River	Chinook	Chilliwack R	Summer	Smolts	500,000	410,000	820	
			Fall	Smolts	2,200,000	1,800,000	74,160	
	Chum	Chilliwack R	Fall	Fed Fry	5,200,000	3,000,000	46,500	
				Unfed Fry		1,900,000	13,300	
	Coho	Chilliwack R	Fall	Smolts	2,400,000	1,950,000	236,145	
	Pink	Chilliwack R	Fall	Unfed Fry	0	0	0	
Steelhead	Chilliwack R	Winter	Smolts	200,000	120,000	4,800		

Appendix 1. 1997 BROOD PRODUCTION TARGETS

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Project	Species	Stock	Run	Stage	Eggs	Release	ExpAdults		
Conuma River	Chinook	Conuma R	Fall	Smolts	3,200,000	2,400,000	81,400		
				Yearling Smolts		50,000	400		
	Chum	Tlupana R	Fall	Smolts	50,000	40,000	460		
				Canton Cr	Fall	Fed Fry	1,500,000	1,290,000	9,546
				Conuma R	Fall	Fed Fry	5,000,000	4,600,000	34,040
				Deserted R	Fall	Fed Fry	2,000,000	1,700,000	12,580
				Sucwoa R	Fall	Fed Fry	4,000,000	3,440,000	25,456
	Coho	Tlupana R	Fall	Fed Fry	1,500,000	1,290,000	9,546		
				Conuma R	Fall	Smolts	200,000	100,000	10,700
					Spr Fry		52,000	1,175	
Fulton River	Steelhead	Conuma R	Winter	Fed Fry	30,000	22,500	225		
	Sockeye	Fulton Ch.#1	Summer	Spr Fry	66,000,000	33,000,000	422,400		
		Fulton Ch.#2	Summer	Spr Fry	180,000,000	90,000,000	1,152,000		
		Fulton R	Fall	Spr Fry	250,000,000	40,000,000	512,000		
Gates R Spawn Chan	Sockeye	Gates R	Summer	Spr Fry	30,000,000	21,000,000	168,000		
Glendale Channel	Pink	Glendale Chan	Fall	Unfed Fry	24,000,000	12,000,000	471,600		
Horsefly Creek	Sockeye	Horsefly Chan	Summer	Spr Fry	0	0	0		
Inch Creek	Chinook	Chilliwack R	Fall	Smolts	0	200,000	4,040		
				Maria Slough	Summer	Smolts	10,000	7,200	62
	Chum	Inch Cr	Fall	Fed Fry	1,200,000	1,000,000	8,200		
				Stave R	Fall	Fed Fry	2,200,000	2,000,000	45,400
	Coho	Inch Cr	Fall	Smolts	300,000	200,000	18,800		
				Nicomen Sl	Fall	Smolts	80,000	60,000	5,640
				Norrish Cr	Fall	Smolts	80,000	60,000	5,640
				Stave R	Fall	Smolts	550,000	430,000	40,420
	Cutthroat	Fraser R Low	Fall	Smolts	0	0	0		
	Steelhead	Chilliwack R	Winter	Smolts	0	20,000	800		
Kakweiken River	Pink	Kakweiken R	Fall	Unfed Fry	32,000,000	16,000,000	628,800		
Kitimat River	Chinook	Dala R	Spring	Smolts	100,000	85,000	1,224		
				Hirsch Cr	Spring	Smolts	200,000	170,000	2,448
				Kildala R	Spring	Smolts	225,000	191,000	2,750
				Kitimat R Low	Spring	Smolts	1,100,000	935,000	13,464
				Kitimat R Upp	Spring	Smolts	600,000	510,000	7,344
				Chum	Hirsch Cr	Summer	Fed Fry	1,500,000	1,245,000
	Kildala R	Summer	Fed Fry				750,000	623,000	14,454
	Kitimat R	Summer	Fed Fry				4,000,000	3,320,000	77,024
	Coho	Kitimat R	Fall				Smolts	500,000	430,000
	Cutthroat	Kitimat R	Fall	Smolts	10,000	6,800	680		
Steelhead	Kitimat R	Winter	Smolts	65,000	44,000	1,760			
Little Qualicum R	Chinook	L. Qualicum R	Fall	Smolts	3,500,000	2,500,000	19,750		
	Chum	L. Qualicum R	Fall	Unfed Fry	62,000,000	38,000,000	190,000		
Nadina R Spawn Chan	Steelhead	L. Qualicum R	Winter	Smolts	0	25,000	1,000		
	Sockeye	Nadina R	Summer	Spr Fry	15,000,000	7,500,000	45,000		

