

Diet Analysis Data for Juvenile Chinook Salmon from the Campbell River Estuary, Campbell River, B.C., during 1994 and 1995

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DIET ANALYSIS DATA FOR JUVENILE CHINOOK SALMON FROM
THE CAMPBELL RIVER ESTUARY, CAMPBELL RIVER, B.C.,
DURING 1994 AND 1995

by

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ABSTRACT

Anderson, S. S., and B. A. Bravender. 2000. Diet analysis data for juvenile chinook salmon from the Campbell River estuary, Campbell River, B. C., during 1994 and 1995. Can. Data Rep. Fish. Aquat. Sci. 1058: 169 p.

During 10 trips to the Campbell River estuary, between May and August, 1994, juvenile salmonids were sampled from 373 beach seine sets done at 26 sites. These sites were located in three zones designated as tidal freshwater (2), estuarine (19), and transition (5). Diet analysis was carried out on 264 juvenile chinook salmon.

In 1995, beach seining was repeated at eight of the same sites sampled in the estuary during the 1994 survey, and eight new sites in a slough on the west side of the estuary. Twenty-nine chinook fry from sites 47, 49, 50 and 53 were retained for stomach analysis. Here we present the raw data on the diet analysis for the juvenile chinook salmon sampled, during both 1994 and 1995.

RÉSUMÉ

Anderson, S. S., and B. A. Bravender. 2000. Diet analysis data for juvenile chinook salmon from the Campbell River estuary, Campbell River, B. C., during 1994 and 1995. Can. Data Rep. Fish. Aquat. Sci. 1058: 169 p.

Au cours de dix campagnes menées dans l'estuaire de la Campbell entre mai et août 1994, nous avons échantillonné les salmonidés juvéniles à l'aide de 373 traits de senne de plage effectués à 26 sites. Les sites se trouvaient dans trois zones désignées comme eau douce à marée (2), estuaire (19) et transition (5). Nous avons analysé le régime alimentaire de 264 quinnats juvéniles.

En 1995, les pêches à la senne de plage ont été répétées à huit des sites échantillonnés dans l'estuaire lors des campagnes de 1994, et à huit nouveaux sites dans un bras situé du côté ouest de l'estuaire. Nous avons gardé 29 alevins de quinnat des sites 47, 49, 50 and 53 pour analyser leur contenu stomacal. Nous présentons ici les données brutes sur l'analyse du régime alimentaire des quinnats juvéniles échantillonnés en 1994 et 1995.

INTRODUCTION

In the early 1980's, a new dryland log sort and log booming facility was constructed by B. C. Forest Products in the Campbell River estuary (Brownlee et al., 1984). The building of this structure resulted in the destruction of a large area of salt marsh. In keeping with the Department of Fisheries and Oceans' policy of "no net loss of productive habitat", four new intertidal islands were constructed in the estuary, and planted with marsh vegetation.

Between 1982 and 1986, a sampling program was carried out by Fisheries and Oceans Canada to assess the distribution and abundance of juvenile salmonids within the estuary and the nearshore marine environment of Discovery Passage. One of the goals of the project was to assess whether the new islands in the estuary were providing nearshore habitat suitable for rearing for the many juvenile salmonids within the system, as compared to natural habitats (Brown et al. 1983, 1984a, b, 1985a, 1986a, 1987). In addition, the production of food organisms was assessed, including the zooplankton and epibenthos present at selected sites within the estuary and nearshore habitats in Discovery Passage (Brown et al. 1984c, 1985b, c, 1986b; Kask et al. 1984, 1985, 1986a).

Stomach analysis was conducted on juvenile chinook collected from selected sites, also sampled in 1982 to 1986, and the results are available in a number of data and technical reports (Kask et al. 1986b, 1988a, b; Brown et al. 1989).

To begin a comparison to the diet analysis carried out in the 1980's, juvenile chinook were collected from sites within the estuary, in both 1994 and 1995. Each site within the estuary and the nearby marine area was designated as to one of seven habitat types, and fish were selected from each of the habitat types for analysis.

MATERIALS AND METHODS

Ten sampling trips were completed between May 12 and August 11, 1994 (Table 1). Replicate beach seine sets were done at 26 sites within three zones, designated as tidal freshwater, estuarine, or transition, based on the exposure to fresh and salt water of each area (Fig. 1). The sites were also subjectively categorised into seven habitat types, based on substrate and vegetation (Fig. 2, Table 2).

Five one day trips were conducted weekly, from April 25 to May 23, 1995 (Table 3). Sixteen sites were sampled, including one in the tidal freshwater zone, fourteen in the estuarine zone, and one in the transition zone (Fig. 2).

During both the 1994 and 1995 surveys, the fish were captured with a beach seine 13.5 m in length and 2.9 m deep, with 4.5 m wings of 1 cm (3/8") stretched mesh, and a 4.6 m bunt of 0.6 cm (1/4") stretched mesh. Rope bridles 15 m long

were fitted to each end. In 1994, duplicate sets were made at most sites to sample an area of 100 m², by pulling the net offshore with an aluminium boat 5 m long, powered by a 50 horsepower outboard engine, fitted with a jet drive. In 1995, a boat 5.5 m in length was used, with an 80 horsepower engine and jet drive. The net was set in a semi-circle, and then slowly pulled into shore by hand. At some sites, where access was limited (narrow channels, docks etc.), a correction factor was applied to the catch, to standardise all catches to an area of 100 m² (Table 4). Single sets only were done at the sites in the grooves on the islands, by pulling the net along the length of the groove to the top end.

Where possible, the entire catch was counted and the juvenile salmonids identified to species and origin, either hatchery or river, based on size, and life stage of fry or smolt. Hatchery origin juveniles included both marked and unmarked chinook, which were generally larger than those identified as river (wild) origin. River origin juveniles included offspring of both wild chinook and hatchery chinook which had spawned naturally, in either the Quinsam or Campbell rivers. In the case of very large catches, a portion was placed into a 10 litre bucket for counting and identification, using a dip net, and the remainder of the catch was subsampled by dip net and released. The total catch was then calculated, by multiplying the subsample count by the number of dip nets of fish released.

Temperature and salinity data were recorded to depth, using a YSI Model 33 salinometer. In 1995, dissolved oxygen (DO) profiles were also recorded, using an Oxyguard Handy Mk 1 meter, and the measurements converted to milligrams per litre, using tables to compensate for temperature and salinity differences. In addition, two replicates of the surface water were collected at each site in DO bottles, and analysed in the lab using a Winkler titration to calibrate the meter readings.

In 1994, up to ten of each species of salmonid captured at each site were placed in a 10% solution of formalin and returned to the lab. The fish were then removed from the preservative solution and rinsed with fresh water. The field identification and count was checked and the catch numbers corrected. Lengths of each fish to the nearest millimetre from nose to fork of the tail were measured. The fish were then damp dried and weighed to the nearest 0.01 g using a Mettler PE 360 scale. Each fish was returned to the preservative after being labelled with a six number tag (E#), attached to the body.

In the case of the adipose fin clipped hatchery coho and chinook, each containing a coded wire tag (CWT), the heads were removed, labelled with another E#, and sent to be read to ascertain the location of origin and date of release. In 1994, one hundred and fifty juvenile chinook were frozen, and their otoliths processed using a method developed by Dr. Z. Zhang, at the Pacific Biological Station in Nanaimo. A previous study has shown that analysis of otolith structure can determine the origin of juvenile salmon as hatchery or wild, with an accuracy of approximately 85%

(Zhang et al., 1995). Scale samples were also taken from the juvenile chinook that were determined to be of uncertain origin. These were read by the Ageing Laboratory at the Pacific Biological Station in Nanaimo, to assess the possibility of determining origin (river or hatchery) from the scale patterns. In 1995, only 29 river origin chinook fry, captured on May 2 at sites 47, 49, 50 and 53, were retained for length, weight, and stomach analysis.

The juvenile chinook analysed for diet from the 1994 study were chosen based on the habitat type in the estuary where they were captured. The long term objective was to try and delineate the value of each habitat to the chinook rearing in the estuary. The stomachs, from the oesophagus to the pyloric caecae, were removed and damp weighed to the nearest 0.001 g using a Mettler PE 360 balance. The stomach was placed in a petrie dish of water, and a visual estimate of the fullness was made as a percent of the total stomach capacity occupied by the contents. The stomach was then opened and the contents removed into the petrie dish. The damp weight of the empty stomach was recorded, and the weight of the contents calculated as the weight of the full stomach minus the weight of the empty stomach.

The degree of digestion of the stomach contents, from 0 to 100%, was estimated subjectively. All undigested prey items within the stomach were identified to general group (amphipod, cumacean, mysid). Where possible, each prey item was measured for length, using a millimetre grid under the petrie dish or a measuring eyepiece. Where large numbers of prey were found, ten of each type were measured and recorded and the average length (mm) was calculated. Percent volume of each prey type was visually estimated. The percent volume of the digested contents was also estimated subjectively, and the probable prey type was noted.

The salinity, temperature, and DO levels recorded, the catch data, length, and weights of all the juvenile salmonids retained, and the results of the otolith microstructure and scale analysis are reported in Anderson et al., 1998. Korman et al. (1997) present an analysis of the catch, and length and weight data for juvenile chinook captured in 1994, including the use of various habitats within the estuary and transition zone, growth rates, and potential competitive interactions between wild chinook fry, hatchery chinook, and other juvenile salmonids. Here, we present the stomach analysis data for the juvenile chinook salmon analysed from the 1994 and 1995 surveys

RESULTS

In 1994, juvenile chinook were chosen for stomach analysis based on the habitat type at the sites where they were captured. Between 9 and 52 fish were analysed from each sampling trip (Table 5). Table 6 lists the abbreviations used in Tables 7 and 8. Each fish analysed for diet in 1994 is listed in Table 7, including the date and site of capture, length (mm), weight (g), and the % stomach capacity and content

weight. Table 8 presents the same information for the juvenile chinook analysed in 1995. The abbreviations used for stomach contents, and the results of the stomach analysis are presented in Tables 9, 10 and 11, including prey length (mm), total number, average size (mm), and % volume for each prey item.

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Table 1. Sampling schedule for the 1994 estuary beach seine survey.

