



## **SHELLY CREEK COHO SMOLT TRAP REPORT - 2017**



**Prepared for Mid Vancouver Island Habitat Enhancement Society**

**Prepared by Barb Riordan**

**March 2018**

## **Table of Contents**

<b>Abstract.....</b>	<b>1</b>
<b>Introduction.....</b>	<b>2</b>
<b>Methods.....</b>	<b>2</b>
<b>Results.....</b>	<b>3</b>
<b>Discussion.....</b>	<b>6</b>
<b>Recommendations.....</b>	<b>9</b>
<b>Acknowledgements.....</b>	<b>9</b>
<b>References.....</b>	<b>9</b>

## **List of Figures**

<b>Figure 1. 2017 Daily Inventory at Shelly Creek .....</b>	<b>4</b>
<b>Figure 2. Fork Lengths of Coho Smolt in 2017.....</b>	<b>5</b>
<b>Figure 3. Daily Temperatures and Rainfall in Shelly Creek .....</b>	<b>6</b>
<b>Figure 4. Real-Time Hydrometric Data Graph for ENGLISHMAN RIVER – January 01 to May 31 2017.....</b>	<b>8</b>

## **List of Tables**

<b>Table 1. Comparison of Coho Smolt and Trout Numbers by Year.....</b>	<b>6</b>
<b>Table 2. Average Monthly Air Temperatures (°C) and Total Monthly Precipitation (mm) from Environment Canada Weather Station at Qualicum Beach Airport.....</b>	<b>7</b>
<b>Table 4. Comparison of Coho Smolt Fork Lengths in 2015 and 2016.....</b>	<b>8</b>

## **Appendices**

- Appendix I. Juvenile Salmonid Data Sheet**
- Appendix II. 2017 Shelly Creek Smolt Trap Data**

## **Abstract**

A Coho smolt study was conducted between March 25 and May 25, 2017 in Shelly Creek located in Parksville, BC. The objectives of the study were to monitor the number of Coho smolts migrating from Shelly Creek into the Englishman River.

A total of 1796 fish were captured by the smolt trap of which 755 were Coho smolts and 153 were trout (Cutthroat and Rainbow). Despite operating the trap 30 days more than in 2016, the number of smolts counted was significantly lower than that in 2016 when 4,313 smolts were captured. The catch for trout was comparable to 2016.

During the trap operations in 2017, heavy rainfall in late March and April caused the water level in the creek to rise, resulting in peak flows that bypassed around the trap. Fish avoidance could account for the low count of Coho smolts in trap operations in 2017. We can also conclude that flooding flows influenced the count of 153 trout, some of which could have easily bypassed the trap and were not counted. A higher estimate of trout leaving Shelly Creek, would mean that 2017 was an exceptional year for trout, since the number captured in the trap was comparable to 2016 when there was no flow bypass.

## **Introduction**

Coho smolt migration studies were conducted in Shelly Creek during the spring of 2011, 2012, 2013, 2015 and 2016 (Riordan, 2016) to learn the extent of the smolt and trout utilization of lower Shelly Creek, and increase public awareness and stewardship of the creek system.

In April 2017, another smolt trap study was conducted to complement previous assessments. The project was funded through the D.F.O. public involvement program with support from D.F.O. community advisor, Dave Davies. Support was also provided by the Qualicum Beach Streamkeepers Society, M.V.I.H.E.S. (Mid Vancouver Island Habitat Enhancement Society), and the Castaways club.

The objective of the study is to monitor the number of Coho smolt migrating through the spring period from Shelly Creek to the Englishman River.

## **Methods**

On 24 March 2017, a smolt trap was installed in Shelly Creek in the same location and configuration as previous smolt trap studies. The trap was installed two weeks earlier than in 2016 to ensure the beginning of the smolt migration was captured.

Sampling methods and data collection were the same as the studies conducted from 2011 – 2016. The trap box was checked daily by teams of volunteers. Daily inventory and fork lengths were recorded for Coho smolt on a Juvenile Salmonid Data Sheet (Appendix 1). A random selection of 10 Coho were measured to the closest mm fork length for every 100 Coho smolts counted. These daily records of Coho measurements are located on the MVIHES Google Drive.

Daily inventory was also recorded for Rainbow and Cutthroat trout, sculpin and stickleback. Water level and temperature data were also collected.

