

Appendix I. Example of haul record form

140°	45°	50°	55°	60°	65°	70°
0'						
50'						
100'						
150'						
200'						

ECOLOGICAL SNELL - HAUL RECORD
UNIVERSITY OF WASHINGTON
COLLEGE OF FISHERIES

Area	Station	Month	Day	Year	Time	Duration	P.m.	Cable	Net	Depth	Depth	Average	Stomach	Intensity	Stomach	Gain	Temp.	Oxygen	O ₂	Second disk	# Smelt	# Smelt	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

# Smelt	# Juvenile Smelt	# Smelt	# Smelt	# Red Salmon	# Other Salmon	# Chinook	# Coho	# Steelhead	# Trout	# Lake Trout	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic Char	# Arctic 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COMMENTS:

Number	Number	Number	Number
73	74	75	76
77	78	79	80

Appendix II. Explanation of codes used on haul record form.

Starting in column	Label	Code	Explanation
1	Area	1	Limnetic area north of an artificial line from Pt. Champaign to Sand Point
		2	Limnetic area between the above defined line and the Evergreen Point Floating Bridge
		3	Limnetic area between the Evergreen Point Floating Bridge and the Mercer Island Bridge
		4	Limnetic area south of the Mercer Island Bridge
2	Station	0	The standard station for each area (see Fig. 1 for location)
		1-9	Other haul locations within the area defined by column 1
3	Month		Month of the year haul was made: Jan. = 1, Dec. = 12
5	Day		Day of the month haul was made
7	Year		Last digit of the year, i.e., 1959 = 9, 1964 = 4
8	Time	1	0000 - 0559
		2	0600 - 1159 (local times includ-
		3	1200 - 1759 ing daylight savings
		4	1800 - 2359 time)

Appendix II (Continued)

Starting in column	Label	Code	Explanation
9	Duration	0	9-11 minutes at trawling depth
		1	1- 3 " "
		2	4- 6 " "
		3	7- 8 " "
		4	12-13 " "
		5	14-17 " "
		6	18-21 " "
		7	22-24 " "
		8	24-26 " "
10	Ftm. cable		Fathoms of cable paid out
13	Net depth		Estimated depth of net in fms.
15	Depth estimate	0	Basis for net depth estimate:
		1	Cable out relationship at 700 rpm
			As in 0 but BT record obtained
			for haul
		2	As in 0 but BT and BKG records
			obtained for haul
		3	As in 0 but BKG record obtained
			for haul
		4	Cable out relationship at 625 rpm
		5	Other auxillary information
		6	BT or BKG record used rather than
16	Average depth		cable out relationship
18	Simrad intensity		Average depth of lake during tow
			Estimate of number of distinct
			marks at the depth of the net
			in 15 cm.'s of the Simrad
			record for the tow. Correction
			was made for the depth of the
			transducer below the water's
			surface

Appendix II (Continued)

Starting in column	Label	Code	Explanation
21	Simrad gain		Estimate of the location of the tow in the water column with respect to concentration of marks
		1	Above all concentrations of marks
		2	Within the upper concentration if two concentrations are present
		3	Between two layers of concentrations
		4	Near the upper margin of the main or lower concentration
		5	Near the center of the main or lower concentration
		6	Near the lower margin of the main or lower concentration
		9	Below the main or lower concentration
22	Temperature		Temperature in °F. at the depth of the tow from the most applicable bathythermograph slide
24	Oxygen		Oxygen data from Dr. W.T. Edmondson expressed as mg./l.
28	Carbon dioxide		Carbon dioxide data from Dr. W.T. Edmondson expressed as 10 x mg./l
30	Secchi disk		Data from Dr. W.T. Edmondson, observations in meters
33	% Adult smelt		% of <i>S. thaleichthys</i> 13 months old or older

Appendix II (Continued)

Starting in column	Label	Code	Explanation
35	# Female smelt		# of female <u>S. thaleichthys</u> 13 months old or older
37	# Male smelt		# of male <u>S. thaleichthys</u> 13 months old or older
39	# Juvenile smelt		# of smelt less than 13 months old
41	ml. mysids		# of ml. of mysids measured in 10% formalin in a graduated cone after 2 minutes settling
45	# Red salmon		# <u>Oncorhynchus nerka</u>
47	# Other Salmonidae		# <u>Oncorhynchus</u> sp. or <u>Salmo</u> sp. (excluding <u>O. nerka</u>)
48	# Peamouth		# <u>Mylocheilus caurinum</u>
49	# Squawfish		# <u>Ptychocheilus oregonense</u>
50	# Lamprey		# <u>Entosphenous tridentatus</u>
51	# Cottus sp.		# <u>Cottus</u> sp.
53	# Prickly sculpin		# <u>Cottus asper</u>