Date	May 12- 13	May 17- 19	May 25- 26	June 1-3	June 8	June 15- 16	June 28- 29	July 13- 15	July 27- 28	Aug 10- 11	Stn Total Sets
Trip No.	1	2	3	4	5	6	7	8	9	10	
	Sets										
Stn No.											
1	2	2	0	2	0	2	2	2	2	2	16
2	2	2	0	2	0	2	2	2	2	2	16
3	2	2	0	2	0	2	2	2	2	2	16
4	2	4	2	2	2	2	2	2	2	2	22
5	2	2	2	2	2	2	2	2	2	2	20
6	2	2	0	2	0	2	2	2	2	2	16
7	2	4	2	2	2	2	2	2	2	2	22
8	2	4	2	2	2	2	2	2	2	2	22
10	2	2	0	2	0	2	2	2	2	2	16
11	1	1	0	1	0	1	1	1	1	1	8
13	0	2	0	2	0	2	2	2	2	2	14
14	1	1	0	1	0	1	1	1	1	1	8
15	0	1	0	1	0	1	1	1	1	1	7
16	1	1	0	1	0	1	1	0	1	1	7
17	0	1	0	1	0	1	1	0	1	1	6
18	0	2	0	2	0	2	2	2	2	2	14
141	0	2	0	0	0	0	0	0	0	0	2
151	0	1	0	1	0	1	1	1	1	1	7
111	2	2	0	2	0	2	2	2	2	2	16
20	2	4	2	2	2	2	2	2	2	2	22
33	0	2	0	2	0	2	2	2	2	2	14
34	2	2	0	2	2	2	2	2	2	2	18
35	2	2	0	2	0	2	2	2	2	2	16
37	2	2	0	2	0	2	2	2	2	2	16
45	0	2	0	2	0	2	2	2	2	2	14
47	2	4	0	2	0	2	2	2	2	2	18
Total sets	33	56	10	44	12	44	44	42	44	44	373

Table 2. Locations, descriptions, habitat types, and salinity recorded at all depths combined, at the stations in the Campbell River estuary and surrounding nearshore area sampled during the 1994-1995 surveys.

Station no./Name	Description
1. Mother Ramp	Beside Rainbow Air seaplane ramp, west side of Tye Spit; sand, marsh at higher elevations, gravel at lower elevations; moderate slope. Salinity range: 0-28.9 ppt. Habitat type: Marsh
2. Nunns Island	Southwest tip of Nunns Island; marsh/mud upper bank, gravel lower bank; steep drop-off. Salinity range: 0-28.4 ppt. Habitat type: Marsh
3. Nunns Creek	Southwest side of Nunns Creek; marsh; very steep drop-off. Salinity range: 0.5-28.5 ppt. Habitat type: Marsh
4. Spit	Northwest tip of Tye Spit; gravel; very steep drop-off. Salinity range: 0-28.2 ppt. Habitat type: Gravel
5. Bar	Sand/gravel bar on north side of river mouth channel; eelgrass at lower elevations; moderate drop off. Salinity range: 0.5-27.5 ppt. Habitat type: Eelgrass
6. Bulkhead	Beach by wooden bulkhead, west side of Campbell River; gravel; moderate slope, fast flow. Salinity range: 0-28.4 ppt. Habitat type: Gravel
7. NBM	South shore of north arm of Baikie Slough at confluence with Campbell River; marsh at higher elevations, eelgrass at lower elevations; moderate drop-off. Salinity range: 0-27.8 ppt. Habitat type: Eelgrass

Table 2 (cont'd).

Station no./Name	Description
8. NBS	North shore of north arm of Baikie Slough at confluence with channel leading to Freshwater Marina ramp; marsh at higher elevations, mud/wood debris at lower elevations; slight drop-off. Salinity range: 0-23.6 ppt. Habitat type: Marsh
10. SBM	South shore of south arm of Baikie Slough at confluence with Campbell River; sand/gravel; moderate to steep drop-off. Salinity range: 0-25.8 ppt. Habitat type: Gravel
11. Island 1	Bay on Island No. 1; transplanted marsh at higher elevations; mud/wood debris at lower elevations; shallow slope. Salinity range: 0-22.9 ppt. Habitat type: Island Marsh
111. Grass Island	North side of natural island south of Island No. 1; sand/mud marsh at higher elevation; steep drop for 1 m then moderate slope. Salinity range: 0-27.6 ppt. Habitat type: Marsh
13. Island 2	Beach on south side of Island No. 2; gravel, marsh at higher elevation; shallow slope. Salinity range: 0-27.8 ppt. Habitat type: Island Marsh
14. Island 3: mid river side	Experimental tidal groove on Island No. 3, middle groove on river side; transplanted marsh at higher elevations, gravel/mud/wood/algae at lower elevations; moderate slope. Salinity range: 0-15.1 ppt. Habitat type: Island Marsh

Table 2 (cont'd).

Station no./Name	Description
141. Island 3: upper river side	Experimental tidal groove on Island No. 3, upstream groove mostly filled in on river side; transplanted marsh at higher elevations, gravel/mud/wood/algae at lower elevations; moderate slope. Salinity range: 0 ppt. Habitat type: Island Marsh
15. Island 3: mid spit side	Experimental tidal groove on Island No. 3, middle groove on spit side; transplanted marsh at higher elevations, gravel/mud/wood/algae at lower elevations; moderate slope. Salinity range: 0-13.4 ppt. Habitat type: Island Marsh
151. Island 3: upper spit side	Experimental tidal groove on Island No. 3, upstream groove on spit side; transplanted marsh at higher elevations, gravel, mud/wood algae at lower elevations; moderate slope. Salinity range: 0-11.9 ppt. Habitat type: Island Marsh
16. Island 3: lower river side	Experimental tidal groove on Island No. 3, downstream groove on river side; mud/wood/algae at lower elevation; shallow to moderate slope. Salinity range: 0-13.9 ppt. Habitat type: Island Gravel
17. Island 3: lower spit side	Experimental tidal groove on Island No. 3, downstream groove on spit side; gravel, mud/wood/algae at lower elevations; moderate shallow slope. Salinity range: 0 -13.2 ppt. Habitat type: Island Gravel

Table 2 (cont'd).

Station no./Name	Description
18. Island 4	Southwest side of Island No.4; gravel, mud/wood debris at lower elevations; shallow slope. Salinity range: 0-11.9 ppt. Habitat type: Island Gravel
20. Boat Ramp	Next to boat launch ramp on east side of Tyee Spit; gravel/cobble beach; moderate slope. Salinity range: 18.3-29.2 ppt. Habitat type: Gravel
33. Cameron's Marina	Beach south of boat launch at Perkins Road, shoreline at marina; rocks, cobble; steep slope. Salinity range: 0-28.8 ppt. Habitat type: Gravel
34. Painter's Channel	Eastern shore on a channel near Painter's Lodge exposed on tides <2m; mud/sand with eelgrass in lower elevation; shallow slope. Salinity range: 1.5-28.2 ppt. Habitat type: Eelgrass
35. Outer Bar	Beach approximately 100 m north of Station 5; sand/gravel bar, eelgrass at lower elevation; moderate slope with steep drop-off. Exposed on tides <2m. Salinity range: 14.0-27.6 ppt. Habitat type: Eelgrass
37. Log Sort	Within bay of B.C. Forest Products former log sorting area; rip-rap; very steep slope. Salinity range: 0.7-28.9 ppt. Habitat type: Riprap
45. Upper Fred's Slough	Small beach on side channel south of Baikie's Slough approximately 50 m upstream of site 47; overgrown riparian, gravel; shallow slope. Salinity range: 0-2.5 ppt. Habitat type: Riparian

Table 2 (cont'd).

Station no./Name	Description
47. Fred's Slough	Small beach on side channel south of Baikie Slough, backing onto C. R. Mills sorting yard; overgrown with willow, riparian shore; shallow slope. Salinity range: 0-7.5 ppt. Habitat type: Riparian
48. Baikie Slough South	South-western point of south arm of Baikie Slough just west of culvert to side channel; gravel/mud/wood debris at lower elevation, steep cobble/gravel at higher elevation, riparian fringe. Access frequently impaired by log bundles. Salinity range: 0-23.5 ppt. Habitat type: Gravel
49. Baikie Slough South	On east side of south Baikie Slough; gravel/marsh beach, wood debris/gravel at lower elevation, thick riparian fringe, <i>Carex</i> on upper slope, lower slope <i>Carex</i> growth inhibited by log storage; gentle slope. Access frequently impaired by log bundles. Salinity range: 0-23.5 ppt. Habitat type: Marsh
50. Baikie Slough South	Northwest shore of South Baikie Slough just west of causeway to Baikie's Island; mud/wood debris/gravel/cobble(angular), no vegetation; very shallow. Salinity range: 0-23.5 ppt. Habitat type: Gravel
51. Baikie Slough South	Point north of site 49 where South Baikie Slough opens to log storage area; steep undercut bank, riparian fringe, gravel/cobble/wood debris at lower elevation; moderate slope. Salinity range: 0-23.5 ppt. Habitat type: Gravel

Table 2 (cont'd).

Station no./Name	Description
52. Baikie Slough South	Gravel beach on south side of Baikie Island on main arm of slough just north of site 51; riparian/marsh fringe, gravel/sand/silt/wood debris; moderate slope. Salinity range: 0-23.5 ppt. Habitat type: Marsh
53. Baikie Slough North	West shore of North Baikie Slough at Ocean Cedar products; mud/wood debris; very shallow. Access frequently impaired by log bundles. Salinity range: 0-21.0 ppt. Habitat type: Marsh
54. Baikie Slough North	West shore of Baikie Island in North Baikie Slough; mud/wood debris; very shallow. Log bundles frequently stored - grounded. Salinity range: 0-21.0 ppt. Habitat type: Marsh
55. Baikie Slough North	Beach north of site 53 on west shore of North Baikie Slough, near helicopter base; mud/marsh/wood debris; very shallow. Salinity range: 0-21.0 ppt. Habitat type: Marsh
56. Baikie Slough South	Site offshore in south Baikie Slough where temperature and salinity profiles were recorded Habitat type: Gravel
57. Baikie Slough North	Site offshore in north Baikie Slough where temperature and salinity profiles were recorded. Habitat type: Gravel

Table 3. Sampling schedule for the 1995 estuary beach seine survey.

Date	Apr 25	May 2	May 9	May 16	May 23	Stn Total Sets
Trip No.	1	2	3	4	5	
Stn. No.	Sets					
1	2	2	2	2	2	10
4	0	0	0	0	1	1
6	2	2	0	0	0	4
7	2	2	2	2	2	10
8	2	2	2	2	2	10
11	1	1	1	1	1	5
33	0	0	0	0	1	1
47	2	2	2	2	2	10
53	1	1	1	1	1	5
54	1	0	1	0	0	2
55	1	0	0	0	0	1
48	1	1	0	1	0	3
49	1	1	0	1	0	3
50	1	1	1	0	1	4
51	0	0	1	0	0	1
52	0	0	0	0	1	1
Total sets	17	15	13	12	14	71

Table 4. Correction factors to adjust catch to total numbers 100 m⁻².