The smolt trap was decommissioned on May 25 to avoid stressing the fish (caused by warm water temperatures and low stream flows). The size of the fish indicated that Coho fry were being captured, as opposed to smolts, which appeared to be stressed by the trap.

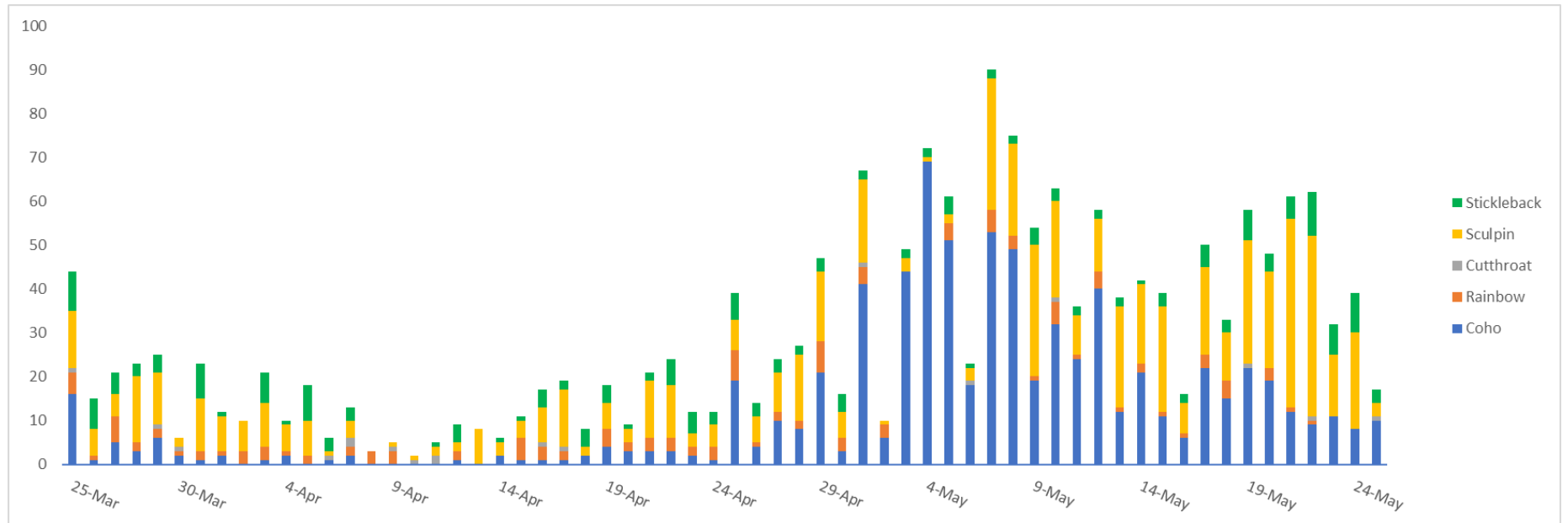
Daily rainfall data and average monthly air temperature was acquired from the Environment Canada Weather Station at the Qualicum Beach Airport .