Appendix II (Continued)

Starting in column	Label	Code	Explanation
55	# Stickle- back		# <u>Gasterosteus aculeatus</u>
56	# Yellow perch		# <u>Perca flavescens</u>
57	# Crappie		# <u>Pomoxis nigromaculatus</u>
58	# Other fish		# Other fish species
59	# Fish w/o post larvae		# All juvenile through adult fishes including also all smelt regardless of stage
61	# Total fish		# Total fish including post larvae
63	Small crus- taceans		Not determined
67	Pontoporeia	0 1 2 3 4 5 6 7 8 9	# <u>Pontoporeia affinis</u> None 1 or 2 3 or 4 5 or 6 7 or 8 9 or 10 11 or 12 13 or 14 15 or 16 17 or more

Appendix II (Continued)

Starting in column	Label	Code	Explanation
68	Chironomids	0 1 2 3 4 5 6 7 8 9	# of chironomids (predominantly <u>Polypedilum fallax</u>) None 1 or 2 3 or 4 5 or 6 7 or 8 9 or 10 11 or 12 13 or 14 15 or 16 17 or more
69			Empty
73		Blank or - 1 2 3 4 5 6	Vessel used COMMANDO HOH COBB MALKA TIPELLA PAPCO BROWN BEAR
74	Trip number		Trip sequence number
78		Blank or - 1 2 3 4 5 6	Comment column Midwater trawl Otter trawl 9' x 9' tow net COBB pelagic trawl Two mwt's simultaneously Unsuccessful midwater trawl haul Hit bottom on mwt haul

Appendix II (Continued)

Starting in column	Label	Code	Explanation
79	Haul number		Haul sequence number

Appendix III. Example of smelt record form

ECOLOGY OF SMELT - SMELT RECORD 1
 UNIVERSITY OF WASHINGTON
 COLLEGE OF FISHERIES

Boat	Trip				Haul			
	2		4		6		8	

MERISTICS

Sex	Length				Age	Height				Vertebrae	Pectorals	Dorsal	Anal	Total Gill rakers
	10		12		14		16		18	20	22	24	26	28

MORPHOMETRICS

Lower gill rakers		Pyloric caeca	Pectoral	Pelvic		Anal		Head		Jaw		Orbit	
30		32	34	36		38 40		42		44 46		48	

STOMACH CONTENTS

Adipose	Depth	Pectoral-Pelvic	Dorsal origin	Neomysis	Chironomidae	Diaptomus	Epischura		
50	52	54	56	58	60	62	64	66	68

MISC.

Cyclops		Diaphanosoma		Other		Nematodes		Fused Vert.			
70		72		74		76		78		80	

NOTES

Appendix IV. Explanation of codes used on smelt record form

Starting in column	Label	Code	Explanation
1	Boat	Blank or - 1 2 3 4 5 6	Vessel used COMMANDO HOH COBB MALKA TIPELLA PAPCO BROWN BEAR
2	Trip		Trip sequence number
6		Blank 1 2 3 4 5 6	Comment column Midwater trawl Otter trawl 9' x 9' tow net COBB pelagic trawl Two midwater trawls simultaneously Unsuccessful midwater trawl Hit bottom with midwater trawl
7	Haul number		Haul sequence number
9	Sex	1 2	Male Female
10	Length		Standard length in mm.
13	Age		Age in months: March = 0, April = 1, etc.
15	Weight		Weight in grams, in air, surface moisture blotted dry after being preserved in formalin

Appendix IV (Continued)

Starting in column	Label	Code	Explanation
19	# Vertebrae		Count includes the urostyle but not the base of the occipital bone. In cases involving fusions the haemal or neural spines were counted and a 1:1 relationship assumed.
21	# Pectoral		All fin rays on the left side
23	# Dorsal		All distinct fin rays counted, the last two if sharing a single basal were counted as one
25	# Anal		All distinct fin rays counted, the last two if sharing a single basal were counted as one
27	# Total gill rakers		All rakers including minute projections counted
29	# Lower gill rakers		Gill rakers on the lower arm, including one in the angle
31	# Pyloric caeca		Total number of projections
32	Length of pectoral		Measured in tenths of mm. from insertion to posterior tip of the longest ray on the left side

Appendix IV (Continued)

Starting in column	Label	Code	Explanation
35	Length of pelvic		Measured in tenths of a mm. from insertion to posterior tip of the longest ray on the left side
38	Length of anal		The length of the seventh from the last anal fin ray, in tenths of a mm.
41	Length of head		The length from the anterior end of the lower jaw to the posterior margin of the opercle bone in tenths of a mm.
44	Length of jaw		The length of the upper jaw from its anterior end to the end of the maxillary in tenths of a mm. on the left side
47	Length of orbit		The greatest diameter of the orbit on the left side in tenths of a mm.
49	Length of adipose		The length of the base of the adipose fin in tenths of a mm.
51	Depth		The greatest depth of the fish, generally between the insertion of the pectoral fin and the origin of the dorsal fin measured in tenths of a mm.