Station No.	Area sampled m ²	Correction factor to 100 m ²
1	75	1.33
11	150	0.67
14	15	6.67
141	15	6.67
15	15	6.67
151	15	6.67
16	15	6.67
17	15	6.67
33	50	2.00
45	50	2.00
47	50	2.00
53	50	2.00
54	50	2.00
55	50	2.00
48	50	2.00
49	50	2.00
50	50	2.00
51	50	2.00
52	50	2.00

Table 5. Summary of juvenile chinook analysed for stomach contents from the 1994 and 1995 surveys (wild=river origin, unmk=unmarked hatchery, mark=marked hatchery).

Date 1994	Trip #	Stn #	Stn Name	Habitat Type	Group	# Stomachs
May 12-13	1	1	Mother Ramp	Marsh	Wild	1
"	"	"	"	"	Unmk	4
"	"	6	Bulkhead	Gravel	Wild	2
"	"	7	N. Baikie Mouth	Eelgrass	Wild	2
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	3
"	"	8	N. Baikie Slough	Marsh	Wild	1
"	"	"	"	"	Unmk	1
"	"	"	"	"	Mark	2
"	"	11	Island #1	Isl. Marsh	Wild	2
"	"	"	"	"	Unmk	1
"	"	16	Island #3	Isl. Gravel	Wild	2
"	"	47	Fred's Slough	Riparian	Wild	2
Total						25
May 17-18	2	1	Mother Ramp	Marsh	Wild	2
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	1
"	"	6	Bulkhead	Gravel	Wild	2
"	"	7	N. Baikie Mouth	Eelgrass	Wild	2
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	3
"	"	8	N. Baikie Slough	Marsh	Unmk	1
"	"	"	"	"	Mark	2
"	"	11	Island #1	Isl. Marsh	Wild	1
"	"	13	Island #2	Isl. Marsh	Wild	1
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	3
"	"	15	Island #3	Isl. Marsh	Unmk	1
"	"	"	"	"	Mark	3
"	"	16	Island #3	Isl. Gravel	Wild	1
"	"	"	"	"	Unmk	1
"	"	"	"	"	Mark	1
"	"	33	Cameron's	Gravel	Wild	2
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	5

Table 5 (cont'd)

Date 1994	Trip #	Stn #	Stn Name	Habitat Type	Group	# Stomachs
May 17-18	2	45	Upslough	Riparian	Unmk	1
"	"	47	Fred's Slough	Riparian	Wild	2
"	"	141	Island #3	Isl. Marsh	Mark	3
Total						46
May 25-26	3	7	N. Baikie Mouth	Eelgrass	Mark	7
"	"	8	N. Baikie Slough	Marsh	Mark	2
Total						9
June 1-2	4	1	Mother Ramp	Marsh	Wild	2
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	2
"	"	6	Bulkhead	Gravel	Wild	2
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	6
"	"	7	N. Baikie Mouth	Eelgrass	Wild	2
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	3
"	"	8	N. Baikie Slough	Marsh	Wild	1
"	"	"	"	"	Unmk	1
"	"	"	"	"	Mark	2
"	"	10	S. Baikie Mouth	Gravel	Mark	3
"	"	11	Island #1	Isl. Marsh	Unmk	1
"	"	"	"	"	Mark	1
"	"	13	Island #2	Isl. Marsh	Wild	1
"	"	"	"	"	Unmk	1
"	"	"	"	"	Mark	3
"	"	14	Island #3	Isl. Marsh	Wild	1
"	"	16	Island #3	Isl. Gravel	Unmk	1
"	"	17	Island #3	Isl. Gravel	Wild	1
"	"	18	Island #4	Isl. Gravel	Wild	1
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	1
"	"	33	Cameron's	Gravel	Unmk	2
"	"	37	Log Dump	Rip Rap	Wild	2

Table 5 (cont'd)

Date 1994	Trip #	Stn #	Stn Name	Habitat Type	Group	# Stomachs
June 1-2	4	47	Fred's Slough	Riparian	Wild	2
"	"	"	"	"	Unmk	2
Total						52
June 8	5	7	N. Baikie Mouth	Eelgrass	Mark	1
"	"	8	N. Baikie Slough	Marsh	Mark	2
Total						3
June 15-16	6	1	Mother Ramp	Marsh	Wild	2
"	"	"	"	"	Mark	1
"	"	2	Nunn's Creek	Marsh	Mark	1
"	"	4	Spit	Gravel	Unmk	1
"	"	6	Bulkhead	Gravel	Wild	2
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	3
"	"	8	N. Baikie Slough	Marsh	Wild	1
"	"	10	S. Baikie Mouth	Gravel	Mark	1
"	"	11	Island #1	Isl. Marsh	Wild	1
"	"	"	"	"	Unmk	1
"	"	13	Island #2	Isl. Marsh	Wild	1
"	"	"	"	"	Unmk	2
"	"	14	Island #3	Isl. Marsh	Wild	1
"	"	"	"	"	Unmk	1
"	"	18	Island #4	Isl. Gravel	Wild	2
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	3
"	"	37	Log Dump	Rip Rap	Unmk	3
"	"	47	Fred's Slough	Riparian	Wild	2
"	"	151	Island #3	Isl. Marsh	Mark	1
Total						34
June 28-29	7	1	Mother Ramp	Marsh	Wild	2
"	"	"	"	"	Unmk	2
"	"	2	Nunn's Island	Marsh	Mark	1

Table 5 (cont'd)

Date 1994	Trip #	Stn #	Stn Name	Habitat Type	Group	# Stomachs
June 28-29	7	6	Bulkhead	Gravel	Wild	2
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	1
"	"	7	N. Baikie Mouth	Eelgrass	Wild	1
"	"	8	N. Baikie Slough	Marsh	Wild	1
"	"	11	Island #1	Isl. Marsh	Unmk	1
"	"	13	Island #2	Isl. Marsh	Wild	2
"	"	"	"	"	Unmk	3
"	"	18	Island #4	Isl. Gravel	Wild	2
"	"	47	Fred's Slough	Riparian	Wild	2
"	"	111	Grass Island	Marsh	Unmk	1
Total						23
July 13-15	8	1	Mother Ramp	Marsh	Wild	2
"	"	"	"	"	Unmk	3
"	"	6	Bulkhead	Gravel	Wild	2
"	"	7	N. Baikie Mouth	Eelgrass	Wild	2
"	"	"	"	"	Unmk	3
"	"	8	N. Baikie Slough	Marsh	Wild	1
"	"	"	"	"	Unmk	2
"	"	10	S. Baikie Mouth	Gravel	Unmk	2
"	"	14	Island #3	Isl. Marsh	Wild	2
"	"	47	Fred's Slough	Riparian	Wild	2
"	"	"	"	"	Unmk	2
"	"	111	Grass Island	Marsh	Unmk	3
Total						26
July 27-28	9	1	Mother Ramp	Marsh	Unmk	3
"	"	2	Nunn's Island	Marsh	Unmk	2
"	"	6	Bulkhead	Gravel	Wild	1
"	"	"	"	"	Unmk	1
"	"	7	N. Baikie Mouth	Eelgrass	Wild	3
"	"	"	"	"	Unmk	1
"	"	8	N. Baikie Slough	Marsh	Wild	1
"	"	"	"	"	Unmk	1
"	"	10	S. Baikie Mouth	Gravel	Unmk	1

Table 5 (cont'd)

Date 1994	Trip #	Stn #	Stn Name	Habitat Type	Group	# Stomachs
July 27-28	9	11	Island #1	Isl. Marsh	Wild	2
"	"	"	"	"	Unmk	1
"	"	18	Island #4	Isl. Gravel	Unmk	1
"	"	37	Log Dump	Rip Rap	Wild	2
"	"	47	Fred's Slough	Riparian	Wild	1
"	"	111	Grass Island	Marsh	Mark	1
Total						22
Aug. 10-11	10	1	Mother Ramp	Marsh	Wild	2
"	"	"	"	"	Unmk	2
"	"	"	"	"	Mark	1
"	"	3	Nunn's Creek	Marsh	Unmk	1
"	"	6	Bulkhead	Gravel	Wild	2
"	"	"	"	"	Unmk	2
"	"	7	N. Baikie Mouth	Eelgrass	Wild	2
"	"	"	"	"	Unmk	3
"	"	8	N. Baikie Slough	Marsh	Wild	1
"	"	11	Island #1	Isl. Marsh	Unmk	1
"	"	16	Island #3	Isl. Gravel	Wild	2
"	"	37	Log Dump	Rip Rap	Unmk	3
"	"	45	Upslough	Riparian	Wild	1
"	"	47	Fred's Slough	Riparian	Wild	1
Total						24
TOTAL FOR 1994						264
1995						
May 2	1	47	Fred's Slough	Riparian	Wild	10
"	"	49	-	Marsh	"	5
"	"	50	-	Gravel	"	5
"	"	53	-	Marsh	"	9
TOTAL FOR 1995						29

Table 6. Abbreviations used in tables 7 and 8.

REF #	the unique number assigned to each fish analysed, starting at 1.
DATE	the date that each fish was captured by day, month and year
TIME	the time each set was done (PST)
LEN	length of the fish in mm
WT	weight of the fish in grams
STN #	station number (see Fig. 2, Table 2)
STN NAME	name assigned to each site
GROUP	salmonids grouped into: MK - marked hatchery CWT - adipose fin clipped UNMK - unmarked hatchery - distinguished from river (wild) origin population by size WILD - river origin distinguished from hatchery unmarked population by size
E#	unique 6 digit numbered tag attached to each fish's body and head analysed for length, weight and CWT data.
CWT	coded wire tag number identifying each fish by hatchery of origin and date released
STOM #	the number assigned to each stomach analysed
WT CONT	weight of the stomach contents in grams
% CAP	subjective estimate of the percent fullness of the stomach
ISL#3	Sites on Island 3
ISL#1	Site 11 on Island 1

Table 6 (cont'd).

NBM	Site 7, northern mouth of Baikie Slough
MOTHER	Site 1, ramp at Air Rainbow
NUNISL	Site 2, on Nunns Island
SPIT	Site 4, inside of Tyee Spit
BLKHD	Site 6, wooden bulkhead on river
GRASS	Site 111, north side of natural island
ISL#2	Site 13 on Island 2
ISL#4	Site 18 on Island 4
NUNCRK	Site 3 at the mouth of Nunns Creek
LOGDUMP	Site 37 on the rip rap wall inside the log sort basin
UPSLU	Site 45 south of site 47 in Fred's Slough
FREDS	Site 47 inside the north mouth of Fred's Slough
NBS	Site 8 inside North Baikie Slough at the mouth of the marina
SBM	Site 10 at the southern mouth of Baikie Slough
CAMS	Site 33 on the inside shore of Cameron's Marina

Table 7. Date, time and site of capture and group designation, length, weight, stomach content weight and stomach % capacity for juvenile chinook analysed for diet in 1994.