# Results

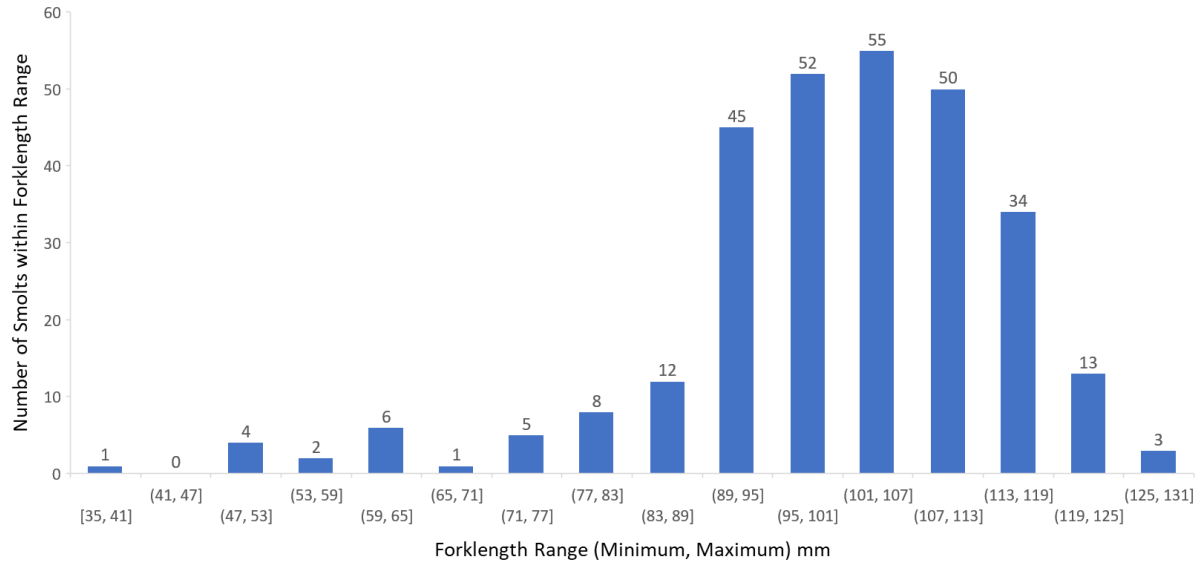
## Fish Sampling

Total fish counted during the 63 days of trap operation was 1796. Daily counts of fish and species are found in Appendix II. Total count for Coho smolts was 755, and 153 for trout (Cutthroat and Rainbow). Other fish species sampled included Stickleback and Sculpin. The highest daily count of Coho smolt was 69 on May 4<sup>th</sup> (Figure 1). The number of smolts is significantly less than in 2016 when 4,313 smolts were counted.

**Figure 1. 2017 Shelly Creek Inventory**



**Figure 2. Fork Lengths of Coho Smolts in 2017**

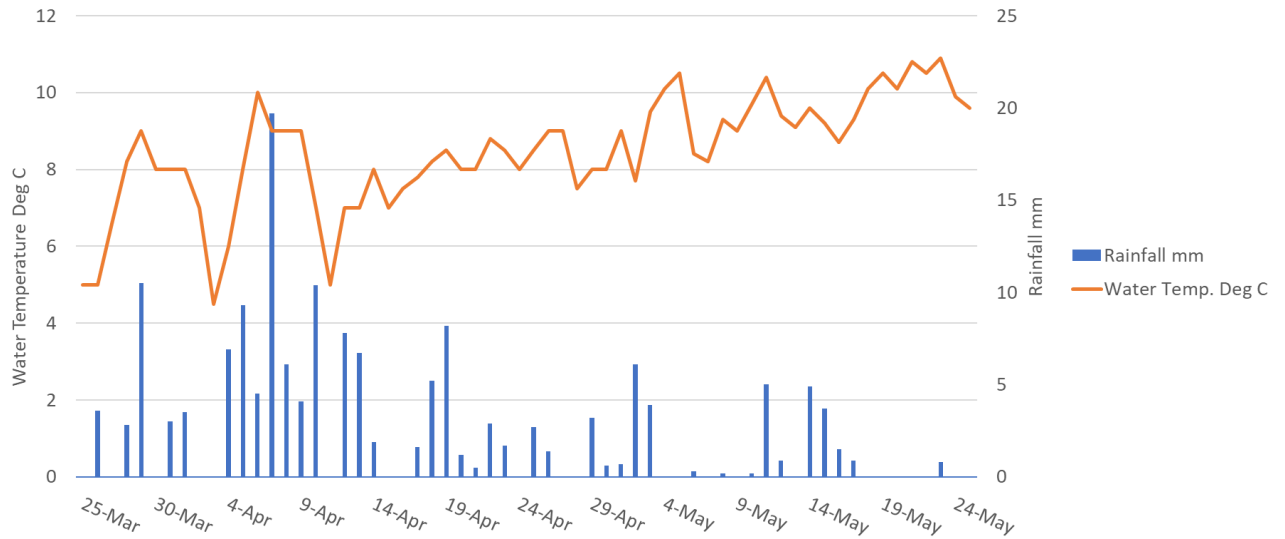


In 2017, fork lengths were measured on 291 Coho smolts and grouped into fork length ranges (Figure 2). Fork lengths range between 35 and 131 mm, with 95% being within a normal distribution of 71 to 131 mm. The range with the highest number of smolts (N=55) is 101 to 107 mm. The average fork length is 101 mm.

#### Stream Conditions during Downstream Trapping

Rainfall records from the Qualicum airport show heavy rainfall at the end of March and throughout April (Figure 3). These wet conditions caused the water level in the creek to rise to a point where a portion of the creek flow bypassed the trap for most of April. Sandbags could have been installed to stop flow from bypassing the smolt trap however, this may have caused the water level to rise high enough to prevent access to the smolt counting box.

