2015 Juvenile Wild Salmon Monitoring Program

Clayoquot Sound, BC

Prepared for:

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Table of Contents

Table of Contents……ii

List of Table and Figures……..iii

1.0 Introduction……1

2.0 Methods……..1

3.0 Results……3

Appendix 1- Individual Seine Data……..…7

Appendix 2- Fork Length……..8

Appendix 3- Water Quality Summary in Clayoquot Sound ……....9

Appendix 4- Sample of Photarium photographs……10

List of Tables and Figures

Figure 1: Clayoquot Sound Wild Smolt Monitoring Stations……2

Table 1: Sea lice Infection rates on salmon smolts captured between April 16th and June 18th, 2015……...3

Figure 2: Sea lice Infection rates on salmon smolts captured between April 16th and June 18th, 2015……..3

Table 2: Average length of smolts captured between April 16th and June 18th, 2015……4

Figure 3: Clayoquot Sound Salinity and Temperature (Surface)…….4

Figure 4: Wild Smolt and Sea Lice Distribution by Location……5

1.0 Introduction

This report summarizes the results of juvenile wild salmonids captured during beach seining in Clayoquot Sound, BC. The report was completed by Cermaq Canada Ltd and distributed to Clayoquot Sound Sea lice Monitoring Group and Fisheries and Oceans Canada (DFO) Aquaculture Environmental Operations Group. The fish were captured at 17 sites in Clayoquot Sound, BC between April 16, 2015 and June 18, 2015. The sample population consisted of 2,293 Chum (Oncorhynchus keta), 238 Coho (Oncorhynchus kisutch), 29 Chinook (Oncorhynchus tshawytscha), 12 Sockeye (Oncorhynchus nerka) salmon smolts and 1 Cutthroat Trout (Oncorhynchus clarkii).

The purpose of this study was to monitor wild salmonid distribution in the Clayoquot Sound area and around Cermaq Canada finfish facilities and to observe the prevalence of sea lice on wild smolts. As identification of the developmental stage of the sea lice was not performed this year and the wild smolts also had their lengths measured, only non-lethal sampling was performed.