REF #	DATE	TIME (PST)	STN #	STN NAME	GROUP	LEN (mm)	WT (g)	E#	CWT	STOM #	WT CONT	%CAP
1	120594	1437	16	ISL#3	WILD	35	0.52	299429		49	0.006	40
2	120594	1437	16	ISL#3	WILD	48	0.63	299430		6	0.022	100
3	130594	915	11	ISL#1	UNMK	69	3.64	258594		50	0.052	90
4	130594	915	11	ISL#1	WILD	45	0.92	258583		4	0.027	90
5	130594	915	11	ISL#1	WILD	42	0.74	258587		5	0.016	90
6	120594	920	7	NBM	WILD	55	2.13	306383		48	0.028	60
7	120594	920	7	NBM	UNMK	92	9.52	306389		46	0.085	50
8	130594	1317	7	NBM	MK	82	5.95	270781	181358	1	0.034	20
9	130594	1302	7	NBM	WILD	35	0.43	258514		2	0.012	80
10	130594	1302	7	NBM	UNMK	83	6.75	270800		47	0.018	25
11	130594	1040	1	MOTHER	WILD	45	1.04	299483		42	0.040	90
12	130594	1040	1	MOTHER	UNMK	83	7.39	299484		3	0.089	20
13	130594	1040	1	MOTHER	UNMK	82	6.34	299485		43	0.030	30
14	130594	1040	1	MOTHER	UNMK	79	5.39	299486		44	0.027	40
15	130594	1040	1	MOTHER	UNMK	83	6.90	299487		45	0.099	70
16	170594	955	1	MOTHER	MK	79	5.28	258666	181360	7	0.027	40
17	170594	955	1	MOTHER	UNMK	82	5.76	258654		8	0.018	15
18	170594	955	1	MOTHER	UNMK	87	7.75	258655		9	0.055	50
19	170594	945	1	MOTHER	WILD	45	0.96	258648		10	0.021	90
20	170594	945	1	MOTHER	WILD	49	1.44	258649		11	0.008	10
21	170594	1233	15	ISL#3	MK	87	8.30	344932	181360	13	0.119	90
22	170594	1233	15	ISL#3	UNMK	89	9.36	344925		12	0.416	100
23	170594	1255	16	ISL#3	UNMK	81	6.03	306583		16	0.126	90

Table 7 (cont'd).

REF #	DATE	TIME (PST)	STN #	STN NAME	GROUP	LEN (mm)	WT (g)	E#	CWT	STOM #	WT CONT	%CAP
24	170594	1158	11	ISL#1	WILD	47	1.24	306557		14	0.006	25
25	170594	1255	16	ISL#3	WILD	54	1.88	306596		15	0.009	70
26	180594	1007	7	NBM	MK	84	7.06	319443	181358	17	0.087	60
27	180594	1007	7	NBM	UNMK	92	9.53	319444		18	0.133	40
28	180594	1007	7	NBM	UNMK	82	6.25	319446		19	0.008	10
29	180594	1007	7	NBM	WILD	55	2.13	319460		20	0.038	50
30	180594	1007	7	NBM	WILD	58	2.07	319461		21	0.012	20
31	250594	901	7	NBM	MK	92	9.46	332066	180628	22	0.074	30
32	250594	901	7	NBM	MK	75	5.06	332054	181362	23	0.115	50
33	260594	844	7	NBM	MK	85	7.59	316374	180629	24	0.197	90
34	260594	844	7	NBM	MK	97	11.39	316366	181358	25	0.223	90
35	10694	915	1	MOTHER	MK	100	12.00	374553	181361	26	0.099	30
36	10694	915	1	MOTHER	MK	88	8.04	374555	180630	27	0.046	25
37	10694	915	1	MOTHER	UNMK	92	10.00	374575		28	0.196	80
38	10694	915	1	MOTHER	UNMK	76	4.80	374584		29	0.031	25
39	10694	915	1	MOTHER	WILD	55	2.02	374594		30	0.010	15
40	10694	915	1	MOTHER	WILD	56	2.30	374596		31	0.018	20
41	10694	1210	7	NBM	MK	79	5.85	374706	180629	32	0.020	5
42	10694	1210	7	NBM	UNMK	83	6.18	374693		33	0.017	20
43	10694	1210	7	NBM	UNMK	98	11.62	374694		34	0.272	100
44	10694	1210	7	NBM	WILD	51	1.65	374708		35	0.024	80
45	10694	1210	7	NBM	WILD	47	1.31	374709		36	0.012	30
46	20694	904	11	ISL#1	MK	86	6.51	374910	800000	37	0.085	80
47	20694	904	11	ISL#1	UNMK	100	10.16	374914		38	0.001	0

Table 7 (cont'd).

REF #	DATE	TIME (PST)	STN #	STN NAME	GROUP	LEN (mm)	WT (g)	B#	CWT	STOM #	WT CONT	%CAP
48	20694	750	16	ISL#3	UNMK	71	4.28	374929		39	0.040	60
49	20694	815	14	ISL#3	WILD	44	1.00	374941		41	0.000	0
50	20694	800	17	ISL#3	WILD	53	1.84	374931		40	0.008	10
51	80694	755	7	NBM	MK	82	6.28	316466	180630	51	0.072	70
52	150694	1150	1	MOTHER	MK	91	7.88	375100	181360	52	0.038	20
53	150694	1150	1	MOTHER	WILD	59	2.57	375093		53	0.046	60
54	150694	1150	1	MOTHER	WILD	62	2.91	375094		54	0.027	80
55	150694	1221	2	NUNISL	MK	84	7.03	258428	180631	55	0.145	90
56	160694	904	4	SPIT	UNMK	99	11.41	331830		56	0.427	80
57	150694	1040	6	BLKHD	MK	93	9.14	331606	181360	57	0.072	40
58	150694	1050	6	BLKHD	UNMK	98	10.50	331635		58	0.000	0
59	150694	1050	6	BLKHD	UNMK	80	6.28	331636		59	0.107	70
60	150694	1040	6	BLKHD	WILD	63	2.90	331614		60	0.049	50
61	150694	1040	6	BLKHD	WILD	52	1.71	331615		61	0.009	10
62	150694	1245	151	ISL#3	MK	75	4.62	331810	180631	62	0.024	20
63	150694	1257	14	ISL#3	UNMK	79	5.76	331697		63	0.065	30
64	160694	955	11	ISL#1	UNMK	77	5.65	331882		64	0.018	20
65	150694	1257	14	ISL#3	WILD	53	1.75	331701		65	0.010	20
66	160694	955	11	ISL#1	WILD	59	3.14	331883		66	0.011	30
67	280694	1016	6	BLKHD	MK	86	7.09	316652	180631	67	0.007	0
68	280694	1005	6	BLKHD	UNMK	87	8.37	316639		68	0.055	40
69	280694	1016	6	BLKHD	UNMK	120	23.08	316649		69	0.114	60
70	280694	914	7	NBM	WILD	70	4.60	319698		70	0.031	10
71	280694	1005	6	BLKHD	WILD	60	2.57	316641		71	0.011	10

Table 7 (cont'd).

REF #	DATE	TIME (PST)	STN #	STN NAME	GROUP	LEN (mm)	WT (g)	E#	CWT	STOM #	WT CONT	%CAP
72	290694	1022	2	NONISL	MK	110	16.91	319751	181358	72	0.062	75
73	290694	1042	1	MOTHER	UNMK	108	15.27	319709		73	0.350	70
74	290694	1042	1	MOTHER	UNMK	131	30.16	319712		74	1.034	90
75	290694	1042	1	MOTHER	WILD	60	2.86	319716		75	0.021	10
76	290694	1042	1	MOTHER	WILD	59	2.56	319721		76	0.027	15
77	290694	1220	11	ISL#1	UNMK	80	6.35	319759		77	0.000	0
78	290694	950	13	ISL#2	UNMK	80	6.15	319765		78	0.037	30
79	290694	913	111	GRASS	UNMK	95	10.49	319793		79	0.095	30
80	290694	1150	18	ISL#4	WILD	71	5.07	319774		80	0.020	10
81	290694	950	13	ISL#2	WILD	66	3.13	319763		81	0.001	0
82	130794	955	7	NBM	UNMK	108	15.72	319840		82	0.068	20
83	130794	1005	7	NBM	UNMK	88	9.19	319850		83	0.065	10
84	130794	1005	7	NBM	UNMK	117	20.94	319852		84	0.089	20
85	130794	955	7	NBM	WILD	74	5.22	319843		85	0.072	20
86	130794	955	7	NBM	WILD	80	6.81	319844		86	0.109	40
87	140794	934	1	MOTHER	UNMK	94	11.02	319942		87	0.651	90
88	140794	934	1	MOTHER	UNMK	111	18.60	319943		88	0.342	75
89	140794	934	1	MOTHER	UNMK	87	8.36	319939		89	0.195	50
90	140794	943	1	MOTHER	WILD	74	5.05	319944		90	0.057	40
91	140794	943	1	MOTHER	WILD	69	4.23	319945		91	0.056	60
92	140794	1147	111	GRASS	UNMK	90	8.70	319949		92	0.049	40
93	140794	1147	111	GRASS	UNMK	99	12.93	319953		93	0.118	80
94	140794	1202	111	GRASS	UNMK	85	7.92	319954		94	0.116	80
95	150794	754	14	ISL#3	WILD	73	4.94	319976		95	0.039	60

Table 7 (cont'd).

