Results of a Beach Seine Survey at the Courtenay River Estuary, Courtenay, B.C., 1998

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RESULTS OF A BEACH SEINE SURVEY AT THE COURTENAY RIVER ESTUARY, COURTENAY, B. C., 1998

by

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ABSTRACT

MacDougall, L.A., B.A. Bravender, and L.R. Russell. 1999. Results of a beach seine survey at the Courtenay River estuary, Courtenay, B. C., 1998. Can. Data Rep. Fish. Aquat. Sci. 1054: 23 p.

This report gives data on the distribution and abundance of juvenile salmonids within the Courtenay River estuary, from a survey conducted between May and July, 1998.

A total of 767 juvenile salmonids and 9053 non-salmonid fish was recorded in 176 beach seine sets. Lengths and weights were also recorded for a total of 162 juvenile salmonids.

Habitat types included fine sandy substrates, human modified areas, and steep grassy riverbanks. Swift currents were evident in some areas of the estuary. Vegetation at sites along the Courtenay River included marshgrass, shrubs, and trees, while sites within the estuary frequently included eelgrass and algae.

RÉSUMÉ

MacDougall, L.A., B.A. Bravender, and L.R. Russell. 1999. Results of a beach seine survey at the Courtenay River estuary, Courtenay, B. C., 1998. Can. Data Rep. Fish. Aquat. Sci. 1054: 23 p.

Le présent rapport fait état d'une étude sur la distribution et l'abondance des salmonidés juvéniles dans l'estuaire de la Courtenay, qui a été réalisée de mai a juillet 1998.

On a noté, au total, 767 salmonidés juvenilés et 9053 individus d'autres espèces dans 176 coups de sennes de plage. On a également enregistré la longueur et le poids d'un total de 162 salmonides juveniles.

Les types d'habitat comprennent les substrats de sable fin, les zones modifiées par l'intervention humaine et les berges gazonnées très escarpées. Il y a également des courants vifs dans certaines parties de l'estuaire. Dans les sites situés le long de la rivière Courtenay, la végétation est composée d'herbes de marais, d'arbustes et d'arbres, tandis que dans l'estuaire, on trouve de la zostère et algues.

INTRODUCTION

During the summer of 1998, a field program was carried out to assess the distribution and abundance of juvenile salmonids within the Courtenay River estuary. Previous studies of this area include a review of published information (Morris et al., 1979), and physical and chemical oceanographic studies (Waldichuk et al., 1968; Waldie, 1951).

Baynes Sound is a body of water about 30 km long, situated between the city of Comox and Deep Bay. It is a narrow trough, separated from Georgia Strait by Denman Island and the shallow Comox Bar. Waldie (1951) notes that the rich organic sand and mud substrates of Baynes Sound suggest the area is protected from strong currents. The Courtenay River is the main source of fresh water (Waldie, 1951), and flows into the head of Baynes Sound through the Courtenay River estuary. Morris et al. (1979) describe the Courtenay River estuary as highly stratified, particularly during the summer months, with a saltwater wedge existing below a freshwater layer on the surface. Wind mixing is minor because of the protection provided by Goose Spit and Denman and Hornby islands.

The Courtenay River estuary has a long history of anthropological changes, many of which have reduced the ecological utility of the estuarine foreshore. Logging, marina and wharf construction, foreshore development, and sewage disposal have had a large impact on the estuary. A portion of Comox Harbour is used for log dumping and sorting, and log handling and storage occupies large areas within the estuary and along the foreshore. Marina and wharf construction often requires dredging, which has a significant impact on vegetation, substrate, and the shape of the basin. Tidal marshes have been filled to facilitate construction of the sewage lagoon, housing developments, Fields Sawmill, and various wharves. Morris et al. (1979) also noted that Comox Harbour was closed to shellfish harvesting as a result of faecal coliform contamination associated with sewage pollution.

Despite the considerable human use of this area, relatively little data are available regarding juvenile salmon distribution in the estuary. Thus, information from this study will help to augment the ecological information available for this system, as well as providing baseline data useful to the development of the Estuary Management Plan, initiated in September, 1997, by Fisheries and Oceans Canada. The plan will designate types of appropriate activities within the estuary, establish a co-ordinated project review board to address specific proposals within the management plan area, and promote transparency and public participation in the development and implementation of the plan.

MATERIALS AND METHODS

A total of seventeen sites within the Courtenay River estuary were sampled on eight trips between May 6 and July 29, 1998 (Table 1). Locations of the sites are shown in Figure 1. Each site was sampled with a beach seine 13.5 m long and 2.9 m deep with 4.5-m wings of 1-cm stretched mesh and a 4.6-m bunt of 0.6-cm stretched mesh. Rope bridles 15 m in length were fitted to each end of the net. Duplicate sets were done at each site except on May 6, when single sets only were done at each site. The net was positioned using an 18.5-foot aluminium craft, with a 150 hp jet drive. The net was pulled offshore to the full length of the rope bridles, where possible, set in a circle back to shore, and retrieved by hand.

At most sites the entire catch of non-salmonids was counted and identified to species where possible. Where necessary, the catch was randomly subsampled using a dipnet so as to sample all species present in the catch. These fish were then identified and counted and results multiplied by the subsample proportion to estimate the total catch.

At most sites the entire catch of salmonids was counted, and identified to species, but a subsample was taken where necessary. Coho and chinook were further identified as marked (CWT) or unmarked. All or a subsample of salmonids were then anaesthetised with Alka Seltzer™ on shore at the site. The fork length of each fish to the nearest millimetre was recorded, and they were damp dried and weighed to the nearest 0.1g in water using an Ohaus Model No. C305 portable balance. The fish were then placed in a bucket of water from the sampling site to recover, and were released back into the estuary once they were actively swimming inside the bucket.

A condition factor (K) was determined using the equation:

$$K = \frac{W}{L^3} \times 10^5$$

where K is the condition factor, W is the wet weight of the fish in grams, and L is the fork length of the salmon in millimetres (Meehan et al., 1978).

Tide heights for Table 4 were determined from Canadian Tide and Current Tables (Canadian Hydrographic Service, Fisheries and Oceans Canada, 1998).

Two sites were moved after the first or second sampling. Site 10 was moved further north, toward the mouth of the Courtenay River, and site 5 was moved further north as well, as it was determined that it was close enough to site 4 to be representative of the same habitat.

Salinity and temperature were recorded at the surface, and then at 1-m intervals to the bottom, or to 5 m depth at each site, using a YSI Model 33 meter. An Oxyguard Handy MK 1 meter and a YSI Model 57 Oxygen Meter recorded dissolved oxygen levels in mg/L ± 2%.

RESULTS

Table 2 contains the abbreviated, scientific, and common names of captured fish species. Temperature, salinity, and oxygen levels may be found in Table 3. A total of 176 beach seines were completed (Table 4). In all catches combined there were 221 coho, 351 chinook, 162 chum, 25 steelhead and 8 cutthroat for a total catch of 767 juvenile salmonids (Table 4). A total of 9053 non-salmonid fish was also caught in the beach seines. This included 3370 sculpins, 2947 sticklebacks and 858 perch.

Lengths and weights were recorded for a total of 162 juvenile salmonids. Measurements were taken from 118 chinook, including 77 unmarked, 4 marked, and 37 chinook likely of hatchery origin, and condition factors were determined for these fish (Table 5). Lengths, weights, and K-factors were also recorded for 43 coho, including 33 coho fry and 10 unmarked, likely hatchery origin, coho. One chum salmon was also measured and weighed. The minimum K-factor (0.68) was calculated for a coho salmon at site 11. The maximum recorded K-factor was 1.38, calculated for a coho salmon at site 14.