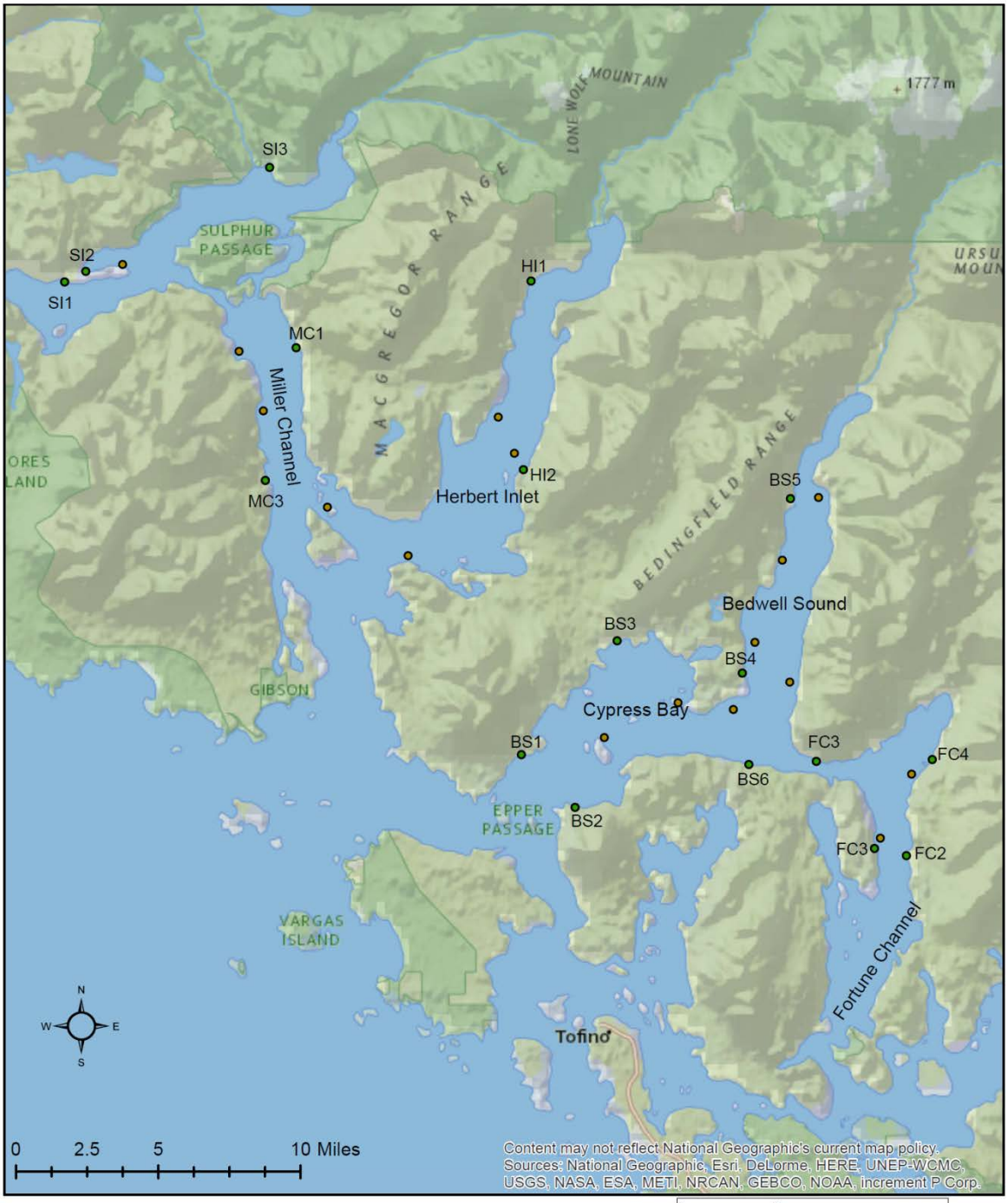
2.0 Methods

The Clayoquot Sound Sea Lice Monitoring Group along with Cermaq Canada employees used historical sample locations for beach seining with the addition of two new locations to determine wild smolt prevalence in proximity to proposed new Cermaq Facility in Millar Channel. (See figure 1.)

Beach Seining in Bedwell Sound

At each location environmental data was obtained (Temperature, Dissolved Oxygen & Salinity) and in order to obtain data without harming the smolts, fish were held in photariums or Ziploc bags while they were identified, photographed and observations were made for the presence of sea lice. The numbers of smolts captured were documented and a target of 20 smolts were sampled from each seine.

Clayoquot Sound Wild Smolt Monitoring Program 2015



Legend

- Marine_sites
- Beach Seine Location

cermaq

Figure 1: Clayoquot Sound Wild Smolt Monitoring Stations

3.0 Results

2,572 smolts were captured by beach seine during the sample period and the results are presented in Appendix 1. This sample population consisted of 2,293 Chum, 238 Coho, 29 Chinook and 12 Sockeye salmon smolts. Where possible a target of 20 smolts from each seine were then inspected for the presence of sea lice and their length was measured.

A total of 259 specimens had their fork length measured and were inspected for the presence of sea lice. The results of these inspections are found in Tables 1 and 2. A summary of the environmental water conditions is found in Table 3.

A total of 57 smolts (22%) were found to be infected with sea lice during the sample period.

Table 1: Sea lice Infection rates on salmon smolts captured between April 16th and June 18th, 2015

Date	# Smolts sampled	# Smolts with Sea Lice	Abundance
30-April-2015	42	0	0
07-May-2015	48	6	0.13
14-May-2015	78	21	0.27
20-May-2015	63	26	0.41
28-May-2015	14	1	0.07
11-Jun-2015	14	3	0.21

Fig 2: Sea lice Infection rates on salmon smolts captured between April 16th and June 18th, 2015

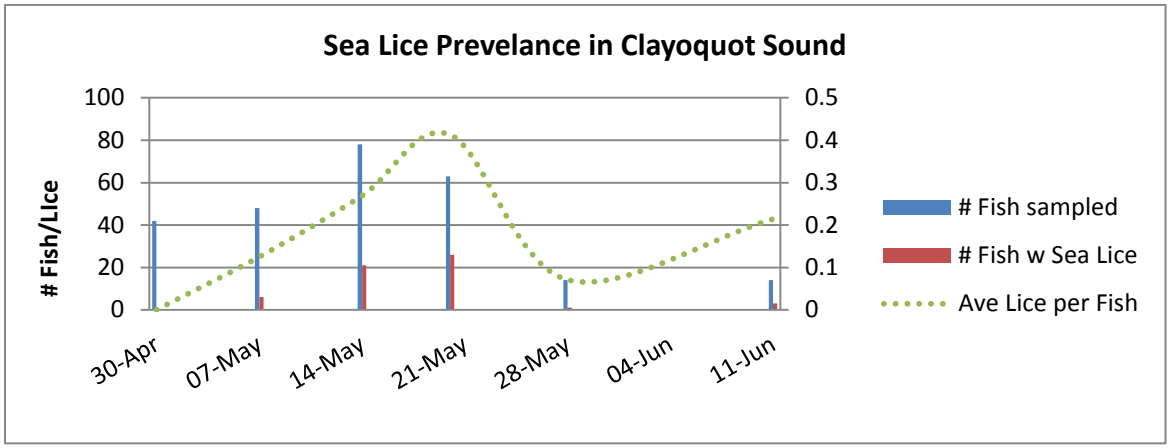
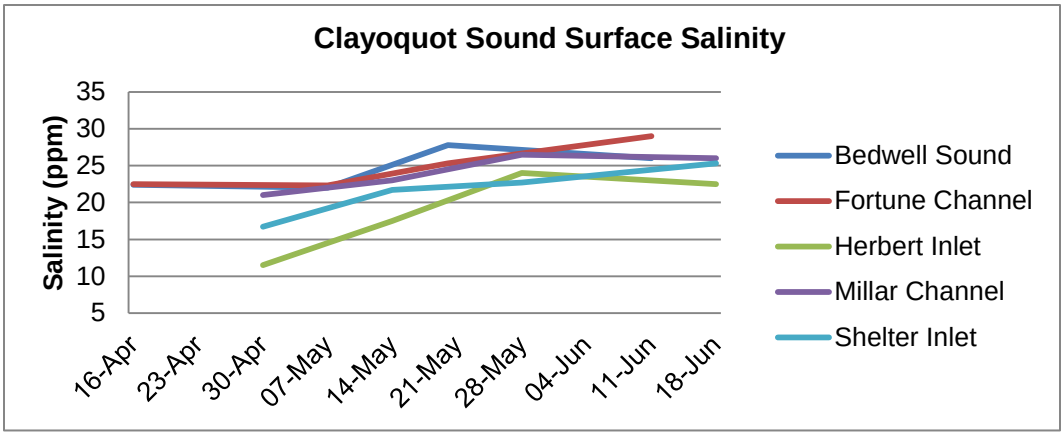