REF #	DATE	TIME (PST)	STN	DESC	GROUP	LEN (mm)	WT (g)	E#	CWT	STOM #	WT CONT	%CAP
96	150794	754	14	ISL#3	WILD	79	6.15	319977		96	0.053	50
97	270794	915	7	NBM	UNMK	102	14.04	306189		97	0.361	100
98	270794	843	10	SBM	UNMK	96	11.99	319995		98	0.357	100
99	270794	909	7	NBM	WILD	84	8.00	306180		99	0.151	100
100	270794	915	7	NBM	WILD	76	5.58	306183		100	0.025	15
101	270794	915	7	NBM	WILD	79	6.05	306184		101	0.041	20
102	280794	846	1	MOTHER	UNMK	113	20.77	344705		102	1.944	100
103	280794	846	1	MOTHER	UNMK	130	32.89	344706		103	2.410	100
104	280794	846	1	MOTHER	UNMK	118	22.26	344707		104	0.883	90
105	280794	1055	2	NUNISL	UNMK	98	10.52	344727		105	0.089	50
106	280794	1055	2	NUNISL	UNMK	94	11.41	344728		106	0.514	100
107	280794	942	111	GRASS	MK	98	12.01	344722	180630	107	0.090	40
108	280794	1005	11	ISL#1	UNMK	99	11.58	344713		108	0.119	25
109	280794	1121	18	ISL#4	UNMK	106	15.62	344731		109	0.180	70
110	280794	1005	11	ISL#1	WILD	83	7.10	344710		110	0.042	25
111	280794	1005	11	ISL#1	WILD	77	5.58	344712		111	0.075	60
112	100894	935	7	NBM	UNMK	105	17.63	344759		112	0.415	80
113	100894	935	7	NBM	UNMK	106	14.89	344760		113	0.237	80
114	100894	935	7	NBM	UNMK	171	69.93	344762		114	0.414	30
115	100894	924	7	NBM	WILD	77	5.19	344750		115	0.041	20
116	100894	935	7	NBM	WILD	84	8.29	344753		116	0.085	50
117	110894	916	1	MOTHER	MK	135	36.12	344792	180629	117	2.058	100
118	110894	916	1	MOTHER	UNMK	172	73.80	344793		118	0.332	20
119	110894	926	1	MOTHER	UNMK	106	13.34	344794		119	0.140	30

Table 7 (cont'd).

REF #	DATE	TIME (PST)	STN	DESC	GROUP	LEN (mm)	WT (g)	E#	CWT	STOM #	WT CONT	%CAP
120	110894	916	1	MOTHER	WILD	95	10.97	344789		120	0.213	90
121	110894	916	1	MOTHER	WILD	86	7.96	344790		121	0.250	90
122	110894	1012	3	NUNCRK	UNMK	126	24.42	344795		122	0.340	90
123	110894	1100	16	ISL#3	WILD	84	6.48	344798		123	0.020	15
124	110894	1100	16	ISL#3	WILD	92	8.78	344797		124	0.120	70
125	110894	1225	11	ISL#1	UNMK	98	9.51	344796		125	0.098	40
126	160694	1056	37	LOGDUMP	UNMK	79	6.58	331942		126	0.347	95
127	160694	1056	37	LOGDUMP	UNMK	77	5.72	331943		127	0.347	95
128	160694	1056	37	LOGDUMP	UNMK	94	11.59	331944		128	0.605	100
129	110894	1335	37	LOGDUMP	UNMK	96	11.44	344799		129	0.180	90
130	110894	1335	37	LOGDUMP	UNMK	101	13.30	344800		130	1.034	100
131	110894	1335	37	LOGDUMP	UNMK	105	15.60	344801		131	0.837	100
130	20694	942	37	LOGDUMP	WILD	63	2.95	374939		132	0.047	80
133	20694	942	37	LOGDUMP	WILD	62	2.60	374940		133	0.033	75
134	280794	813	37	LOGDUMP	WILD	85	7.89	344703		134	0.059	30
135	280794	813	37	LOGDUMP	WILD	68	4.11	344704		135	0.024	20
136	180594	1132	45	UPSLU	UNMK	62	3.13	319554		136	0.137	80
137	10694	1046	47	FREDS	UNMK	63	3.20	374380		137	0.048	70
138	10694	1046	47	FREDS	UNMK	76	5.59	374381		138	0.072	80
139	130794	900	47	FREDS	UNMK	77	6.28	319925		139	0.078	60
140	130794	900	47	FREDS	UNMK	78	5.92	319926		140	0.073	60
141	130594	810	47	FREDS	WILD	52	2.01	258614		141	0.091	90
142	130594	810	47	FREDS	WILD	40	0.79	258615		142	0.013	30
143	180594	1215	47	FREDS	WILD	45	1.09	319526		143	0.024	90

Table 7 (cont'd).

REF #	DATE	TIME (PST)	STN	DESC	GROUP	LEN (mm)	WT (g)	E#	CWT	STOM #	WT CONT	%CAP
144	180594	1215	47	FREDS	WILD	59	2.49	319532		144	0.022	30
145	10694	1046	47	FREDS	WILD	60	2.99	374383		145	0.055	90
146	10694	1046	47	FREDS	WILD	41	0.89	374391		146	0.004	30
147	150694	858	47	FREDS	WILD	62	2.94	331803		147	0.026	40
148	150694	858	47	FREDS	WILD	50	1.45	331808		148	0.018	50
149	280694	835	47	FREDS	WILD	77	6.25	319689		149	0.077	60
150	280694	835	47	FREDS	WILD	65	3.60	319690		150	0.037	40
151	130794	900	47	FREDS	WILD	75	5.63	319918		151	0.102	80
152	130794	900	47	FREDS	WILD	54	1.76	319924		152	0.056	90
153	270794	828	47	FREDS	WILD	74	5.37	344702		153	0.011	2
154	100894	841	47	FREDS	WILD	88	8.19	344787		154	0.141	60
155	100894	821	45	UPSLU	WILD	79	6.26	344786		155	0.105	60
156	170594	1255	16	ISL#3	MK	77	5.44	306590	181357	156	0.055	30
157	10694	1330	18	ISL#4	MK	80	6.21	374858	180631	157	0.031	25
158	150694	1330	18	ISL#4	MK	90	8.53	331742	180629	158	0.072	30
159	130594	1342	8	NBS	MK	87	7.70	258546	181357	159	0.000	0
160	130594	1342	8	NBS	MK	70	5.66	258548	181358	160	0.020	10
161	180594	1035	8	NBS	MK	69	3.75	374332	181360	161	0.015	15
162	180594	1035	8	NBS	MK	92	9.48	374348	181358	162	0.047	40
163	260594	917	8	NBS	MK	75	4.64	316382	181360	163	0.073	60
164	260594	917	8	NBS	MK	98	12.01	316392	181358	164	0.302	100
165	10694	1232	8	NBS	MK	96	10.44	374795	181361	165	0.141	100
166	10694	1232	8	NBS	MK	83	6.96	374797	181360	166	0.019	15
167	80694	823	8	NBS	MK	90	8.34	316488	181360	167	0.186	90
168	80694	823	8	NBS	MK	71	5.555	316498	180630	168	0.151	90
169	10694	1404	6	BLKHD	MK	84	6.10	374430	181361	169	0.043	30
170	10694	1404	6	BLKHD	MK	81	6.16	374432	180630	170	0.021	25

Table 7 (cont'd).

REF #	DATE	TIME (PST)	STN	DESC	GROUP	LEN (mm)	WT (g)	E#	CWT	STOM #	WT CONT	%CAP
171	10694	1404	6	BLKHD	MK	79	5.61	374434	181359	171	0.018	25
172	10694	1404	6	BLKHD	MK	94	10.06	374436	181359	172	0.113	90
173	10694	1404	6	BLKHD	MK	69	4.12	374438	180631	173	0.011	15
174	10694	1404	6	BLKHD	MK	90	8.17	374440	181359	174	0.037	50
175	150694	1040	6	BLKHD	MK	88	7.57	331604	181361	175	0.084	70
176	150694	1050	6	BLKHD	MK	81	6.04	331634	180631	176	0.087	70
177	10694	1157	10	SBM	MK	87	7.94	374739	181359	177	0.060	60
178	10694	1157	10	SBM	MK	93	9.91	374741	181359	178	0.062	50
179	10694	1157	10	SBM	MK	77	5.06	374743	180631	179	0.057	70
180	150694	920	10	SBM	MK	93	9.76	331679	180629	180	0.032	15
181	130594	1302	7	NBM	MK	70	3.87	270789	181359	181	0.026	72
182	130594	1302	7	NBM	MK	75	5.11	270793	181358	182	0.040	60
183	180594	1007	7	NBM	MK	75	4.92	319435	181361	183	0.063	60
184	180594	1007	7	NBM	MK	89	7.90	319439	181362	184	0.118	75
185	250594	901	7	NBM	MK	69	4.12	332064	181359	185	0.115	90
186	250594	901	7	NBM	MK	81	6.48	332070	181361	186	0.156	100
187	260594	844	7	NBM	MK	79	5.98	316370	180630	187	0.103	70
188	10694	1210	7	NBM	MK	88	8.04	374702	180629	188	0.025	10
189	10694	1210	7	NBM	MK	86	7.81	374704	180630	189	0.021	10
190	170594	1233	15	ISL#3	MK	75	4.68	344934	181361	190	0.036	40
191	170594	1233	15	ISL#3	MK	90	8.67	344936	181362	191	0.195	90
192	180594	1302	13	ISL#2	MK	74	4.66	319591	181360	192	0.000	0
193	180594	1302	13	ISL#2	MK	89	8.62	319595	181361	193	0.019	10
194	180594	1302	13	ISL#2	MK	77	5.81	319597	181358	194	0.047	60
195	180594	1432	141	ISL#3	MK	83	6.98	374352	181357	195	0.196	100
196	180594	1432	141	ISL#3	MK	88	8.47	374356	181357	196	0.032	15
197	180594	1432	141	ISL#3	MK	72	4.80	374360	181360	197	0.084	95
198	10694	1300	13	ISL#2	MK	87	8.13	374754	181359	198	0.070	75
199	10694	1300	13	ISL#2	MK	91	8.56	374756	181357	199	0.060	50
200	10694	1300	13	ISL#2	MK	72	4.66	374758	180631	200	0.091	90
201	150694	1330	18	ISL#4	MK	93	9.11	331740	181360	201	0.051	20

Table 7 (cont'd).