The habitat types were varied, from fine sandy substrate with little slope (e.g. sites 2 and 7), to sandy substrate on steep banks covered in marshgrass (e.g. sites 1, 11 and 17). In contrast, sampling sites 8, 9 and 14 were located in human modified areas, including changes such as large riprap breakwaters, dredged basins, and areas where foreshore vegetation has been removed or paved over. Vegetation at sites along the Courtenay River included marshgrass, shrubs, and trees. Sites within the estuary typically contained algal species, including *Fucus* sp. and *Ulva* sp., often with marshgrass and shrubs in the high intertidal or backshore.

Some areas of the estuary were characterised by high currents. Sites 1and 13, located along the Courtenay River, were areas of high current as were sites 10 and 12, located in the upper estuary along the river channel and site 6, located on the north side of Goose Spit.

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Table 1. Locations and descriptions of beach seine sites sampled.

Site No.	Description
1.	Located in upper estuary at mouth of dredged small boat slough. Moderate to steep slope, fine mud substrate. River banks covered in grasses and small shrubs near the water's edge, large trees less than 1 m back from water. Swift currents.
2.	Mouth of Trent River (Gartley Point). Flat sandy substrate with fist-sized and some larger rocks, becoming mud offshore. Grasses and shrubs 10 m back from water. *Fucus* sp., barnacles, *Ulva* sp.
3.	Located at Royston. Very shallow, pebble and mid-sized rocks. No vegetation on the beach.
4.	Site where riprap breakwater intersects shoreline, west side of estuary. Rocky/gravel substrate, very gradual slope. *Fucus* sp., and large eelgrass bed offshore.
5.	Foot of Hilton Road. Sandy and muddy substrate with large rocks covered in barnacles. Very shallow, little slope, some eelgrass and debris near shore.
6.	Sampled on north side of Goose Spit. Sandy substrate, steep slope, some marshgrass on upper shore. Swift currents.
7.	Located at mouth of Brooklyn Creek, adjacent to residential area. Mid-size gravel to sand/mud offshore, flat. *Fucus* sp. and *Ulva* sp. in intertidal area.
8.	Sampled within the Comox Marina, at Grid #2. Large rocks, pebble and sand mix on shore, steep slope into the water. Little intertidal vegetation. Sheltered from wind and wave action.
9.	North of Comox Marina, in front of condominium complex. Large riprap breakwater with steep slope to gravel/sand/mud in low intertidal area. Moderate slope offshore, no vegetation in intertidal or upper shore.
10.	Site on shore of Indian Reserve No. 1, on east side of the river channel. Fine mud and sand substrate, marshgrass in backshore, shells, some rocks and gravel in intertidal area. Moderate slope, occasional swift current.

Table 1 (cont'd).

Site No.	Description
11.	Located at mouth of Duck Slough in upper estuary. Gravel substrate, moderate slope, marshgrass on upper shore.
12.	Sampled adjacent to airpark, on west side of river channel. Steep gravel beach, marsh grass in backshore. Swift current.
13.	Site on west side of river channel, foot of Tenth St., across river from site 1. Steep slope, gravel substrate, tall, dense marshgrass to waterline, trees in upper shore 1 m from waterline. Swift currents.
14.	Sampled within abandoned dredged boat basin on west side of river channel, north of boat launch. Very steep slope, tall marshgrass, trees to waterline. *Fucus* sp., *Ulva* sp.
15.	Site on south side of Goose Spit. Gentle sloping mid sized gravel, substrate became sandy at low intertidal/subtidal. Sand dollars, eelgrass in low intertidal/subtidal area, tall grasses and evergreens in backshore, about 5 m from shore. Exposed to wind and wave action.
16.	Narrow, small slough parallel to sewage lagoon. Shallow, muddy substrate, marsh grass in upper shore.
17.	Sampled on riverbank, across from Lewis Park. Moderately sloping river banks, sandy substrate covered with marsh grass. Swift current.

Table 2. Species of fish captured and abbreviations.

Fish Species	Common Name	Abbreviation
Oncorhynchus kisutch	Coho salmon fry	COFR
Oncorhynchus kisutch	Juvenile/marked hatchery coho	MKCO
Oncorhynchus kisutch	Juvenile unmarked coho	UNCO
Oncorhynchus tshawytsha	Juvenile unmarked hatchery chinook	HTCH
Oncorhynchus tshawytsha	Juvenile marked hatchery chinook	MKCH
Oncorhynchus tshawytsha	Juvenile unmarked chinook	UNCK
Oncorhynchus keta	Juvenile chum	CHUM
Salmo gairdneri	Juvenile marked hatchery steelhead	MKST
Salmo gairdneri	Juvenile unmarked steelhead	UNST
Salmo clarki clarki	Cutthroat trout	CUTT
	Unidentified sculpin	UNSC
Family Embiotocidae	Unidentified perch	UNPE
Citarichthys stigmaeus	Speckled sanddab	SADA
Platichthys stellatus	Starry flounder	STFL
	Unidentified flatfish	UNFL
Gasterosteus aculeatus	Threespine stickleback	THST
Ammodytes hexapterus	Pacific sandlance	PASA
Apodichthys flavidus	Penpoint gunnel	PPGU
Pholis ornata	Saddleback gunnel	SAGU
Family Stichaeidae	Unidentified blenny	UNBL
Family Hexagrammidae	Unidentified greenling	UNGR
Hexagrammos stelleri	Whitespotted greenling	WSGR
Syngnathus griseolineatus	Bay pipefish	BAPI
Lumpenus saggita	Snake prickleback	SNPR

Table 3. Temperature, salinity and dissolved oxygen data (n/s=not sampled).

Date/Site	Time (PST)	Depth (m)	Temp (°C)	Salinity (o/oo)	Oxygen (mg/L)
21-May-98					
Site 7	0900	surface	15.5	20.0	n/s
Site 8	1030	surface	16.0	25.0	n/s
Site 9	1100	surface	15.0	26.0	n/s
Site 10	1150	surface	19.0	20.0	n/s
Site 11	1215	surface	13.5	0.0	n/s
Site 12	1235	surface	12.5	0.0	n/s
3,4-Jun-98					
Site 1	0855	surface	12.0	0.0	n/s
Site 2	0930	surface	18.0	7.3	n/s
Site 3	1055	surface	19.5	10.5	n/s
Site 4	1025	surface	15.0	15.5	n/s
Site 5	0900	surface	12.3	8.5	n/s
Site 6	1210	Surface	20.0	22.9	n/s
"	"	1	21.0	21.2	n/s
"	"	2	20.5	21.9	n/s
Site 7	1140	surface	17.0	20.0	n/s
Site 8	1200	surface	24.8	9.8	n/s
"	"	1	24.0	15.0	n/s
Site 9	1240	surface	22.5	18.5	n/s
Site 10	1325	surface	16.0	1.5	n/s
Site 11	1355	surface	15.0	0.0	n/s
Site 12	0830	surface	12.8	0.0	n/s
"	1325	surface	15.0	0.0	n/s
"	"	1	14.1	0.0	n/s
Site 13	0945	surface	12.0	0.0	n/s
Site 14	1240	surface	17.0	0.0	n/s
"	"	1	19.0	6.5	n/s
Site 15	1015	surface	20.0	18.8	n/s
17,18-Jun-98					
Site 1	0900	surface	16.2	0.0	9.6
"	"	1	16.2	0.0	9.5
Site 2	0900	surface	16.8	13.6	9.8
Site 3	0925	surface	16.5	11.0	9.4

Table 3 (cont'd).