Table 2: Average length of smolts captured between April 16th and June 18th, 2015

Species	Length (mm)		
	Average	Median	St.Dev.
Chum	64.4	78	14.5
Coho	108.9	118	24.9
Chinook	73.75	64	19.2
Sockeye	87	110.5	23.3
Cutthroat Trout	80	80	-

Figure 3: Clayoquot Sound Salinity and Temperature (Surface)



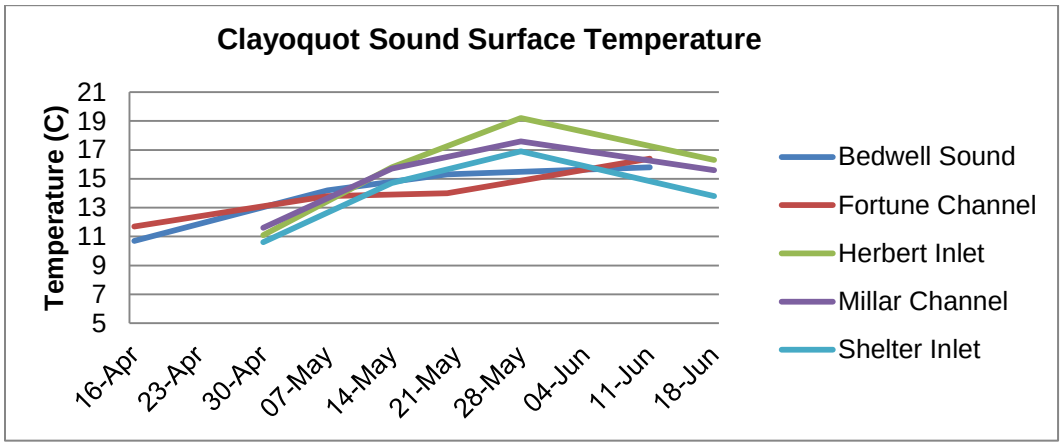
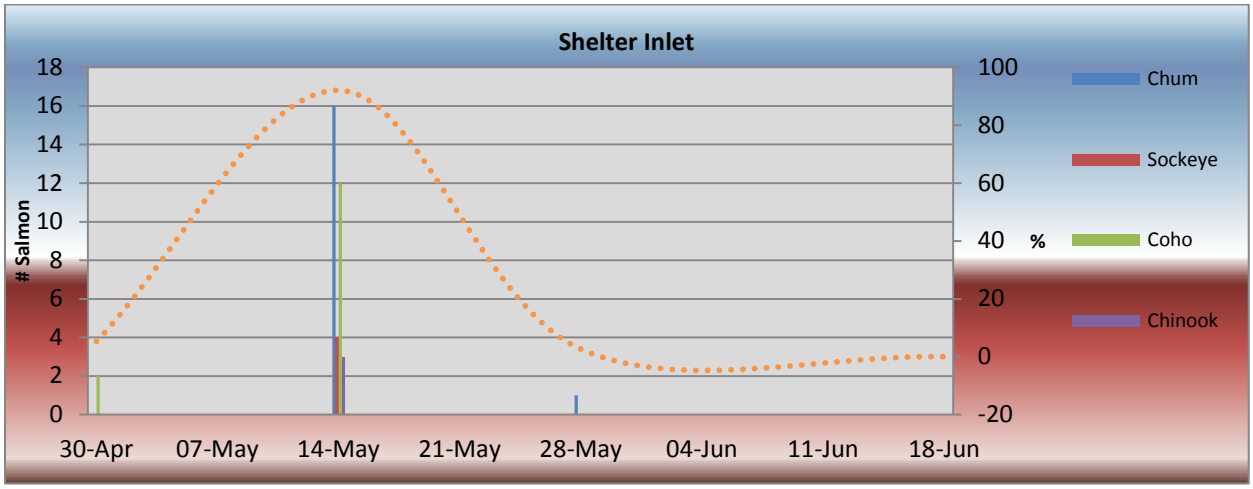
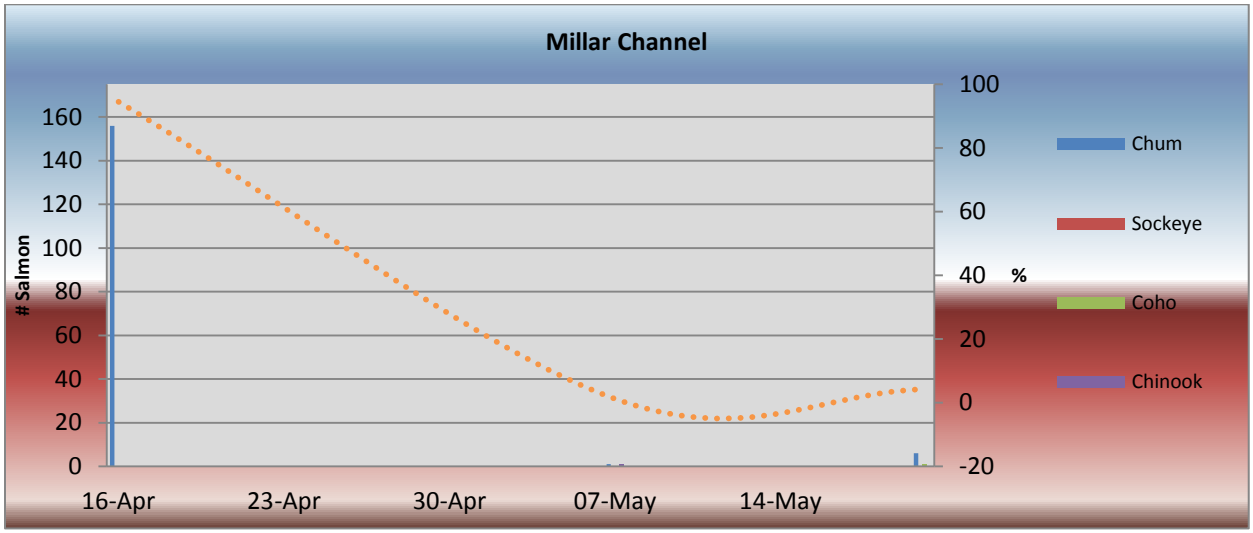
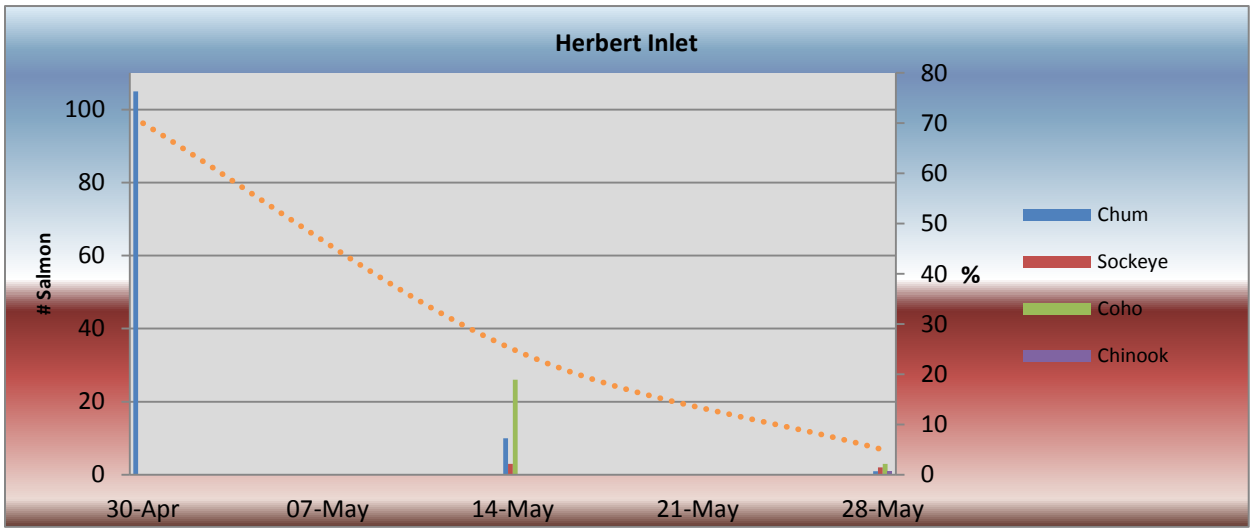
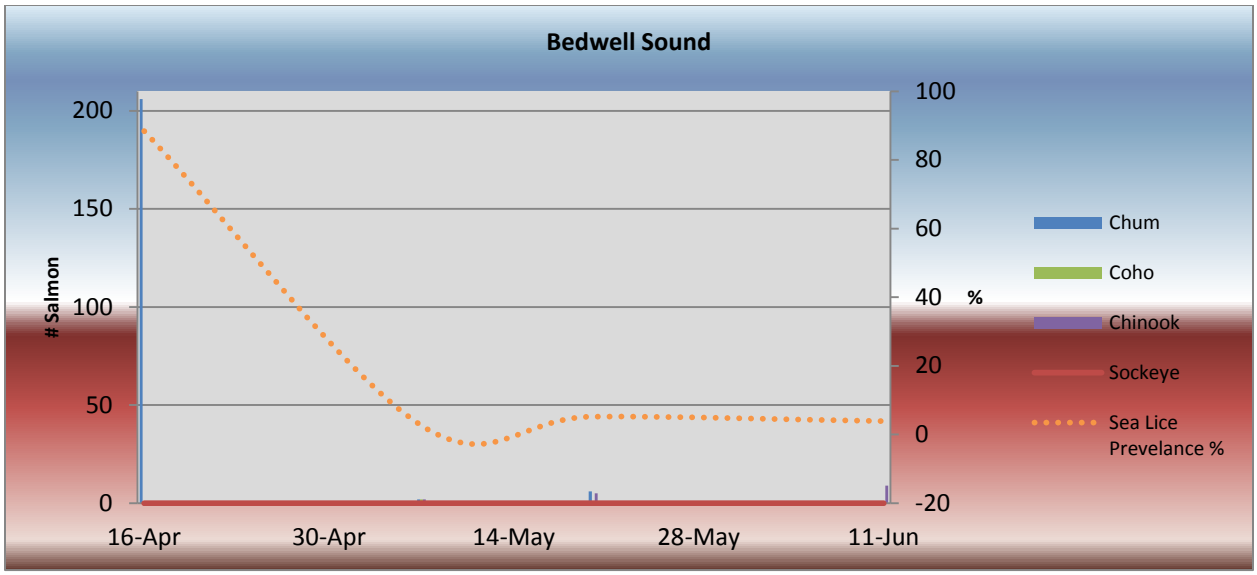