REF #	DATE	TIME (PST)	STN	DESC	GROUP	LEN (mm)	WT (g)	E#	CWT	STOM #	WT CONT	%CAP
202	150694	1330	18	ISL#4	MK	87	7.09	331744	180630	202	0.022	30
203	180594	930	33	CAMS	MK	73	4.92	344961	181362	203	0.236	100
204	180594	930	33	CAMS	MK	81	6.05	344963	181360	204	0.066	90
205	180594	930	33	CAMS	MK	83	6.59	344965	181361	205	0.094	70
206	180594	930	33	CAMS	MK	82	7.32	344967	181358	206	0.137	90
207	180594	930	33	CAMS	MK	82	6.55	344969	181358	207	0.038	60
208	120594	1016	8	NBS	WILD	46	1.12	285523		208	0.017	90
209	10694	1232	8	NBS	WILD	58	2.33	374834		209	0.011	80
210	150694	1015	8	NBS	WILD	53	1.84	331665		210	0.019	70
211	280694	942	8	NBS	WILD	66	3.93	319704		211	0.061	70
212	130794	1036	8	NBS	WILD	74	5.30	319862		212	0.085	80
213	270794	950	8	NBS	WILD	84	8.43	319993		213	0.199	90
214	100894	958	8	NBS	WILD	91	9.29	344764		214	0.083	60
215	120594	1030	6	BLKHD	WILD	46	1.23	285542		215	0.013	40
216	120594	1030	6	BLKHD	WILD	53	2.06	285543		216	0.085	95
217	170594	1415	6	BLKHD	WILD	56	2.00	344901		217	0.017	25
218	170594	1415	6	BLKHD	WILD	49	1.53	344902		218	0.015	30
219	10694	1404	6	BLKHD	WILD	47	1.05	374407		219	0.010	20
220	10694	1404	6	BLKHD	WILD	58	2.38	374408		220	0.017	60
221	280694	1005	6	BLKHD	WILD	66	3.43	316646		221	0.016	30
222	140794	1350	6	BLKHD	WILD	56	2.49	319962		222	0.055	70
223	140794	1353	6	BLKHD	WILD	86	8.41	319966		223	0.036	30
224	270794	1026	6	BLKHD	WILD	74	5.12	306200		224	0.066	30
225	100894	1038	6	BLKHD	WILD	93	9.93	344747		225	0.072	80
226	100894	1038	6	BLKHD	WILD	96	12.25	344748		226	0.181	70
227	180594	930	33	CAMS	WILD	39	0.65	319406		227	0.015	90
228	180594	930	33	CAMS	WILD	54	1.83	319408		228	0.017	30
229	10694	1404	6	BLKHD	UNMK	72	4.31	374421		229	0.025	10
230	10694	1404	6	BLKHD	UNMK	105	14.23	374427		230	0.030	20
231	270794	1018	6	BLKHD	UNMK	91	9.24	344701		231	0.126	70
232	100894	1038	6	BLKHD	UNMK	114	18.79	344745		232	0.514	80

Table 7 (cont'd).

REF #	DATE	TIME (PST)	STN	DESC	GROUP	LEN (mm)	WT (g)	E#	CWT	STOM #	WT CONT	%CAP
233	100894	1038	6	BLKHD	UNMK	173	77.25	344746		233	-	NA
234	130794	921	10	SBM	UNMK	100	14.22	319864		234	0.019	10
235	130794	921	10	SBM	UNMK	84	7.75	319866		235	0.052	15
236	180594	930	33	CAMS	UNMK	78	5.81	344958		236	0.018	25
237	180594	930	33	CAMS	UNMK	99	11.44	344959		237	0.039	25
238	10694	1447	33	CAMS	UNMK	91	8.79	374899		238	0.047	40
239	10694	1447	33	CAMS	UNMK	83	6.57	374900		239	0.028	40
240	120594	951	8	NBS	UNMK	85	7.11	285536		240	0.011	0
241	180594	1035	8	NBS	UNMK	85	7.15	374314		241	0.029	40
242	10694	1232	8	NBS	UNMK	85	6.46	374829		242	0.016	5
243	130794	1028	8	NBS	UNMK	85	7.20	319857		243	0.004	1
244	130794	1036	8	NBS	UNMK	103	13.35	319861		244	0.096	10
245	270794	939	8	NBS	UNMK	98	12.29	319990		245	0.192	90
246	180594	1302	13	ISL#2	UNMK	93	9.71	319574		246	0.062	40
247	180594	1302	13	ISL#2	UNMK	73	4.38	319575		247	0.097	80
248	10694	1300	13	ISL#2	UNMK	83	6.43	374767		248	0.013	10
249	160694	1013	13	ISL#2	UNMK	79	5.72	331864		249	0.069	40
250	160694	1013	13	ISL#2	UNMK	94	9.95	331866		250	0.024	15
251	290694	950	13	ISL#2	UNMK	80	5.76	319767		251	0.117	70
252	290694	950	13	ISL#2	UNMK	90	8.30	319769		252	0.059	40
253	180594	1302	13	ISL#2	WILD	48	1.27	319585		253	0.003	60
254	10694	1300	13	ISL#2	WILD	53	1.85	374775		254	0.017	80
255	160694	1013	13	ISL#2	WILD	64	3.06	331869		255	0.020	30
256	290694	950	13	ISL#2	WILD	72	4.37	319762		256	0.021	30
257	10694	1330	18	ISL#4	UNMK	76	4.63	374861		257	0.018	30
258	10694	1330	18	ISL#4	UNMK	103	12.42	374863		258	0.029	15
259	150694	1330	18	ISL#4	UNMK	67	3.62	331726		259	0.030	80
260	150694	1330	18	ISL#4	UNMK	90	8.50	331732		260	0.074	NA
261	10694	1330	18	ISL#4	WILD	66	3.70	374866		261	0.081	80
262	150694	1330	18	ISL#4	WILD	60	2.65	331736		262	0.073	90
263	150694	1330	18	ISL#4	WILD	51	1.68	331737		263	0.019	40

Table 7 (cont'd).

REF #	DATE	TIME (PST)	STN	DESC	GROUP	LEN (mm)	WT (g)	E#	CWT	STOM #	WT CONT	%CAP
264	290694	1150	18	ISL#4	WILD	64	3.42	319778		264	0.033	80

Table 8. Time and site of capture, length, weight, stomach content weight and stomach % capacity for wild chinook fry captured on May 2, 1995.

TIME (PST)	Site #	LEN (mm)	WT (g)	E#	STOM #	WT CONT	% CAP
821	47	42	0.83	344802	1	0.016	80
821	47	43	0.89	344803	2	0.034	90
821	47	43	0.80	344804	3	0.022	80
821	47	43	0.93	344805	4	0.016	70
821	47	41	0.60	344806	5	0.009	30
821	47	38	0.53	344807	6	0.008	60
821	47	37	0.57	344808	7	0.010	80
821	47	44	0.95	344809	8	0.020	90
821	47	40	0.66	344810	9	0.006	40
821	47	40	0.63	344811	10	0.004	40
905	49	41	0.61	344812	11	0.016	70
905	49	45	1.01	344813	12	0.037	90
905	49	51	1.40	344814	13	0.018	80
905	49	52	1.46	344815	14	0.007	15
905	49	42	0.77	344816	15	0.011	80
1140	53	39	0.52	344817	16	0.002	20
1140	53	43	0.69	344818	17	0.005	30
1140	53	44	0.77	344819	18	0.009	80
1140	53	44	0.87	344820	19	0.007	30
1140	53	42	0.82	344821	20	0.042	100
1140	53	42	0.70	344822	21	0.006	15
1140	53	38	0.56	344823	22	0.011	90
1140	53	41	0.61	344824	23	0.008	50
1140	53	34	0.43	344825	24	0.009	80
851	50	42	0.81	344826	25	0.015	80
851	50	42	0.65	344827	26	0.006	15
851	50	41	0.68	344828	27	0.004	15
851	50	44	0.97	344829	28	0.027	90
851	50	43	0.78	344830	29	0.006	20

Table 9. Abbreviations used in Tables 10 and 11.

STO #	Unique number assigned to each stomach analysed
DIG	% of stomach contents too digested to be identified
AVG (mm)	The average length of all prey items in each category
TOTL #	The total number of each prey item in each category
% VOL	The subjective estimate of the percent of the stomach volume occupied by each prey category
CORO	<i>Corophium</i> sp. amphipod
INUS	Insect of unknown life stage
INAD	Insect adult
INYM	Insect nymph
INLA	Insect larva
CALA	Calanoid and cyclopoid copepods (not differentiated)
HARP	Harpacticoid copepod
CUMA	Cumacean
BCYP	Barnacle cypris
DAPH	<i>Daphne</i> sp. cladoceran
BOSM	<i>Bosmina</i> sp. cladoceran
MYSI	Mysid
DECZ	Decapod larva – zoea stage
DECM	Decapod larva – megalops stage

Table 9 (cont'd)

AMPH	Unidentified amphipod
AMLA	Amphipod juvenile
ISOP	Isopod
MITE	Unidentified mite
PLNT	Unidentified plant material
ROCK	Small rocks
FISH	Unidentified fish
POLY	Polychaete
TANA	Tanadacean
SPON	Sponge
FISC	Fish scales
UNID	Unidentified contents

Table 10 (cont'd)

STO #	DIG	CORGI	INDS	INAD	INYM	INLA	CALA	HARP	CUMA	BCYP	DAPH	BOSM	KYSI	DECE	DECM	AMPH	ANLA	ISOP	MITE	PLNT	ROCK	FISH	POLY	TANA	SPON	FISC	UNID
31																											
% VOL	51.6					4.3	5.2	1.0					34.4	0.9		2.6											
32																											
% VOL		100																									
33																											
% VOL																											
34																											
% VOL		5-0														4.5		2.0		7.0							
		5-0																3.5									
		6-0																4.0									
		6-0																4.0									
		6-5																4.5									
																		5.0									
																		5.0									
																		7.0									
AVG (mm)		5.7														4.5		4.4		7.0							
TOTL #		5														1		9		1							
% VOL	28.9	10.6														46.1		12.4		1.0							

Table 10 (cont'd)

STO #	DIG	CORO	INUS	INAD	INYM	INLA	CALA	HAREP	CUMA	BCYP	DAPH	BOSM	MYSI	DECZ	DECM	AMPH	AMLA	ISOP	MITE	PLANT	ROCK	FISH	POLY	TARA	SPON	FISC	UNID
45																											
TOTL #							3																				
# VOL	54.5						45.5																				
46			2.6					1.6																			
AVG (mm)			2.5					1.6																			
TOTL #			1					1																			
# VOL	97.8	1.8						0.4																			
47			3.0	1.4			2.2											3.2									
AVG (mm)			3.0	1.4			2.2											3.2									
TOTL #			1	1			1											1									
# VOL	74.6	15.0	1.5				2.2											6.7									
48																											
AVG (mm)																											
TOTL #																											
# VOL																											
AVG (mm)																											
TOTL #																											
# VOL																											
AVG (mm)																											
TOTL #																											
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TOTL #																											
# VOL																											
AVG (mm)																											
TOTL #																											
# VOL																											
AVG (mm)																											
TOTL #																											

Table 10 (cont'd)

STO #	DIG	CORO	INUS	INAD	INYM	INLA	CALA	HARP	CUMA	PCYP	DAPH	BOSM	MYSI	DE CZ	DECM	AMPH	AMLA	ISOP	MITE	PLNT	ROCK	FISH	POLY	TAMA	SPON	FISC	UNID
101																											
TOTL #				1	2																						
% VOL				99.3	0.7																						
102		4.0														5.5							20.0				
																							20.0				
																							20.0				
																							22.0				
																							22.0				
																							24.0				
																							24.0				
																							28.0				
																							38.0				
AVG (mm)		4.0														5.5							23.6				
TOTL #		1														1							11				
% VOL		0.1														0.7							99.2				
103		8.0																					13.0				
																							13.0				
																							15.0				
																							20.0				
																							20.0				
																							23.0				
																							23.0				
																							25.0				
																							25.0				
																							28.0				