Date/Site	Time (PST)	Depth (m)	Temp (°C)	Salinity (o/oo)	Oxygen (mg/L)
17,18-Jun-98					
Site 4	1055	surface	15.6	11.8	8.6
Site 5	1300	surface	16.8	12.0	8.2
Site 6	1050	surface	16.8	23.5	10.0
Site 7	1115	surface	17.2	24.0	8.5
Site 8	1410	surface	18.2	24.5	9.8
"	"	1	18.2	24.0	10.0
Site 9	1325	surface	18.4	24.0	8.7
"	"	0.5	18.6	24.0	9.4
Site 10	1350	surface	15.8	7.0	9.8
Site 11	1220	surface	16.0	0.5	9.0
"	"	0.5	17.0	0.5	8.6
Site 12	1245	surface	16.2	0.5	10.4
"	"	1	16.2	0.5	10.3
Site 13	0935	surface	16.2	0.0	9.1
"	"	1	16.2	0.0	9.0
Site 14	1020	surface	16.4	0.0	8.5
"	"	1	16.4	0.0	8.0
"	"	1.5	18.5	0.0	5.4
Site 15	1030	surface	16.2	24.2	8.8
Site 16	1100	surface	16.5	0.0	7.2
"	"	0.5	17.5	0.1	7.5
29,30-Jun-98					
Site 1	0910	surface	20.4	0.0	8.8
"	"	1	18.5	0.0	9.4
Site 2	0840	surface	19.8	15.0	9.2
Site 3	0925	surface	21.6	16.0	7.4
Site 4	0945	surface	21.5	18.5	8.4
Site 5	1025	surface	22.0	29.2	7.5
Site 6	1250	surface	21.4	18.5	7.4
Site 8	1230	surface	21.5	20.0	8.0
"	"	1	20.5	22.1	8.2
"	"	2	20.3	22.8	8.5
Site 9	1225	surface	21.5	10.0	8.5

Table 3 (cont'd).

Date/Site	Time (PST)	Depth (m)	Temp (ºC)	Salinity (o/oo)	Oxygen (mg/L)
Site 10	1358	surface	21.0	1.0	10.6
Site 11	1055	surface	19.7	0.5	8.5
"	"	1	20.3	5.0	9.0
Site 12	1435	surface	20.2	0.2	9.6
"	"	0.5	20.3	0.1	9.5
Site 13	1000	surface	18.2	0.0	10.7
"	"	1	18.2	0.0	10.5
Site 15	1320	surface	21.0	24.5	9.0
Site 17	1030	surface	19.0	0.5	8.6
14,15-Jul-98					
Site 1	0837	surface	19.0	0.0	8.1
"	"	1	19.0	0.0	8.4
Site 2	1000	surface	17.7	17.5	7.0
Site 3	1025	surface	18.0	20.9	7.0
Site 4	1056	surface	18.4	10.9	8.0
Site 5	1130	surface	18.8	8.0	8.2
Site 6	1213	surface	17.2	21.1	7.7
"	"	1	17.2	21.5	7.8
Site 7	1145	surface	18.2	19.6	7.1
Site 8	1039	surface	18.0	20.0	7.1
"	"	1	17.8	22.0	7.1
"	"	2	17.1	22.9	7.2
"	"	3	16.0	23.5	6.5
Site 9	1012	surface	18.0	19.7	7.9
"	"	1	17.7	22.0	7.4
Site 10	1248	surface	19.0	3.0	8.1
Site 11	0835	surface	17.1	0.0	8.1
"	"	1	17.1	0.8	8.5
Site 12	1325	surface	17.5	0.5	9.1
"	"	1	17.8	0.5	8.6
Site 14	0946	surface	18.5	0.5	8.0
"	"	1	19.0	5.5	6.9
Site 15	0920	surface	17.2	19.5	8.1
"	"	1	15.9	22.1	7.5
"	"	2	15.8	22.1	7.4

Table 3 (cont'd).

Date/Site	Time (PST)	Depth (m)	Temp (ºC)	Salinity (o/oo)	Oxygen (mg/L)
29-Jul-98					
Site 17	0903	surface	18.9	0.0	8.1
Site 1	0933	surface	22.7	0.0	7.5
"	"	1	22.3	0.0	7.7
"	"	2	22.1	0.0	8.0
Site 2	1255	surface	23.1	22.5	9.8
Site 4	1325	surface	23.9	16.5	9.8
"	"	1	21.8	21.0	9.6
Site 8	1140	surface	23.2	20.0	8.8
"	"	1	22.3	21.5	9.0
"	"	2	21.6	21.9	9.4
"	"	3	20.2	22.9	9.8
Site 11	1024	surface	23.2	0.5	7.2
"	"	1	21.9	6.5	7.7
Site 14	1003	surface	22.9	0.0	7.6
"	"	1	23.5	3.1	8.6
Site 15	1220	surface	23.7	21.5	9.8
"	"	1	23.2	22.5	10.6
Site 17	0840	surface	22.1	0.0	7.8
"	"	1	21.6	0.0	8.0
"	"	2	21.5	0.0	8.0
"	"	3	21.4	0.0	8.2

Table 4. Fish catches (see Table 2 for abbreviations).

Date / Site	Set No.	Time PST	Tide (m)	CO FR	MK CO	UN CO	HT CH	MK CH	UN CK	CH UM	MK ST	UN ST	CU TT	UN SC	UN PE	SA DA	ST FL	UN FL	TH ST	PA SA	PP GU	SA GU	UN BL	UN GR	WS GR	BA PI	SN PR
6 May																											
1	1	0832	2.3	0	0	0	0	0	18	9	0	0	0	7	0	0	0	0	52	0	0	0	0	0	0	0	0
2	1	0933	2.2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	0949	2.3	0	0	0	0	0	0	2	0	0	0	75	0	0	1	0	0	0	0	0	0	0	0	0	0
4	1	1017	2.3	0	0	0	0	0	0	6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
5	1	1033	2.4	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0
6	1	1100	2.5	0	0	0	0	0	0	0	0	0	0	13	2	0	7	0	0	157	0	0	3	0	0	0	0
7	1	1111	2.6	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0
8	1	1240	3.1	30	0	0	0	0	0	30	0	0	0	6	90	0	0	0	1500	0	0	0	12	0	0	0	0
9	1	1300	3.2	0	0	0	0	0	8	3	0	0	0	23	0	0	2	0	0	0	0	0	2	0	0	0	0
10	1	1318	3.3	0	0	0	0	0	0	1	0	0	0	35	0	0	1	0	0	0	0	0	0	0	0	0	0
11	1	1345	3.4	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	1	1400	3.5	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	1	0	0	0	0	0	0	0	0
13	1	1411	3.5	3	0	1	0	0	2	7	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0
14	1	1430	3.5	4	0	0	0	0	42	89	0	0	0	15	0	0	0	0	9	0	0	0	0	0	0	0	0
TOT	14			38		1			71	151				213	92		11		1562	164			17		1		
20 May																											
1	1	1232	3.5	0	0	0	0	0	2	0	0	0	0	5	0	0	0	0	3	0	0	0	0	0	0	0	0
	2	1245	"	0	0	1	0	0	10	0	0	0	0	12	0	0	0	0	9	0	0	0	0	0	0	0	0
2	1	0910	2.8	0	0	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0920	"	0	1	9	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	1	0	0	0	0
3	1	0940	2.9	0	0	0	0	0	0	0	0	0	0	16	0	0	1	0	0	0	0	0	0	0	0	0	0
	2	0950	"	0	1	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0
4	1	1005	3.1	0	0	0	0	0	0	0	0	0	0	10	0	0	1	1	0	0	0	0	4	0	0	1	0
	2	1017	"	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	1	0	1	0	0	0	0
6	1	1035	3.2	0	0	0	0	0	0	0	0	0	0	48	0	29	0	0	0	270	0	0	0	0	0	0	2
	2	1055	"	0	0	2	0	0	0	0	0	0	0	22	0	0	0	12	0	50	0	0	0	0	0	0	8
13	1	1255	3.5	2	0	0	0	0	3	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	1305	"	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0
14	1	1330	3.4	7	0	0	0	0	20	4	0	0	0	18	0	0	0	0	12	0	0	0	0	0	0	0	0
	2	1350	"	19	0	0	0	0	10	0	0	0	0	26	0	0	0	0	17	0	0	0	0	0	0	0	0
TOT	14			28	2	15			46	4				214		29	2	13	49	320	1		6			1	10
21 May																											
7	1	0900	2.2	0	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0905	"	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0
8	1	1030	2.7	0	0	0	0	0	0	5	0	0	0	112	3	0	0	0	0	0	0	2	0	0	0	1	2
	2	1035	"	0	0	0	0	0	0	0	0	0	0	260	0	0	0	0	0	0	0	1	3	0	0	0	1
9	1	1100	2.9	0	0	7	0	0	1	0	0	0	0	200	3	3	0	0	0	0	0	0	2	0	0	0	1
	2	1105	"	0	26	13	0	0	2	0	0	0	0	109	5	1	1	0	0	0	0	0	1	0	0	0	0
10	1	1150	3.2	0	0	0	0	0	0	0	0	0	0	70	130	0	0	1	0	0	0	0	0	0	0	0	0
	2	1155	"	0	0	0	0	0	0	0	0	0	0	77	28	0	0	2	0	0	0	0	0	0	0	0	0
11	1	1215	3.4	0	0	9	0	0	11	0	0	0	0	4	0	0	0	0	1	0	0	0	0	0	0	0	0
	2	1220	"	0	0	3	0	0	1	0	4	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
12	1	1235	3.5	10	0	0	0	0	3	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	1240	"	1	0	1	0	0	0	0	0	1	0	8	0	1	0	0	17	0	0	0	0	0	0	0	0
TOT	12			11	26	33			18	5	4	2		885	169	5	1	3	19			3	6			1	4