**Figure 3. Daily Water Temperatures and Rainfall in Shelly Creek 2017**



In the 2016 smolt study it was suggested that a consistent water temperature of 8.5 °C (or greater) triggered the migration of smolt out of the creek (Riordan 2016). During the spring of 2017, water temperatures did reach (or exceed) 8.5 °C on a few days in the first three weeks of operation, however consistent water temperatures of 8.5 °C and greater did not occur until after April 18th.

## Discussion

### Comparison of Fish Migration Results

Coho smolt and trout numbers for 2017 and 2016 are compared in Table 1.

**Table 1. Comparison of Coho Smolt and Trout Numbers by Year**

YEAR	NUMBER OF SMOLT	NUMBER OF TROUT	TRAP DATES
2016	4313	69	April 8 – May 10
2017	755	153	March 25 – May 25

The number of Coho smolts counted in 2017 is significantly lower than in 2016, even though the trap was in operation an extra 30 days (having been installed 15 days earlier and removed 15 days later than the 2016 operation).

The number of trout in 2017 was more than twice that counted in 2016. A comparison of the number of trout caught per day between 2016 and 2017 shows trout catch was nearly the same between years: 2.0 trout per day in 2016 and 2.4 trout per day in 2017.



The higher total number of trout in 2017 is probably due to the trap being in operation for a longer period of time.

### Comparison of Weather Conditions

A comparison of climate (winter/spring) conditions during the last four years shows that 2017 was the coldest and wettest (Table 2).

**Table 2. Average Monthly Air Temperatures (°C) and Total Monthly Precipitation (mm) from Environment Canada Weather Station at Qualicum Beach Airport**

	Average Daily Temperature °C				Total Precipitaion mm			
	2013	2015	2016	2017	2013	2015	2016	2017
January	2.6	5.0	3.7	2.2	27.2	94.8	160.2	43.9
February	4.9	7.3	5.6	2.1	42.3	125.0	98.9	117.7
March	6.4	7.4	7.6	5.4	56.5	50.4	155.7	78.4
April	8.7	8.5	10.9	8.0	37.2	16.4	20.1	110.0
May	12.5	14.9	14.0	12.5	63.7	5.3	17.2	30.1

The cooler and wetter spring months explains the delay in water temperatures reaching a consistent temperature of 8.5 °C. Three to five times the amount of precipitation fell in April 2017 than in the other 3 years.

### Factors that Influence Smolt Counts

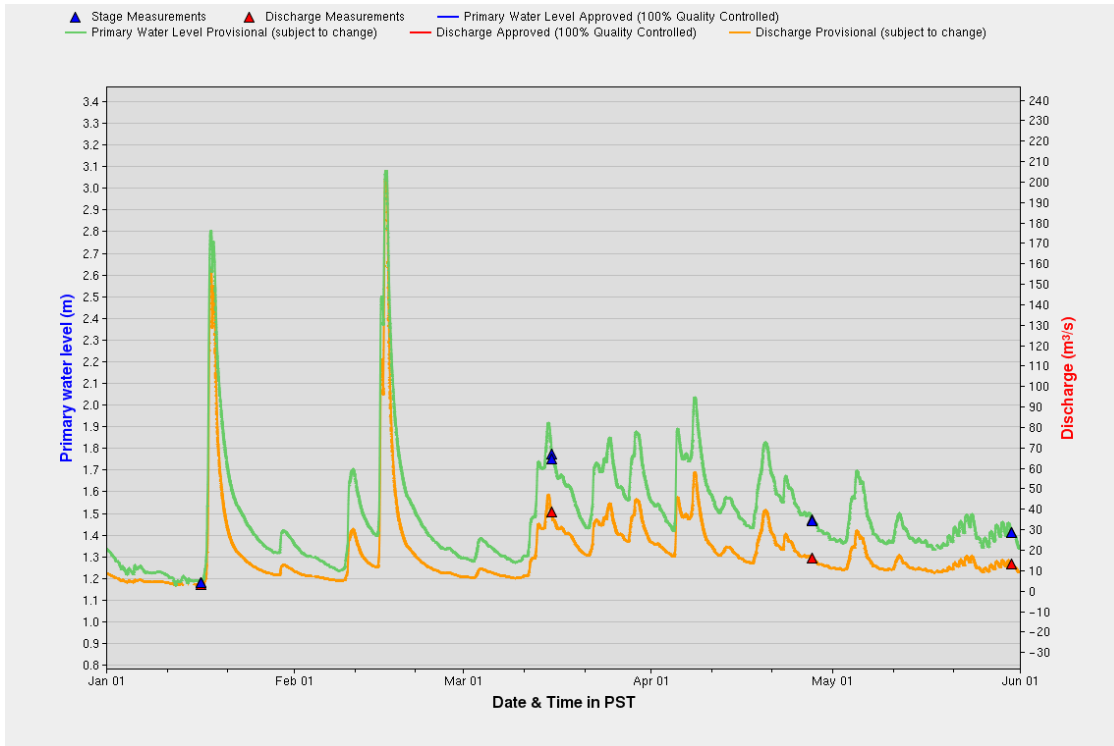
The very low number of Coho smolts counted in 2017 may be due to smolts bypassing the trap in high flows. It is interesting that the number of trout captured in the smolt trap in 2017 was comparable to 2016, despite the bypass. If a significant portion of the fish populations bypassed the trap, it can be assumed the actual number of trout present in the creek would have been significantly higher than 2.4 trout/day. If this was the case, then 2017 was an exceptional year for trout in comparison to other years.