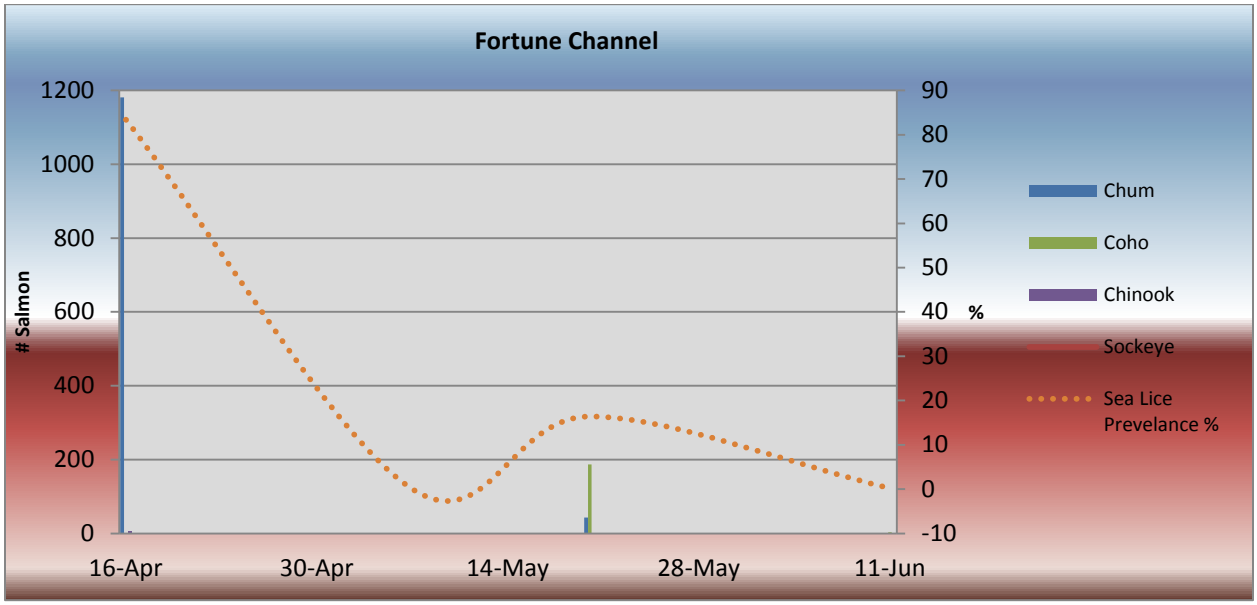
Figure 4: Wild Smolt and Sea Lice Distribution by Location