Table 4 (cont'd).

Date / Site	Set No.	Time PST	Tide (m)	CO FR	MK CO	UN CO	HT CH	MK CH	UN CK	CH UM	MK ST	UN ST	CU TT	UN SC	UN PE	SA DA	ST FL	UN FL	TH ST	PA SA	PP GU	SA GU	UN BL	UN GR	WS GR	BA PI	SN PR
3 June																											
1	1	0855	2.4	1	0	0	0	0	10	1	0	0	0	25	0	0	0	1	4	0	0	0	0	0	0	0	0
	2	0910	"	0	0	0	0	0	7	0	0	0	0	49	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	1055	2.9	0	1	0	0	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	1105	"	0	0	1	0	0	0	0	0	0	0	43	0	0	0	1	0	0	0	0	0	0	0	0	0
4	1	1025	2.8	0	0	0	0	0	0	0	0	0	0	9	12	0	0	0	0	0	0	0	1	0	0	0	0
	2	1040	"	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	1	0	0	0	0	0
6	1	1210	3.2	0	0	0	0	0	0	0	0	2	0	75	0	35	0	1	0	0	0	2	0	0	0	0	5
	2	1220	"	0	0	0	0	0	0	0	0	0	0	24	0	0	0	11	0	0	0	0	0	0	0	0	0
9	1	1240	3.3	0	0	0	0	0	0	0	0	0	0	36	7	1	7	0	0	0	0	0	1	0	0	0	2
	2	1250	"	0	0	0	0	0	0	0	0	0	0	26	13	0	0	17	0	0	0	1	0	0	0	0	1
10	1	1325	3.3	0	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	0	0	0	0	0	0	0	0
	2	1330	"	0	0	0	12	0	0	0	0	5	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0
11	1	1355	3.3	0	0	3	0	0	0	0	0	0	0	18	14	0	2	0	0	0	0	0	0	0	0	0	0
	2	1405	"	0	0	9	0	0	0	0	0	0	0	13	16	0	0	1	2	0	0	0	0	0	0	0	0
13	1	0945	2.6	5	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0950	"	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
TOT	16			6	1	13	12		17	1		7		382	62	36	9	37	6			4	2				8
4 June																											
2	1	0930	2.1	0	0	0	0	0	0	0	0	0	0	35	0	15	3	10	0	0	0	3	0	0	0	1	0
	2	0945	"	0	0	0	0	0	0	0	0	0	0	43	1	1	4	0	0	0	1	1	0	0	0	1	0
5	1	0900	2.0	0	0	0	0	0	0	0	0	0	0	15	16	0	5	1	0	0	1	0	0	0	0	0	0
	2	0910	"	0	1	0	0	0	0	0	0	0	0	35	3	0	2	2	0	0	0	0	0	0	0	0	0
7	1	1040	2.5	0	0	0	0	0	0	0	0	0	0	21	12	0	0	0	0	0	0	1	0	1	0	0	0
	2	1050	"	0	0	0	0	0	0	0	0	0	0	21	1	0	0	0	0	0	0	0	0	0	0	0	0
8	1	1200	3.0	0	0	0	1	0	4	0	0	0	0	6	26	0	0	0	2	0	0	2	0	0	0	2	0
	2	1210	"	0	0	0	0	0	0	0	0	0	0	12	4	0	0	0	0	0	0	0	0	0	0	0	0
12	1	0830	2.0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0835	"	0	0	0	0	0	0	0	0	3	0	7	0	0	0	1	0	0	0	0	0	0	0	0	0
12	1	1325	3.4	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
	2	1335	"	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	1	1240	3.2	14	0	0	0	0	0	0	0	0	0	27	3	3	0	0	131	0	0	0	0	0	0	0	0
	2	1250	"	25	0	0	0	0	0	1	0	0	0	88	13	0	0	7	225	0	0	0	0	0	0	0	0
15	1	1015	2.3	0	0	0	0	0	0	0	0	1	0	16	19	0	0	11	0	0	1	3	0	0	0	2	0
	2	1020	"	0	0	0	0	0	0	0	1	0	0	7	19	0	0	0	0	0	2	0	0	0	0	0	0
TOT	16			39	1		4		4	1	2	4		334	117	19	14	32	359		5	10		1		6	
17 June																											
1	1	0900	3.2	0	0	0	4	0	0	0	0	0	0	3	0	0	4	0	0	0	0	0	0	0	0	0	0
	2	0910	"	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0
8	1	1410	2.7	0	0	0	0	0	4	0	0	0	0	45	4	0	0	0	0	0	3	0	0	0	0	0	1
	2	1415	"	0	0	1	0	0	0	0	0	0	0	6	3	0	0	0	0	0	2	0	0	0	0	0	1
9	1	1325	2.9	0	0	0	0	0	1	0	0	0	0	64	0	2	6	0	0	0	0	0	0	0	0	0	0
	2	1330	"	0	0	0	0	0	2	0	0	0	0	72	2	0	0	18	7	0	0	0	0	0	0	2	0
11	1	1220	3.3	0	0	0	1	0	0	0	0	0	0	20	1	1	6	0	4	0	0	0	0	0	0	0	0
	2	1230	"	0	0	0	1	0	0	0	0	0	1	9	0	8	0	0	8	0	0	0	0	0	0	0	0
12	1	1245	3.2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
	2	1310	"	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	1	0935	3.3	0	0	0	4	0	3	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	0940	"	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4 (cont'd).