Table 10 (cont'd)

STO #	DIG	CORO	INUS	INAD	INYM	INLA	CALA	HARP	CUMA	BCYP	DAFH	BOBM	MYSI	DE CZ	DECM	AMPH	AMLA	ISOP	MITE	PLRT	ROCK	FISH	POLY	TANA	SPON	FISC	UNID
134				4.3																							
				6.0																							
AVG (mm)				5.2																							
TOTL #				2																							
% VOL				100																							
135				1.6										1.2						3.0							
AVG (mm)				1.6										1.2						3.0							
TOTL #				1										1						1							
% VOL	65.9			2.6										28.9						2.6							
136		5.0		2.0	5.0	7.0	1.5														0.7						
		4.0			3.5	7.0	1.5														1.0						
					4.0	5.0	2.0														0.3						
						5.0	2.0														0.5						
						3.0	2.0																				
						3.0	2.0																				
						3.0	2.5																				
						4.0	2.5																				
						6.0	2.5																				
							2.0																				
AVG (mm)		4.5		2.0	4.2	4.8	2.1														0.6						

Table 10 (cont'd)

STO #	DIG	CORO	INTS	INAD	INVM	INLA	CALA	HARP	CUMA	BCYP	DAPH	BOSM	MYSI	DECZ	ANPH	ANLA	ISOP	MITE	PLNT	ROCK	FISH	POLY	TANA	SPON	FISC	UNID
191		6.0					2.2																			
		6.0																								
		6.0																								
		6.0																								
		5.0																								
		5.0																								
		5.0																								
		5.0																								
		3.0																								
AVG (mm)		5.5					2.2								2.3		3.5									
TOTL #		11					3								2		2									
† VOL		35.0	58.3			0.2	2.1								1.9		2.5									
192																										
† VOL		0																								
193				2.2			2.4												5.0							
							2.2																			
AVG (mm)				2.2			2.3												5.0							
TOTL #				1			2												1							
† VOL		83.3	3.3	1.7			5.0												6.7							

Table 10 (cont'd)

STO #	DIG	CORO	IRUS	INAD	INYM	INLA	CALA	HARP	CUMA	BCYP	DAPH	BOSM	MYSI	DEBZ	DECM	AMPH	AMLA	ISOP	MITE	PLNT	ROCK	FISH	POLY	TANA	SPON	FISC	UNID
194		1.0					1.5	1.4			1.0			2.0				2.0									
							1.8	1.4			1.4			2.0													
							2.2	1.4			1.4																
								1.2																			
AVG (mm)		1.0					1.8	1.4			1.3			2.0				2.0									
TOTL #		1					3	4			3			2				1									
* VOL	55.0	27.5		2.2			2.2	2.2			1.6			8.2				1.1									
195		3.0				3.0	4.0	1.4	2.4	1.0				2.0		1.0		2.0			1.8						
		3.0					4.0	1.2	2.4					2.0		1.5		2.0									
		4.0					4.5	1.2	2.4					2.5		2.0		2.0									
		4.0					3.5		2.4					2.0		2.0		2.0									
		4.0					2.2		2.4					2.0		2.0		2.5									
		1.0					2.2		2.4					2.5		2.5		2.5									
							2.4		2.4					2.0		3.0		2.5									
							2.0		2.4					2.5		3.0		2.5									
							4.0		2.8					2.0		3.0		3.0									
							2.2		2.8					4.0		4.0		4.0									
									2.8					2.5		3.5		2.5									
									2.8					2.2		2.5		2.5									
AVG (mm)		3.2				3.0	3.1	1.3	2.5	1.0				2.2		2.5		2.5			1.8						
TOTL #		6				1	105	3	12	1				3		12		33			1						
* VOL		7.2				0.3	53.9	0.4	2.9					0.9		11.2		14.4			0.2						1.4

Table 10 (cont'd)

STO #	DIG	CORO	INGUS	INAD	INYM	INLA	CALA	HARP	CUMA	BCYP	DAPH	BOSM	MYSI	DE CZ	DECH	AMPH	AMLA	ISOP	MITE	PLMNT	ROCK	FISH	POLY	TANA	SPON	FISC	UNID
200																											
Σ VOL	27.8	46.3														19.5		7.4									
201																2.0											
AVG (mm)																2.0											
TOTL #																1											
Σ VOL	91.2															8.8											
202		4.0		2.0																							
AVG (mm)		4.0		2.0																							
TOTL #		1		1																							
202																											
Σ VOL	48.8	48.8		2.4																							
203						3.5	2.2			0.8	0.8	1.0															
							2.2			1.2	1.0																
							2.2				1.0																
							2.2				1.0																
							2.2				1.0																
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							2.2	</																			

Table 10 (cont'd)

STO #	DIG	CORO	INUS	IRAD	INVM	INLA	CALA	BARP	COMA	BCYP	DAPH	BOSM	MYSI	DECZ	DECM	AMPH	AMLA	ISOP	MITE	PLNT	ROCK	FISH	POLY	TAMA	SPON	FISC	UNID
241																5.0											
AVG (mm)																5.0											
TOTL #																1											
‡ VOL	88.5	7.1														4.4											
242																											
‡ VOL	100																										
243													2.8														
AVG (mm)													2.8														
TOTL #													1														
‡ VOL	98.4												1.6														
244		5.0				3.0										3.5											
AVG (mm)		5.0				3.0										3.5											
TOTL #		1				1										1											
‡ VOL		3.2				0.9										4.6							91.3				

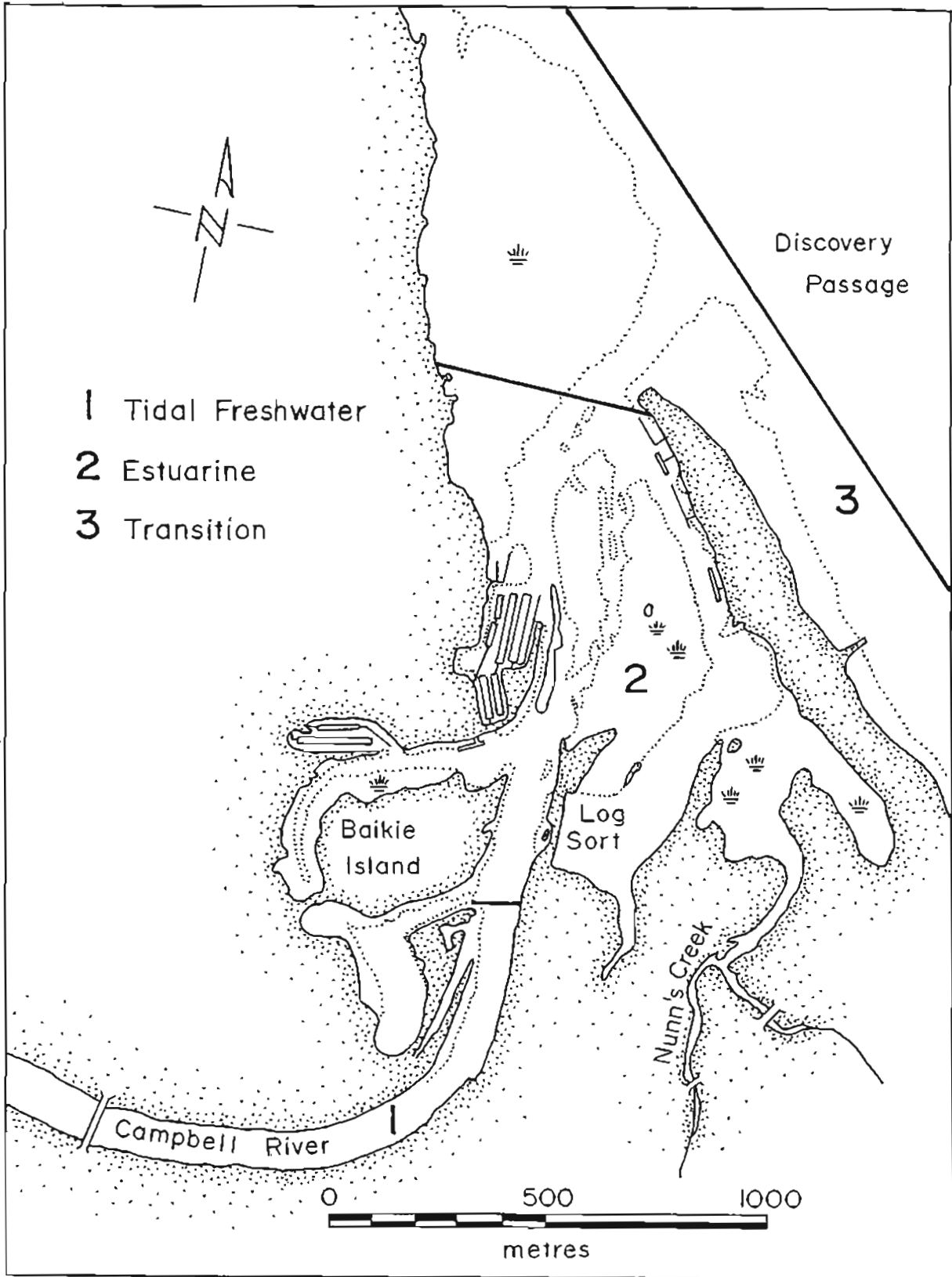


Fig. 1. Tidal freshwater, estuarine, and transition zone designations in the 1994 and 1995 surveys.