Bedwell Sound
Salmon
200
150
100
50
0
100
80
60
40
20
0
-20
%
16-Apr
30-Apr
14-May
28-May
11-Jun
Chum
Coho
Chinook
Sockeye
Sea Lice Prevelance %


Fortune Channel
Salmon
1200
1000
800
600
400
200
0
90
80
70
60
50
40
30
20
10
0
-10
%
16-Apr
30-Apr
14-May
28-May
11-Jun
Chum
Coho
Chinook
Sockeye
Sea Lice Prevelance %

Appendix 1: Individual Seine Data

Time and Location			Environmental Info				Salmonid Species Info				Sea Lice Data	
Date	Time	Sample Point	Temp	DO	Saturation	Salinity	Chum	Coho	Chinook	Sockeye	Number Inspected	Number with Lice
4/16/15	9:30:00 AM	BS 1	10.3	10.4	92	26						
4/16/15	9:45:00 AM	BS 3	10.1	10.4	93	21						
4/16/15	10:00:00 AM	BS 4	10.2	10.6	94	23	206					
4/16/15	12:00:00 PM	BS 5	10.1	10.5	93	17	57		1			
4/16/15	12:50:00 PM	FC 3	11.2	10.2	93	24						
4/16/15	1:30:00 PM	FC 1	11.5	10.4	95	23	1000 (est)					
4/16/15	2:00:00 PM	FC 2	11.5	10.8	99	22	17					
4/16/15	2:30:00 PM	FC 4	12.5	11	103	21	64	1	6			
4/16/15	3:35:00 PM	BS 6	12.7	11.4	107	25	417					
4/30/15	10:15:00 AM	SI 1	11	12.1	109	21						
4/30/15	10:40:00 AM	SI 2	10.3	12.2	108	19		1			1	0
4/30/15	11:15:00 AM	SI 3	10.4	12.1	107	10		1			1	0
4/30/15	11:50:00 AM	MC 1	11.5	11.8	108	19						
4/30/15	12:25:00 PM	MC 3	11.6	12.1	111	23	156				20	0
4/30/15	1:10:00 PM	HI 1	10.4	11.7	106	8	105				20	0
4/30/15	2:10:00 PM	HI 2	11.7	11.6	108	15						
5/07/15	10:14:00 AM	BS 1	13.1	12.8	123	25						
5/07/15	10:40:00 AM	BS 2	13.5	11.2	107	26						
5/07/15	11:05:00 AM	FC 3	12	11.2	104	23						
5/07/15	11:30:00 AM	FC 1	14.6	11.5	113	22						
5/07/15	12:01:00 PM	FC 2	14.3	10.3	100	23						
5/07/15	12:40:00 PM	FC 4	14.1	11.1	113	21						
5/07/15	1:20:00 PM	BS 5	14.1	11.7	114	22	31				22	0
5/07/15	2:05:00 PM	BS 4	15.1	11.3	112	19	2				2	0
5/07/15	2:35:00 PM	BS6	14	10.3	100	20	152				20	6
5/07/15	3:13:00 PM	BS 3	15.2	10.4	103	20		2	2		4	0
5/14/15	10:30:00 AM	SI 1	13.7	12.1	117	24	9				9	6
5/14/15	11:15:00 AM	SI 2	14.9	10.2	115	26		11		4	15	5
5/14/15	12:01:00 PM	SI 3	15.6	9.2	103	15	7				7	0
5/14/15	12:35:00 PM	MC 1	16.1	9.1	104	21	1				1	0
5/14/15	1:00:00 PM	MC 3	15.2	10.3	115	25	6	1			7	1
5/14/15	1:42:00 PM	HI 1	16.6	9.6	111	19	7	14			21	8
5/14/15	2:30:00 PM	HI 2	14.9	9.3	103	16	3	12		3	18	1
5/20/15	10:40:00 AM	FC 1	12.8	10.2	108	21	5	30		1	20	6
5/20/15	11:24:00 AM	FC 2	14.9	10.1	112	26		9		2	11	3
5/20/15	11:47:00 AM	FC 4	14.3	9.9	109	29	38	148			20	10
5/20/15	12:46:00 PM	BS 5	15.2	10.6	119	26						
5/20/15	1:20:00 PM	BS 4	16.6	10.5	121	30	2	1			3	3
5/20/15	2:00:00 PM	BS 6	16.2	9.8	112	30						
5/20/15	2:30:00 PM	BS 3	16.9	10.1	116	21	1		4		5	1
5/20/15	3:06:00 PM	BS 1	13.6	10.5	115	30	2		1		3	2
5/20/15	3:30:00 PM	BS 2	13.2	10.2	110	30	1				1	1
5/28/15	11:15:00 AM	SI 1	15.7	10.4	118	24	1				1	1
5/28/15	11:40:00 AM	SI 2	17.2	10	119	27						
5/28/15	12:10:00 PM	SI 3	17.8	9.8	118	17		1	3		4	0
5/28/15	12:52:00 PM	MC 1	17.7	10.9	128	25			1		1	0
5/28/15	1:20:00 PM	MC 3	17.4	10.8	129	28						
5/28/15	2:10:00 PM	HI 1	19.9	8.5	106	24	1				1	0
5/28/15	2:45:00 PM	HI 2	18.4	9.8	117	24	1	3	1	2	7	0
6/11/15	10:43:00 AM	BS 2	13.9	10.5	115	23			1		1	1
6/11/15	11:16:00 AM	BS 1	14.3	11.2	122	30						
6/11/15	11:44:00 AM	BS 3	15.7	11.2	120	27			9		9	1
6/11/15	12:30:00 PM	BS 4	17.1	10.8	126	25						
6/11/15	1:02:00 PM	BS 5	17.9	10	119	25	1				1	0
6/11/15	1:36:00 PM	BS 6	16.4	10.4	118	26						
6/11/15	2:05:00 PM	FC 3	15.8	10.1	113	29						
6/11/15	2:32:00 PM	FC 4	16.6	10.8	124	29		2			2	1
6/11/15	3:13:00 PM	FC 1	16.9	10.6	123	29		1			1	0
6/18/15	11:15:00 AM	SI 1	13.2	10	107	26						
6/18/15	11:35:00 AM	SI 2	13.2	10.2	109	29						
6/18/15	12:05:00 PM	SI 3	15.1	10.7	120	21						
6/18/15	12:39:00 PM	MC 1	15.1	11.1	124	27						
6/18/15	1:03:00 PM	MC 3	16	11.3	129	25						
6/18/15	1:42:00 PM	HI 1	16.4	10.5	120	21						
6/18/15	2:11:00 PM	HI 2	16.2	10.8	124	24						