Date / Site	Set No.	Time PST	Tide (m)	CO FR	MK CO	UN CO	HT CH	MK CH	UN CK	CH UM	MK ST	UN ST	CU TT	UN SC	UN PE	SA DA	ST FL	UN FL	TH ST	PA SA	PP GU	SA GU	UN BL	UN GR	WS GR	BA PI	SN PR
17 June																											
14	1	1020	3.4	0	0	0	0	0	25	0	0	0	0	30	30	0	0	0	445	0	0	0	0	0	0	0	0
16	1	1100	3.5	0	0	0	0	0	0	0	0	0	0	27	8	7	0	1	184	0	0	0	0	0	0	0	0
	2	1110	"	0	0	0	0	0	0	0	0	0	0	64	0	10	4	0	36	0	0	0	0	0	0	0	0
TOT	15					1	10		35			1	1	348	48	29	20	20	684		5					2	2
18 June																											
2	1	0900	2.6	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	5	0	0	0	0	0	0	0	0
	2	0910	"	0	0	0	0	0	2	0	0	0	0	20	2	0	0	0	1	0	0	0	0	0	0	0	0
3	1	0925	2.8	0	0	0	0	0	0	0	0	0	0	86	88	0	2	0	0	0	0	4	0	0	0	0	0
	2	0930	"	0	0	0	0	0	0	0	0	0	0	34	23	0	0	0	0	0	0	1	0	0	0	0	0
4	1	1055	3.3	0	0	0	0	0	1	0	0	0	0	5	0	0	0	0	0	0	0	1	0	0	0	0	0
	2	1100	"	0	0	0	0	0	0	0	0	0	0	11	0	0	6	0	0	0	0	1	0	0	0	0	0
5	1	1300	3.5	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	1305	"	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0
6	1	1050	3.3	0	0	0	0	0	0	0	0	0	0	137	0	91	0	0	0	0	0	1	0	0	0	0	35
	2	1100	"	0	0	0	0	0	0	0	0	0	1	65	0	10	0	0	0	0	0	0	0	0	0	0	0
7	1	1115	3.4	0	0	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0	0	1	0	0	0	0	0
	2	1120	"	0	0	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	1350	3.4	0	0	0	0	0	0	0	0	0	0	7	0	0	20	0	0	0	0	1	0	0	0	0	0
	2	1355	"	0	0	0	0	0	0	0	0	0	0	43	0	0	53	0	2	0	0	1	0	0	0	0	0
15	1	1030	3.2	0	0	0	0	0	0	0	0	0	0	3	1	2	0	0	0	0	0	5	0	0	0	1	0
	2	1035	"	0	0	0	0	0	0	0	0	0	0	7	3	1	0	0	0	0	0	5	0	0	0	0	0
TOT	16								3				1	487	118	104	82		8			21				1	35
29 June																											
1	1	0910	3.6	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
	2	0940	"	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	1250	2.3	0	0	0	0	0	0	0	0	0	0	16	0	4	0	1	0	0	0	1	0	0	0	0	0
	2	1300	"	0	0	0	0	0	0	0	0	0	0	21	2	4	0	2	1	0	0	0	0	0	0	0	0
9	1	1225	2.4	0	0	0	0	0	0	0	0	0	0	11	0	0	16	0	0	0	0	0	0	7	0	0	0
	2	1235	"	0	0	0	0	1	1	0	0	0	0	12	0	0	9	0	2	0	0	0	0	7	0	0	0
10	1	1358	2.0	0	0	0	0	0	0	0	0	0	0	7	1	0	0	0	0	0	1	6	1	0	0	0	0
	2	1410	"	0	0	0	0	0	0	0	0	0	0	24	0	0	6	0	0	1	4	1	0	4	0	0	0
12	1	1435	1.8	0	0	0	2	1	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0
	2	1445	"	0	0	0	0	0	0	0	0	0	0	14	1	0	0	0	2	0	0	0	0	0	0	0	0
13	1	1000	3.5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	1005	"	0	0	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1	1320	2.1	0	0	0	0	0	0	0	0	0	0	18	2	1	0	0	0	0	0	3	1	0	0	0	0
	2	1330	"	0	0	0	0	0	0	0	0	0	0	24	1	1	0	0	1	0	0	0	0	0	0	3	0
17	1	1030	3.3	0	0	0	41	1	12	0	0	1	1	1	0	0	24	0	58	0	0	0	0	0	0	0	0
	2	1105	"	0	0	0	24	1	7	0	0	3	0	1	0	0	7	0	20	0	0	0	0	0	0	0	0
TOT	16						67	5	23			4	1	154	7	10	66	3	85	1	5	11	2	18		3	
30 June																											
2	1	0840	3.3	0	0	0	0	0	0	0	0	0	0	7	0	0	13	0	2	0	0	6	0	0	0	0	0
	2	0845	"	1	0	0	0	0	0	0	0	0	0	11	4	0	2	0	3	0	0	4	0	0	0	0	0
3	1	0925	3.4	0	0	0	0	0	0	0	0	0	0	11	0	0	2	0	0	0	0	0	0	0	0	0	0
	2	0930	"	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0
4	1	0945	3.5	0	0	0	0	0	1	0	0	0	0	7	1	0	3	0	1	0	0	6	0	0	0	2	0
	2	1000	"	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 4 (cont'd).

Date / Site	Set No.	Time PST	Tide (m)	CO FR	MK CO	UN CO	HT CH	MK CH	UN CK	CH UM	MK ST	UN ST	CU TT	UN SC	UN PE	SA DA	ST FL	UN FL	TH ST	PA SA	PP GU	SA GU	UN BL	UN GR	WS GR	BA PI	SN PR
30 June																											
5	1	1025	3.4	0	0	0	0	0	0	0	0	0	0	3	0	0	10	0	0	0	0	0	0	0	0	0	0
	2	1030	"	0	0	0	0	0	0	0	0	0	0	5	0	0	11	0	0	0	0	0	0	0	0	0	0
8	1	1230	2.9	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
	2	1240	"	0	0	0	0	0	4	0	0	0	0	3	6	0	0	0	0	0	0	0	0	0	0	0	0
11	1	1055	3.4	0	0	2	0	0	1	0	0	0	0	5	13	0	7	0	5	0	0	0	0	0	0	0	0
	2	1100	"	0	0	3	0	0	0	0	0	0	0	10	29	0	8	0	6	0	0	2	0	0	0	0	0
TOT	12			1		5			8					67	54		57		18			18				2	
14 July																											
1	1	0837	3.9	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
	2	0847	"	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	1213	2.4	0	0	0	0	0	0	0	0	0	0	8	2	2	2	5	0	1	0	0	1	0	0	0	0
	2	1218	"	0	0	0	0	0	0	0	0	0	0	39	0	0	11	1	0	1	0	0	1	0	0	0	0
7	1	1145	2.7	0	0	0	0	0	3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	2	1150	"	0	0	0	0	0	0	0	0	0	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0
8	1	1039	3.3	0	0	0	0	0	0	0	0	0	0	4	3	0	0	0	0	0	0	0	0	0	0	0	0
	2	1047	"	0	0	0	0	0	0	0	0	0	0	1	5	0	0	0	1	0	0	0	0	0	0	0	0
9	1	1012	3.5	0	0	0	0	0	0	0	0	0	0	10	7	0	7	5	1	0	0	0	0	0	0	0	0
	2	1020	"	0	0	0	0	0	0	0	0	0	0	5	1	0	6	5	0	0	0	0	0	0	0	0	0
14	1	0946	3.8	0	0	0	0	0	0	0	0	0	0	9	6	0	7	0	28	0	0	0	0	0	0	0	0
17	1	0903	3.9	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	1	0	0	0	0	0	0	0	0
	2	0908	"	0	0	0	0	0	8	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
TOT	13								11					81	30	2	52	16	31	2			2				
15 July																											
2	1	1000	3.8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	2	1005	"	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	1025	3.7	0	0	0	0	0	0	0	0	0	0	93	6	0	2	0	0	0	0	0	0	0	0	0	0
	2	1035	"	0	0	0	0	0	0	0	0	0	0	12	0	0	2	0	0	0	0	0	0	0	0	0	0
4	1	1056	3.5	0	0	0	0	0	2	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	2	0
	2	1105	"	0	0	0	0	0	0	0	0	0	0	2	14	0	0	0	0	0	0	0	0	0	0	2	0
5	1	1130	3.4	0	0	0	0	0	0	0	0	0	0	3	1	0	3	0	0	0	0	0	0	0	0	0	0
	2	1139	"	0	0	0	0	0	0	0	0	0	0	3	3	0	5	0	0	0	0	0	0	0	0	0	0
10	1	1248	2.9	0	0	0	0	0	5	0	0	0	0	5	5	1	0	13	3	0	0	0	0	0	0	0	0
	2	1300	"	0	0	0	0	0	0	0	0	0	2	12	0	0	11	0	1	0	0	0	0	0	0	0	0
11	1	0835	3.7	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0
	2	0843	"	0	0	0	0	0	0	0	0	0	0	3	1	0	0	4	1	0	0	0	0	0	0	0	0
12	1	1325	2.5	0	0	0	0	0	3	0	0	1	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	2	1336	"	0	0	0	0	0	2	0	0	0	0	1	23	0	0	0	10	0	0	0	0	0	0	0	0
15	1	0920	3.8	0	0	0	0	0	2	0	0	0	0	4	17	0	0	4	0	393	0	0	0	0	0	0	0
	2	0928	"	0	0	0	0	0	0	0	0	0	0	10	15	0	0	0	0	11	0	0	0	0	0	0	0
TO	16								14			1	5	159	88	1	23	21	18	404						4	
29 July																											
1	1	0933	3.7	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	14	0	0	0	0	0	0	0	0
	2	0947	3.6	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	33	0	0	0	0	0	0	0	0
2	1	1255	2.3	0	0	0	0	0	0	0	0	0	0	4	3	0	1	0	0	0	1	0	0	0	0	0	0
	2	1309	2.3	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0
4	1	1325	2.2	0	0	0	0	0	0	0	0	0	0	1	0	0	4	0	0	0	0	0	0	0	0	0	0
	2	1334	2.1	0	0	0	0	0	0	0	0	0	0	8	0	0	5	0	0	0	1	6	0	0	0	0	0