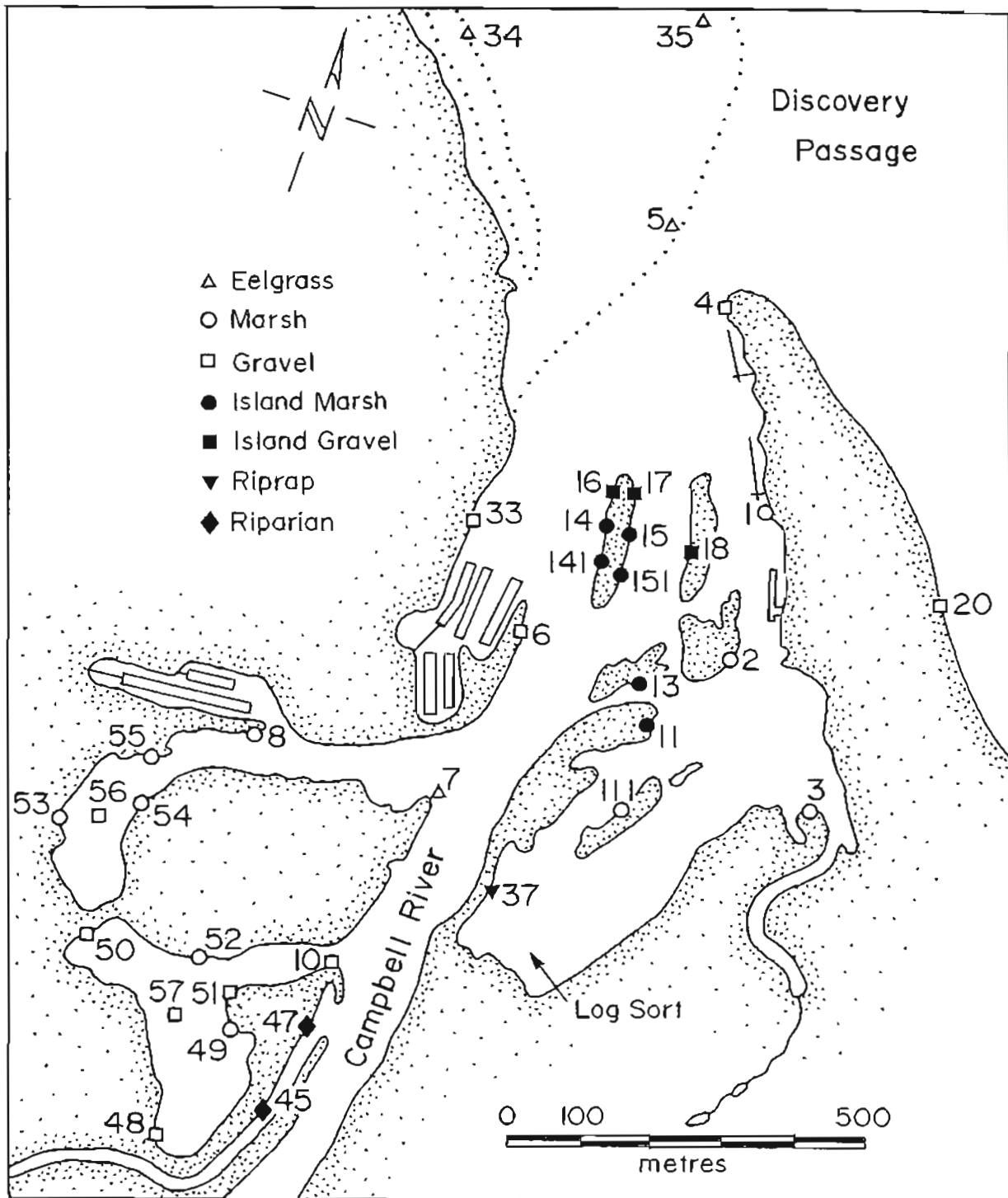


Fig. 2. Locations of all stations sampled in 1994 and 1995 with habitat designation.

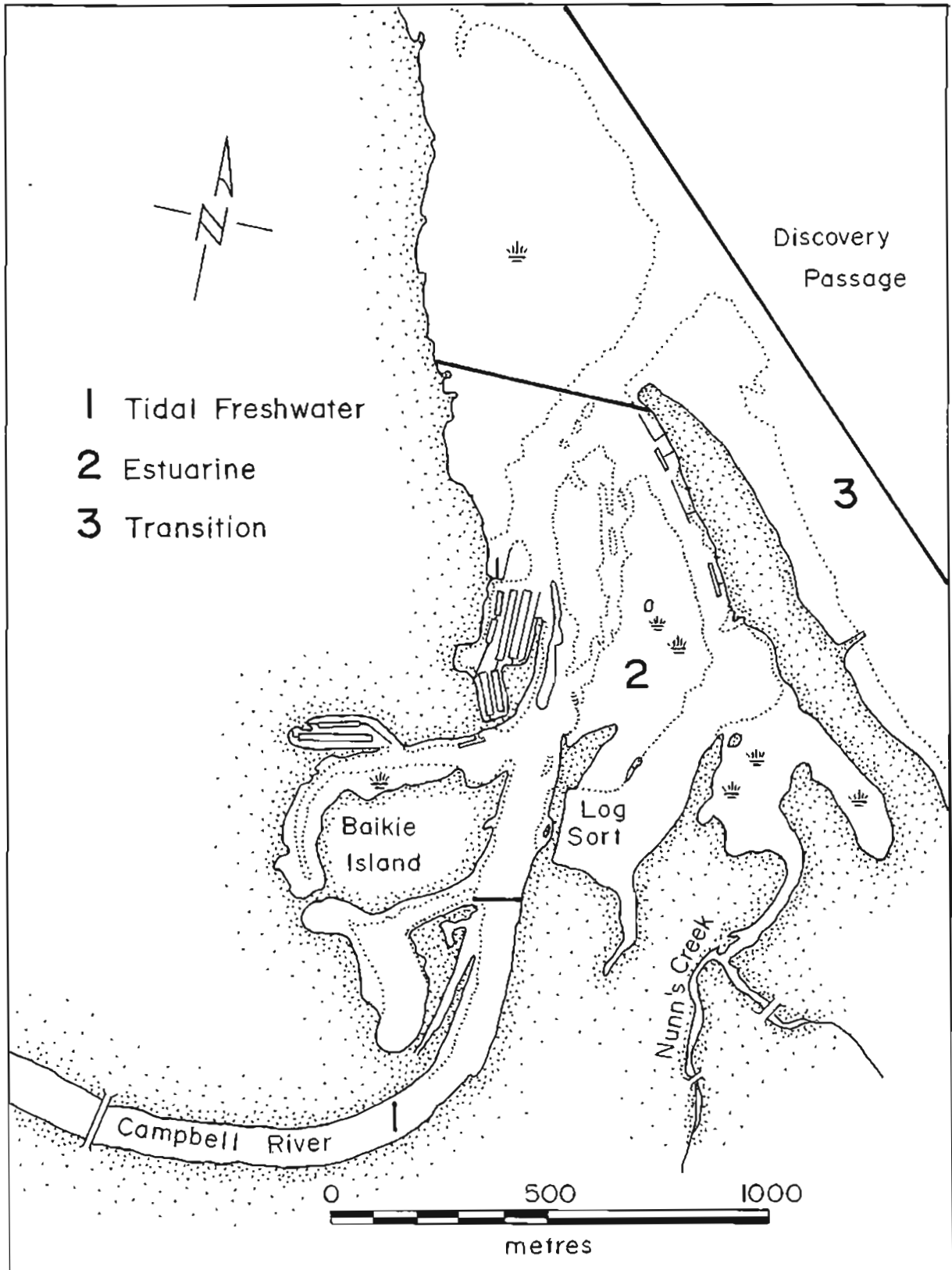


Fig. 1. Tidal freshwater, estuarine, and transition zone designations in the 1994 and 1995 surveys.

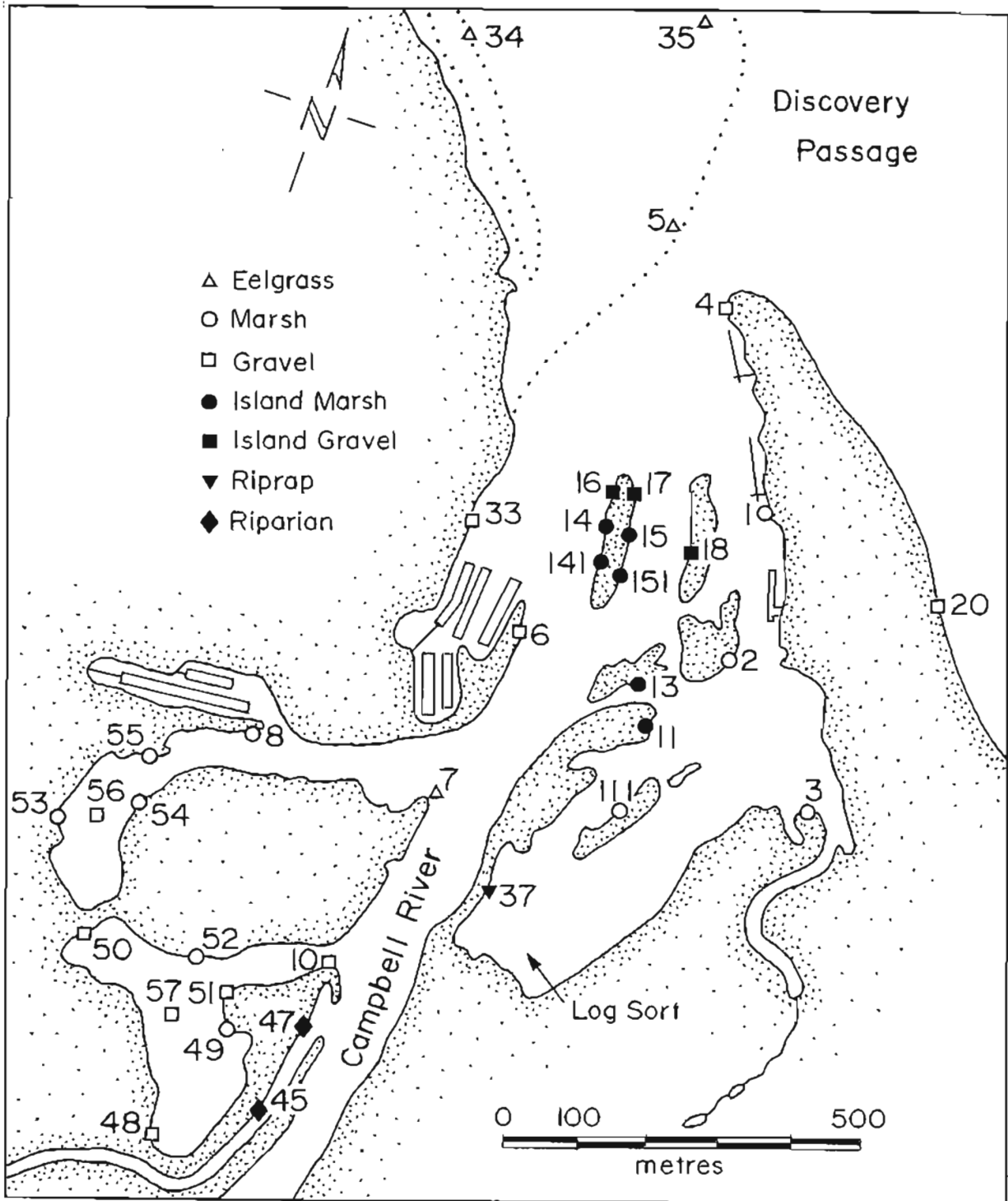


Fig. 2. Locations of all stations sampled in 1994 and 1995 with habitat designation.

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