Appendix IV (Continued)

Starting in column	Label	Code	Explanation
54	Pectoral- pelvic		The distance between the insertions of the pectoral and pelvic fins on the left side in tenths of a mm.
57	Dorsal origin		The distance between the tip of the upper jaw and the origin of the dorsal fin
60	Neomysis		# <u>Neomysis</u> <u>awatchensis</u> in stomach
62	Chironomidae		# Chironomids in stomach (mostly <u>Polypedilum fallax</u>)
64	Diaptomus		# <u>Diaptomus</u> <u>ashlandi</u> in stomach
67	Epischura		# <u>Epischura</u> <u>nevadensis</u> in stomach
69	Cyclops		# <u>Cyclops</u> <u>bicuspidatum</u> in stomach
71	Diaphanosoma		# <u>Diaphanosoma</u> <u>leuchtenbergianum</u> in stomach
73	Other		# Other food organisms in stomach
75	Nematodes	0 1	None present in abdomen Some present in abdomen

Appendix IV (Continued)

Starting in column	Label	Code	Explanation
76	Fused vertebrae	0	Examined for vertebral deformi- ties, none found
		1	Symmetrical fusion of two or more centra
		2	Accessory spine on one or both of last two normal vertebrae (excludes urostyle)
		3	Spiral suture
		4	Asymmetrical vertebral element
		5	Other vertebral irregularities
		6	Codes 1 and 2 above simultaneously
		7	Combination of any two of above types except as in 6
77		8	Combination of three or more of above types
			Sequence number for individual smelt

Appendix V. Data listing for haul records

300507246020054	5011.4	1.60C00000C015005000C0100000000218	-62C9-01
300507246030084	5011.0	1.601000100011503000C0200000000607	-62C9-02
300507246025074	5011.1	1.6060203000150010000040000001016	-62C9-03
30061924601805433	5811.2	1.0010001040350041000010000001125	-6212-01
30061924600602433	6511.4	1.005030201047504100000000001127	-6212-02
30061924601003433	6511.4	1.0010100000175080000000000000919	-6212-03
30061924600301433	6512.2	1.00C00000C0100001000000000000117	-6212-04
30071024602707432	64 8.0	1.007040301 07100000000001624	-6216-01
30071024002707433	64 8.0	1.004030107 020000040000001721	-6216-02
30071024002707433	64 8.0	1.001010004 01100000000000709	-6216-03
30071024002707433	64 8.0	1.005030208 040000000000001728	-6216-04
30071024002707433	64 8.0	1.013060706 000000000000001934	-6216-05
300913240030084	53 3.5	1.101010005012005000000000101915	-6218-01
300913240021064	58 6.6161	1.00000000C012000000015000001517	-6218-02
30091324002106433	58 6.6161	1.00000000201100000000000000909	-6218-03
30091324000902434	66 7.4	1.100000000004500000000000100404	-6218-04
30091324004512432	50 6.5	1.10101000200900000000000000708	-6218-05
30091321004512432	50 6.5	1.1000000020075020000000000000909	-6218-06
30101124003008431	55 8.1261	1.0503020001600300000100000000909	-6220-01
30101124006017431	49 7.7321	1.000000010180020000000000000303	-6220-02
301011240050144	50 8.0321	1.030030001000900000010010001414	-6220-03
41101124003008421		00000000018000000000000000000506	-6220-04
42101124005014419		01000101200000000300000000000505	-6220-05
40101124003008416		00000002017000010000000000001111	-6220-06
431011240021064		0000000020000000014011002323	-6220-07
44101124001805411		00000000008000000000000000000606	-6220-08
301011210030084	8.1261	1.010001020100010200150000002121	-6220-09
31120724003008430	51 9.033	02010100015000000000000000001414	-6222-01
321207240021064	51 9.034	000000000150000000000000000000303	-6222-02
30120724002106433	51 9.034	0000000030500000000000000000000404	-6222-03
30120724004512434	51 8.931	0000000002250200000000000000000404	-6222-04
30120724001504433	51 8.934	0000000022250100000000000000000303	-6222-05
30120724006017432	51 8.734	0000000001750000000000000000000303	-6222-06
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VITA

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