Date / Site	Set No.	Time PST	Tide (m)	CO FR	MK CO	UN CO	HT CH	MK CH	UN CK	CH UM	MK ST	UN ST	CU TT	UN SC	UN PE	SA DA	ST FL	UN FL	TH ST	PA SA	PP GU	SA GU	UN BL	UN GR	WS GR	BA PI	SN PR
29 July																											
8	1	1140	2.9	0	0	0	0	0	0	0	0	0	0	4	24	0	0	0	0	0	0	0	0	0	0	0	0
	2	1149	2.8	0	0	0	0	0	3	0	0	0	0	6	16	0	1	0	0	0	0	0	0	0	0	0	0
11	1	1024	3.4	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	6	0	0	0	0	0	0	0	0
	2	1034	3.4	0	0	0	0	0	0	0	0	0	0	1	5	0	2	0	1	0	0	0	0	0	0	0	0
14	1	1003	3.5	0	0	0	0	0	0	0	0	0	0	10	8	0	0	0	52	0	0	0	0	0	0	0	0
	2	1010	3.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1	1220	2.6	0	0	0	0	0	0	0	0	0	0	3	12	0	0	0	0	0	0	0	0	0	0	0	0
	2	1227	2.5	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	2	0
17	1	0840	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0
	2	0847	3.8	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0
TOT	16								3					46	73		43		108		2	6				2	

Table 5. Lengths, weights and K-factors for juvenile salmonids (see Table 2 for abbreviations).

Date	Site	Time (PST)	Set No.	Fish spp.	Length (mm)	Weight (g)	K Factor
3-Jun	1	0855	1	UNCK	59	2.4	1.17
3-Jun	1	0855	1	UNCK	60	1.9	0.88
3-Jun	1	0855	1	UNCK	65	3.2	1.17
3-Jun	1	0855	1	UNCK	64	2.5	0.95
3-Jun	1	0855	1	UNCK	54	1.5	0.95
3-Jun	1	0855	1	UNCK	63	2.6	1.04
3-Jun	1	0855	1	UNCK	62	2.5	1.05
3-Jun	1	0855	1	UNCK	68	3.5	1.11
3-Jun	1	0855	1	UNCK	63	2.8	1.12
3-Jun	1	0855	1	UNCK	60	2.0	0.93
3-Jun	10	1330	2	HTCH	85	6.4	1.04
3-Jun	10	1330	2	HTCH	84	6.1	1.03
3-Jun	10	1330	2	HTCH	84	5.6	0.94
3-Jun	10	1330	2	HTCH	85	6.0	0.98
3-Jun	10	1330	2	HTCH	91	7.8	1.04
3-Jun	10	1330	2	HTCH	83	5.2	0.91
3-Jun	10	1330	2	HTCH	80	5.3	1.04
3-Jun	10	1330	2	HTCH	85	5.1	0.83
3-Jun	10	1330	2	HTCH	94	8.2	0.99
3-Jun	10	1330	2	HTCH	89	6.2	0.88
3-Jun	10	1330	2	HTCH	89	7.0	0.99
3-Jun	10	1330	2	HTCH	79	4.5	0.91
3-Jun	11	1355	1	UNCO	108	13.0	1.03
3-Jun	11	1355	1	UNCO	68	3.2	1.02
3-Jun	11	1355	1	UNCO	68	3.4	1.08
3-Jun	11	1405	2	COFR	62	2.5	1.05
3-Jun	11	1405	2	COFR	59	1.9	0.93
3-Jun	11	1405	2	COFR	68	2.7	0.86
3-Jun	11	1405	2	UNCO	95	8.3	0.97
3-Jun	11	1405	2	COFR	66	2.7	0.94
3-Jun	11	1405	2	COFR	63	1.7	0.68
3-Jun	11	1405	2	COFR	58	2.0	1.03
3-Jun	11	1405	2	COFR	54	1.4	0.89
3-Jun	11	1405	2	COFR	68	3.3	1.05
4-Jun	8	1200	1	UNCK	65	2.5	0.91

Table 5 (cont'd).

Date	Site	Time (PST)	Set No.	Fish spp.	Length (mm)	Weight (g)	K Factor
4-Jun	8	1200	1	UNCK	60	2.2	1.02
4-Jun	8	1200	1	HTCH	83	6.3	1.10
4-Jun	8	1200	1	UNCK	63	2.3	0.92
4-Jun	8	1200	1	UNCK	70	3.8	1.11
4-Jun	12	1335	2	HTCH	86	7.1	1.12
4-Jun	12	1335	2	HTCH	75	3.8	0.90
4-Jun	12	1335	2	HTCH	85	6.1	0.99
4-Jun	14	1240	1	COFR	58	2.2	1.13
4-Jun	14	1240	1	COFR	58	2.1	1.08
4-Jun	14	1240	1	COFR	57	1.8	0.97
4-Jun	14	1240	1	COFR	63	3.4	1.36
4-Jun	14	1240	1	COFR	67	3.1	1.03
4-Jun	14	1240	1	COFR	62	3.3	1.38
4-Jun	14	1240	1	COFR	60	2.2	1.02
4-Jun	14	1240	1	COFR	72	4.0	1.07
4-Jun	14	1240	1	COFR	70	3.6	1.05
4-Jun	14	1240	1	COFR	64	2.6	0.99
4-Jun	14	1240	1	COFR	55	1.7	1.02
4-Jun	14	1240	1	COFR	60	2.2	1.02
4-Jun	14	1240	1	COFR	54	1.8	1.14
4-Jun	14	1240	1	COFR	85	6.4	1.04
4-Jun	14	1250	2	COFR	57	1.9	1.03
4-Jun	14	1250	2	COFR	56	1.7	0.97
4-Jun	14	1250	2	COFR	58	1.9	0.97
4-Jun	14	1250	2	COFR	59	2.3	1.12
4-Jun	14	1250	2	COFR	56	1.8	1.02
4-Jun	14	1250	2	COFR	59	2.1	1.02
4-Jun	14	1250	2	COFR	62	3.0	1.26
4-Jun	14	1250	2	COFR	48	1.2	1.09
4-Jun	14	1250	2	CHUM	57	1.5	0.81
4-Jun	14	1250	2	COFR	55	1.9	1.14
4-Jun	14	1250	2	COFR	52	1.2	0.85
17-Jun	1	0900	1	HTCH	75	4.6	1.09
17-Jun	1	0900	1	HTCH	73	4.0	1.03
17-Jun	1	0900	1	HTCH	75	4.8	1.14

Table 5 (cont'd).