Appendix 1. 1997 BROOD PRODUCTION TARGETS

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Project	Species	Stock	Run	Stage	Eggs	Release	ExpAdults	
Nitinat River	Chinook	Nitinat R	Fall	Smolts	6,823,200	6,000,000	54,600	
		Sarita R	Fall	Smolts	136,800	120,000	1,092	
	Chum	Nitinat R	Fall	Fed Fry	33,700,000	30,000,000	825,000	
		Coho	Nitinat R	Fall	Smolts	500,000	100,000	7,210
	Pallant Creek		Pachena R	Fall	Spr Fry	25,000	20,250	431
			Sarita R	Fall	Spr Fry	70,000	20,250	431
		Steelhead	Nitinat R	Winter	Fed Fry	12,000	9,720	58
		Chinook	Pallant Cr	Fall	Smolts	225,000	162,000	2,430
			Mathers Cr	Fall	Fed Fry	5,000,000	4,400,000	47,520
		Chum	Pallant Cr	Fall	Fed Fry	10,000,000	8,800,000	95,040
Coho			Braverman Cr	Fall	Spr Fry	200,000	174,000	5,533
Pinkut Creek		Sockeye	Pallant Cr	Fall	Spr Fry	200,000	174,000	5,533
			Pinkut Ab Fall	Summer	Spr Fry	75,000,000	37,500,000	480,000
			Pinkut Chan.	Summer	Spr Fry	80,000,000	40,000,000	512,000
Pitt River Upper	Sockeye	Pinkut Cr	Summer	Spr Fry	37,500,000	5,600,000	71,680	
		A Patterson Ch	Summer	Spr Fry	3,000,000	1,500,000	10,050	
		Pitt R Upp	Summer	Fall Fry	5,500,000	5,000,000	67,500	
Puntledge River	Chinook	Puntledge R	Summer	Smolts	2,400,000	1,900,000	6,270	
			Fall	Smolts		100,000	250	
	Chum	Puntledge R	Fall	Smolts	2,200,000	1,800,000	5,940	
			Fall	Fed Fry	4,000,000	3,750,000	54,750	
	Coho	Puntledge R	Fall	Fall Fry	2,200,000	400,000	2,320	
			Smolts		800,000	44,560		
	Quinsam River	Cutthroat	Puntledge R	Fall	Spr Fry		600,000	3,480
				Smolts		20,000	13,500	1,350
		Pink	Puntledge R	Fall	Unfed Fry	3,750,000	3,000,000	105,000
				Summer	Fed Fry	35,000	25,000	250
Steelhead		Puntledge R	Winter	Smolts	50,000	33,750	1,350	
			Fall	Smolts	4,100,000	3,300,000	31,680	
Quinsam River		Chinook	Quinsam R	Fall	Smolts	1,955,000	300,000	9,330
				Fall	Fall Fry		1,200,000	93,480
		Cutthroat	Quinsam R	Fall	Smolts	10,000	6,750	675
				Fall	Unfed Fry	8,200,000	7,000,000	301,700
	Pink	Quinsam R	Winter	Fed Fry	60,000	20,000	200	
			Smolts			25,000	1,000	
	Robertson Creek	Chinook	Nahmint R	Fall	Smolts	500,000	450,000	9,270
				Fall	Smolts	9,000,000	8,000,000	164,800
		Coho	Robertson Cr	Fall	Yearling Smolts		130,000	1,911
				Smolts		1,000,000	800,000	37,680
Steelhead		Robertson Cr	Summer	Fed Fry	250,000	100,000	1,000	
			Smolts			75,000	2,250	
Shuswap River	Chinook	Somass R	Winter	Smolts	100,000	50,000	2,000	
		Shuswap R Low	Summer	Smolts	925,000	850,000	7,310	
		Shuswap R Mid	Summer	Smolts	300,000	250,000	2,150	
Snettisham	Sockeye	Tahltan Lk	Fall	Spr Fry	6,000,000	4,800,000	32,160	
		Tatsamenie Lk	Fall	Spr Fry	5,000,000	4,000,000	26,800	

Appendix 1. 1997 BROOD PRODUCTION TARGETS

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Project	Species	Stock	Run	Stage	Eggs	Release	ExpAdults
Snootli Creek	Chinook	Atnarko R Low	Summer	Smolts	1,150,000	990,000	2,970
		Atnarko R Upp	Summer	Smolts	1,150,000	990,000	2,970
		Noosgulch R	Summer	Smolts	50,000	43,000	129
		Nusatsum R	Summer	Smolts	100,000	86,000	258
		Salloomt R	Summer	Smolts	100,000	86,000	258
	Chum	Fish+ Airport	Summer	Fed Fry	1,800,000	1,656,000	42,725
		Salloomt R	Summer	Fed Fry	1,800,000	1,656,000	42,725
		Snootli Cr	Summer	Fed Fry	1,800,000	1,656,000	42,725
		Thorsen Cr	Summer	Fed Fry	1,800,000	1,656,000	42,725
	Pink	Atnarko R Low	Fall	Unfed Fry	37,500,000	18,750,000	281,250
Steelhead	Hotnarko Lk	Landlock	Fed Fry	2,000	1,600	10	
Spius Creek	Chinook	Coldwater R	Spring	Yearling Smolts	100,000	70,000	707
		Nicola R	Spring	Yearling Smolts	161,000	140,000	1,414
		Salmon R	Spring	Yearling Smolts	100,000	70,000	707
		Spius Cr	Spring	Yearling Smolts	100,000	70,000	707
	Coho	Coldwater R	Fall	Spr Fry	225,000	175,000	1,470
		Salmon R	Fall	Spr Fry	170,000	150,000	1,260
		Spius Cr	Fall	Smolts	120,000	80,000	3,304
Tenderfoot Creek	Chinook	Porteau Cove	Summer	Smolts	1,800,000	1,500,000	28,200
		Tenderfoot C	Fall	Fed Fry	120,000	100,000	1,700
	Coho	Ashlu Cr	Fall	Smolts	40,000	35,000	3,276
		Mamquam R	Fall	Smolts	40,000	35,000	3,276
		Squamish R	Fall	Smolts	40,000	35,000	3,276
		Tenderfoot C	Fall	Smolts	125,000	110,000	10,296
		Weaver Cr	Fall	Unfed Fry	4,125,000	2,700,000	18,900
Weaver Cr Channel	Chum	Weaver Cr	Fall	Unfed Fry	1,920,000	921,600	34,744
	Pink	Weaver Cr	Fall	Unfed Fry	1,920,000	921,600	34,744
	Sockeye	Weaver Cr	Fall	Spr Fry	65,000,000	46,800,000	514,800