Appendix 2: Fork Length

16-Apr-15

Species	Location	Fork Length (mm)
Chum	BS4	78
Chum	BS4	41
Chum	BS4	31
Chum	BS4	46
Chum	BS4	53
Cutthroat	BS5	81
Chinook	BS5	68
Chum	BS5	31
Chum	BS5	51
Chum	BS5	56
Chum	BS5	50
Chum	FC1	63
Chum	FC1	58
Chum	FC1	67
Chum	FC1	62
Chum	FC2	43
Chum	FC2	48
Chum	FC2	52
Chum	FC2	57
Chum	FC2	55
Chum	FC2	51
Coho	FC4	174
Coho	FC4	128
Coho	FC4	113
Coho	FC4	132
Coho	FC4	95
Coho	FC4	97
Coho	FC4	130
Coho	FC4	115
Chinook	FC4	82
Chum	BS6	47
Chum	BS6	63
Chum	BS6	59
Chum	BS6	57
Chum	BS6	34
Chum	BS6	61

30-Apr-15

Species	Location	Fork Length (mm)
Coho	SI2	79
Coho	SI2	96
Coho	SI3	94
Chum	MC3	54
Chum	MC3	54
Chum	MC3	43
Chum	MC3	64
Chum	MC3	50
Chum	HI1	45
Chum	HI1	58
Chum	HI1	50
Chum	HI1	45
Chum	HI1	43
Chum	HI1	45

07-May-15

Species	Location	Fork Length (mm)
Chum	BS5	47
Chum	BS5	38
Chum	BS5	52
Chum	BS5	47
Chum	BS5	45
Chum	BS4	30
Chum	BS4	74
Chum	BS6	75
Chum	BS6	70
Chum	BS6	66
Chum	BS6	45
Chum	BS6	71
Coho	BS3	93
Coho	BS3	103
Chinnok	BS3	43
Chinnok	BS3	37
Herring		146

14-May-15

Species	Location	Fork Length (mm)
Chum	SI1	44
Chum	SI1	57
Chum	SI1	56
Chum	SI1	56
Chum	SI1	60
Coho	SI2	137
Coho	SI2	190
Coho	SI2	120
Coho	SI2	180
Coho	SI2	132
Coho	SI2	140
Chum	SI3	61
Chum	SI3	64
Chum	SI3	57
Chum	SI3	60
Chum	SI3	54
Chum	MC1	52
Chum	MC3	51
Chum	MC3	45
Chum	MC3	52
Chum	MC3	49
Chum	MC3	51
Chum	MC3	57
Coho	MC3	102
Chum	HI1	51
Chum	HI1	75
Chum	HI1	56
Chum	HI1	58
Chum	HI1	71
Coho	HI1	85
Coho	HI1	91
Coho	HI1	95
Chum	HI2	97
Chum	HI2	81
Chum	HI2	80
Chum	HI2	95
Chum	HI2	96