Date	Site	Time (PST)	Set No.	Fish spp.	Length (mm)	Weight (g)	K Factor
17-Jun	1	0900	1	HTCH	65	3.2	1.17
17-Jun	13	0935	1	HTCH	89	6.9	0.98
17-Jun	13	0935	1	HTCH	89	7.3	1.04
17-Jun	13	0935	1	UNCK	55	1.7	1.02
17-Jun	13	0935	1	UNCK	45	1.1	1.21
17-Jun	13	0935	1	UNCK	57	2.2	1.19
17-Jun	13	0935	1	HTCH	68	3.6	1.14
17-Jun	13	0935	1	HTCH	92	8.3	1.07
17-Jun	14	1020	1	UNCK	59	2.3	1.12
17-Jun	14	1020	1	UNCK	59	2.0	0.97
17-Jun	14	1020	1	UNCK	58	1.6	0.82
17-Jun	14	1020	1	UNCK	55	1.9	1.14
17-Jun	14	1020	1	UNCK	55	1.8	1.08
17-Jun	9	1325	1	UNCK	75	4.2	1.00
17-Jun	9	1330	2	UNCK	70	3.6	1.05
17-Jun	9	1330	2	UNCK	76	4.8	1.09
17-Jun	8	1410	1	UNCK	74	3.9	0.96
17-Jun	8	1410	1	UNCK	90	8.0	1.10
17-Jun	8	1410	1	UNCK	71	3.4	0.95
17-Jun	8	1410	1	UNCK	63	2.4	0.96
17-Jun	8	1415	2	UNCO	52	1.5	1.07
18-Jun	2	0910	2	UNCK	79	4.5	0.91
18-Jun	2	0910	2	UNCK	86	6.7	1.05
18-Jun	4	1055	1	UNCK	70	3.5	1.02
29-Jun	1	0910	1	MKCH	90	7.0	0.96
29-Jun	13	1005	2	UNCK	66	3.1	1.08
29-Jun	13	1005	2	UNCK	87	5.9	0.90
29-Jun	13	1005	2	UNCK	80	4.5	0.88
29-Jun	17	1030	1+2	UNCK	49	1.1	0.93
29-Jun	17	1030	1+2	UNCK	55	1.6	0.96
29-Jun	17	1030	1+2	UNCK	68	2.6	0.83
29-Jun	17	1030	1+2	UNCK	74	4.4	1.09
29-Jun	17	1030	1+2	UNCK	51	1.2	0.90
29-Jun	17	1030	1+2	UNCK	55	1.7	1.02
29-Jun	17	1030	1+2	UNCK	51	1.6	1.21

Table 5 (cont'd).

Date	Site	Time (PST)	Set No.	Fish spp.	Length (mm)	Weight (g)	K Factor
29-Jun	17	1030	1+2	UNCK	64	2.2	0.84
29-Jun	17	1030	1+2	UNCK	55	1.8	1.08
29-Jun	17	1030	1+2	UNCK	58	1.7	0.87
29-Jun	17	1030	1+2	HTCH	85	6.4	1.04
29-Jun	17	1030	1+2	HTCH	79	5.0	1.01
29-Jun	17	1030	1+2	HTCH	90	7.7	1.06
29-Jun	17	1030	1+2	HTCH	87	6.3	0.96
29-Jun	17	1030	1+2	HTCH	85	6.4	1.04
29-Jun	17	1030	1+2	HTCH	89	6.5	0.92
29-Jun	17	1030	1+2	MKCH	85	6.2	1.01
29-Jun	17	1030	1+2	HTCH	85	5.9	0.96
29-Jun	17	1030	1+2	HTCH	81	5.8	1.09
29-Jun	17	1030	1+2	HTCH	75	4.7	1.11
29-Jun	17	1030	1+2	HTCH	82	5.8	1.05
29-Jun	17	1030	1+2	HTCH	75	4.6	1.09
29-Jun	9	1235	2	MKCH	84	5.8	0.98
29-Jun	12	1435	1	HTCH	85	6.1	0.99
29-Jun	12	1435	1	MKCH	85	6.3	1.03
29-Jun	12	1435	1	HTCH	72	3.7	0.99
30-Jun	2	0845	2	COFR	68	3.2	1.02
30-Jun	4	0945	1	UNCK	95	8.8	1.03
30-Jun	11	1055	1	UNCK	87	5.0	0.76
30-Jun	11	1055	1	UNCO	71	3.6	1.01
30-Jun	11	1055	1	UNCO	75	4.6	1.09
30-Jun	11	1100	2	UNCO	64	2.6	0.99
30-Jun	11	1100	2	UNCO	70	3.9	1.14
30-Jun	11	1100	2	UNCO	115	15.7	1.03
30-Jun	8	1230	1	UNCK	76	4.8	1.09
30-Jun	8	1230	1	UNCK	75	3.3	0.78
30-Jun	8	1240	2	UNCK	70	3.8	1.11
30-Jun	8	1240	2	UNCK	68	3.1	0.99
30-Jun	8	1240	2	UNCK	69	3.5	1.07
30-Jun	8	1240	2	UNCK	67	3.2	1.06
14-Jul	17	0908	2	UNCK	88	6.9	1.01
14-Jul	17	0908	2	UNCK	85	6.3	1.03

Table 5 (cont'd).

Date	Site	Time (PST)	Set No.	Fish spp.	Length (mm)	Weight (g)	K Factor
14-Jul	17	0908	2	UNCK	89	7.4	1.05
14-Jul	17	0908	2	UNCK	76	4.6	1.05
14-Jul	17	0908	2	UNCK	92	8.1	1.04
14-Jul	17	0908	2	UNCK	85	6.1	0.99
14-Jul	17	0903	2	UNCK	95	9.7	1.13
15-Jul	15	0920	1	UNCK	87	5.9	0.90
15-Jul	15	0920	1	UNCK	101	11.5	1.12
15-Jul	4	1056	1	UNCK	90	7.2	0.99
15-Jul	4	1056	1	UNCK	90	8.5	1.17
15-Jul	10	1248	1	UNCK	76	4.5	1.03
15-Jul	10	1248	1	UNCK	85	6.7	1.09
15-Jul	10	1248	1	UNCK	78	4.5	0.95
15-Jul	10	1248	1	UNCK	85	7.0	1.14
15-Jul	10	1248	1	UNCK	87	7.8	1.18
15-Jul	12	1325	1	UNCK	79	4.9	0.99
15-Jul	12	1325	1	UNCK	79	4.9	0.99
15-Jul	12	1325	1	UNCK	90	7.8	1.07
15-Jul	12	1336	2	UNCK	82	5.7	1.03
15-Jul	12	1336	2	UNCK	89	7.3	1.04
29-Jul	8	1149	2	UNCK	95	9.1	1.06
29-Jul	8	1149	2	UNCK	85	6.7	1.09
29-Jul	8	1149	2	UNCK	77	5.4	1.18