20-May-15

Species	Location	Fork Length (mm)
Chum	FC1	72
Chum	FC1	81
Chum	FC1	78
Chum	FC1	85
Chum	FC1	76
Chum	FC1	78
Cutthroat	FC1	80
Coho	FC2	148
Coho	FC2	150
Sockeye	FC2	96
Sockeye	FC2	85
Chum	FC4	88
Chum	FC4	92
Chum	FC4	90
Chum	FC4	83
Chum	FC4	88
Chum	BS4	52
Chum	BS4	55
Chinook	BS3	42
Chinook	BS3	42
Chinook	BS3	49
Chinook	BS3	53
Chum	BS3	70
Chinook	BS1	79
Chum	BS1	64
Chum	BS1	56

28-May-15

Species	Location	Fork Length (mm)
Chum	SI1	58
Chinook	SI3	64
Chinook	SI3	68
Chinook	SI3	64
Coho	SI3	96
Chinook	MC1	98
Chinook	MC1	95
Chum	SI3	96
Coho	HI2	100
Coho	HI2	100
Coho	HI2	90
Sockeye	HI2	125
Sockeye	HI2	134
Chum	HI2	78
Chinook	HI2	98

11-Jun-15

Species	Location	Fork Length (mm)
Chinook	BS2	100
Chinook	BS3	67
Chinook	BS3	62
Chinook	BS3	73
Chinook	BS3	63
Chinook	BS3	55
Chum	BS5	48
Coho	FC4	130
Coho	FC4	118
Coho	FC1	150

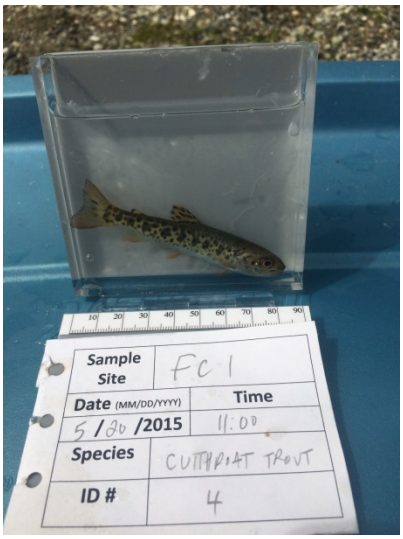
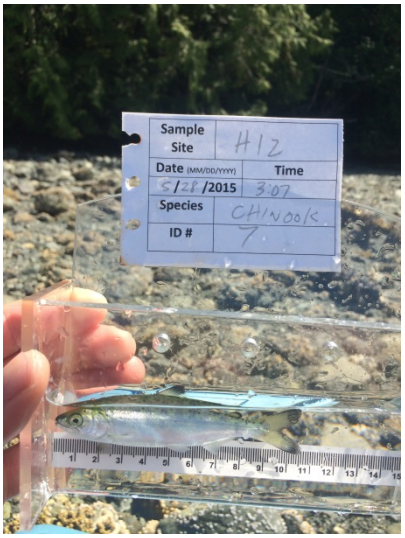
Appendix 3: Water Quality Summary in Clayoquot Sound

Bedwell Sound			
	Temp ^{o}C	Mean D.O (ppm)	Mean Salinity (ppm)
16-Apr	10.7	10.66	22.4
07-May	14.2	11.28	22
20-May	15.3	10.28	27.8
11-Jun	15.8	10.68	26

Fortune Channel			
	Temp ^{o}C	Mean D.O (ppm)	Mean Salinity (ppm)
16-Apr	11.7	10.6	22.5
07-May	13.8	11	22.3
20-May	14	10	25.3
11-Jun	16.4	10.5	29

Herbert Inlet			
	Temp ^{o}C	Mean D.O (ppm)	Mean Salinity (ppm)
30-Apr	11.1	11.7	11.5
14-May	15.8	9.5	17.5
28-May	19.2	9.2	24
18-Jun	16.3	10.7	22.5

Millar Channel			
	Temp ^{o}C	Mean D.O (ppm)	Mean Salinity (ppm)
30-Apr	11.6	11.95	21
14-May	15.7	9.7	23
28-May	17.6	10.9	26.5
18-Jun	15.6	11.2	26

Shelter Inlet			
	Temp ^{o}C	Mean D.O (ppm)	Mean Salinity (ppm)
30-Apr	10.6	12.1	16.7
14-May	14.7	10.5	21.7
28-May	16.9	10.1	22.7
18-Jun	13.8	10.3	25.3

Appendix 4. Sample of Photarium photographs