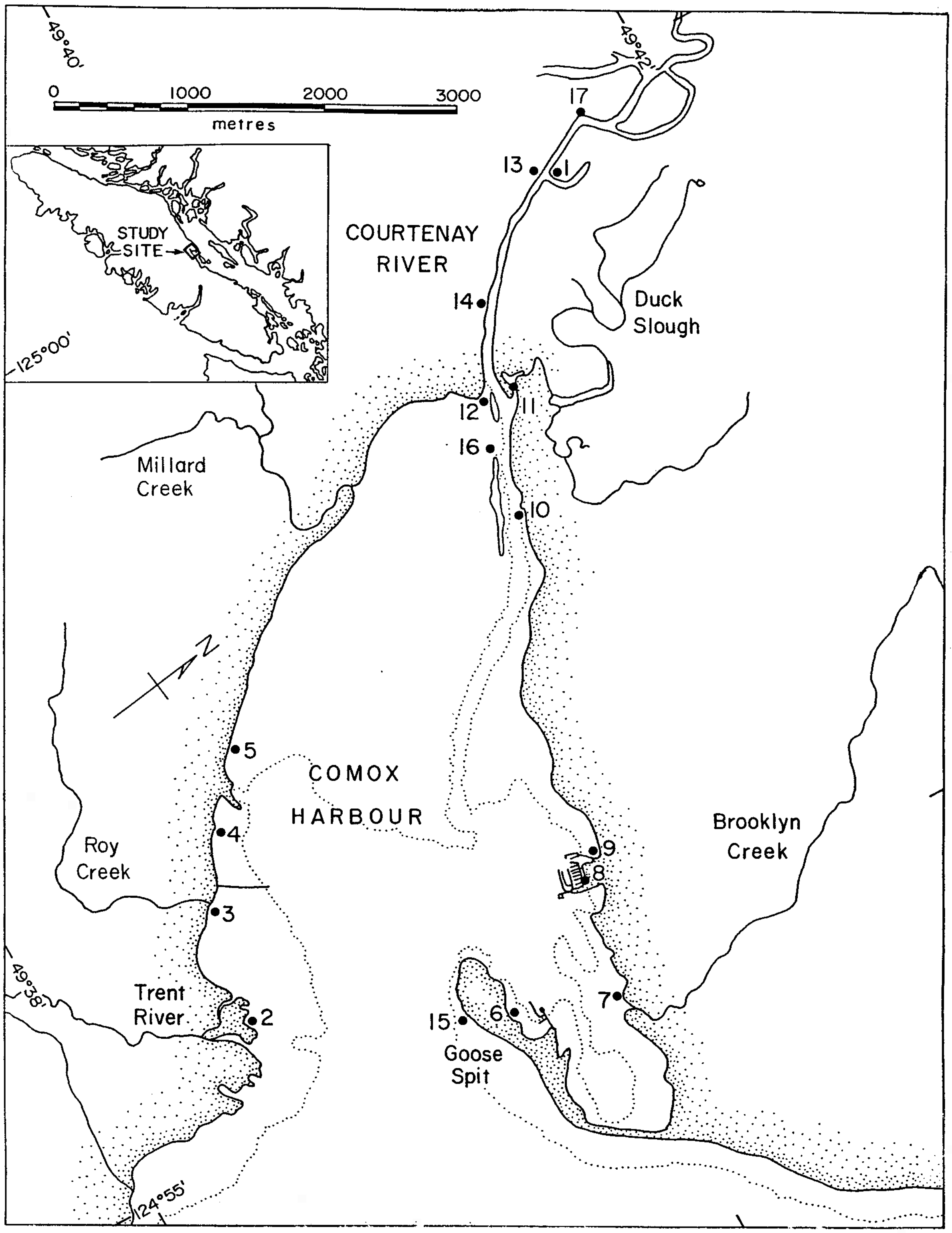

Figure 1. Map of the Courtenay River estuary showing the 17 sites sampled in the 1998 survey.

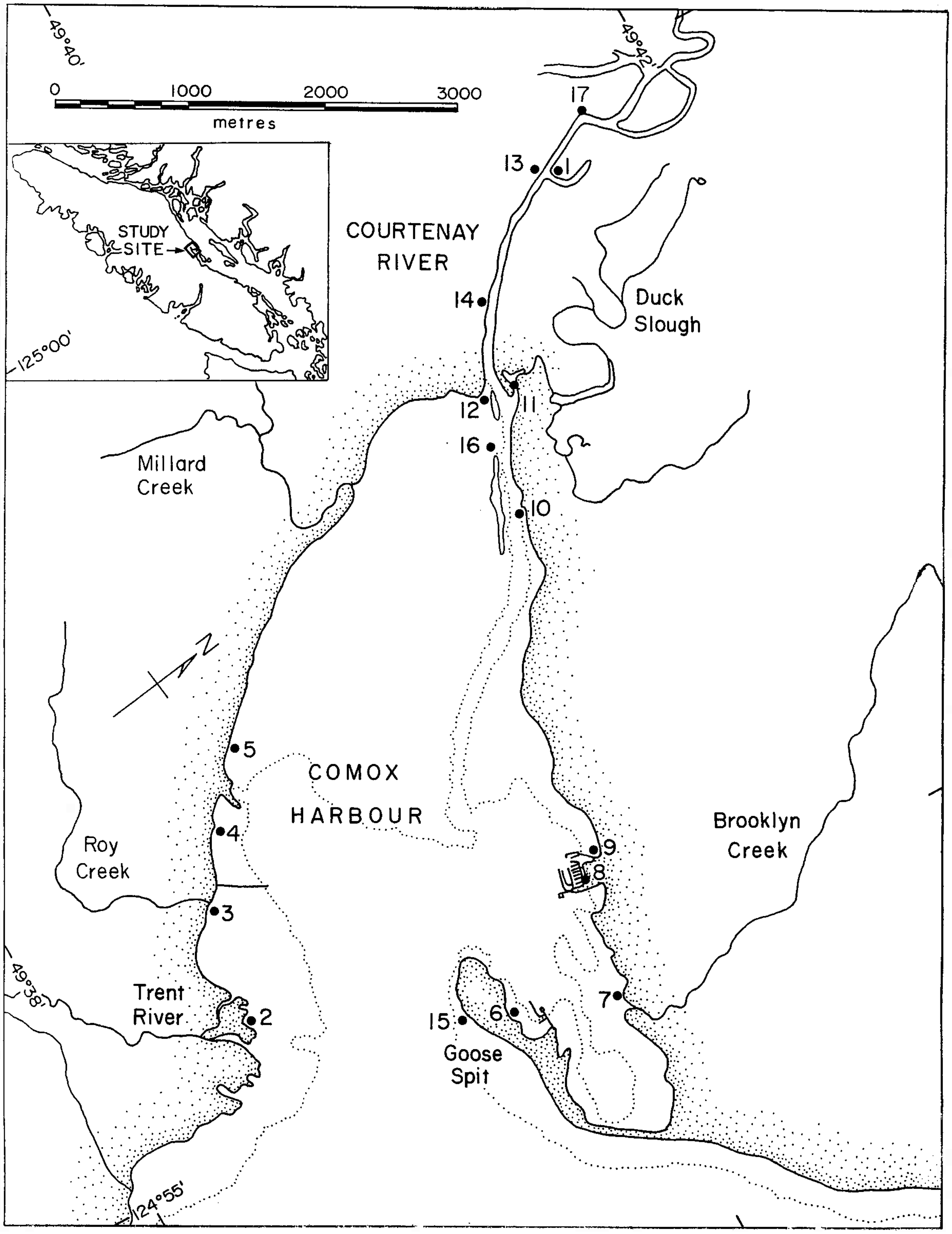

Figure 1. Map of the Courtenay River estuary showing the 17 sites sampled in the 1998 survey.