A second reason for the low count could be that significantly fewer coho smolts and fry entered Shelly Creek over the winter months. Smolts migrating downstream in 2017 would have originated from the fall 2015 Coho salmon spawn. Salmon counts conducted in the Englishman River in 2015 indicated abundance of Coho spawners was slightly higher than average and above expectations (Fisheries and Oceans, 2016). If there was a reduction in abundance of Coho smolts, it was not due to a reduction in returning spawners.

According to the readings from the Water Survey of Canada hydrometric station located on the Englishman River, the river experienced flood events in winter that would have caused Coho smolts and fry to seek refuge in Shelly Creek, as in previous years (Figure

4). The reduction in the number of smolts was not due to a lack of high water levels in the river during winter.

**Figure 4. Real-Time Hydrometric Data Graph for ENGLISHMAN RIVER NEAR PARKSVILLE (08HB002) [BC] – January 01 to May 31 2017.**



Source: Environment Canada

Regardless of the reason for the low smolt count in 2017, the smolt population appeared to be as healthy as the 2016 population based on fork length data. Table 3 shows fork length ranges, distribution and means were very similar in both years, whereas the smolts captured in 2015 were smaller. The smaller size of the 2015 smolts may have been the result of poor conditions in the creek caused by low oxygen levels and high water temperatures in the spring (Riordan, 2016).

**Table 3. Comparison of Coho Smolt Fork Lengths**

	Normal Distribution mm	Mean mm	Range with most fish mm
2015	59 - 118	89	84 - 88
2016	70 - 129	101	99 - 104
2017	71 - 131	101	101 - 107

## Recommendations

1. Shelly Creek should continue to be considered an important Coho salmon and trout producer and be protected from impacts of development and urbanization.
2. A smolt trap study should be conducted in 2018 to monitor the health of the Coho and trout smolt populations.
3. Water levels permitting, the smolt trap should be installed before the water temperature reaches 8.5 °C.

## Acknowledgements:

The Mid Vancouver Island Habitat Enhancement Society and DR Clough Consulting would like to thank volunteers: Pat Vek, Carl Rathburn, Allan (Mickey) McDonald, Peter Law, Elaine Lefebvre, Don Lyster, Shelley Goertzen, Brian Onushko, David Rogers, Don Brown, Gary Fisher, Jim Price, Keith Thompson, Rick Whiting, Terry Martin, Tom Porter, Wilfred Worland, Barb Riordan, for making this project possible.

## References:

- Fisheries and Oceans Canada. Strait of Georgia Salmon Escapement 2015, Final [Riordan, B. 2016. Shelly Creek Smolt Trap 2016. A report sponsored by MVIHES](#)
- Walshe, P. 1999. Shelly Creek Urban Salmon Habitat Assessment. A Report sponsored by MVIHES and City of Parksville.

## Appendix I

<b>JUVENILE SALMONID DATA SHEET</b>
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<b>Location</b> Shelly Creek/Martindale Rd	<b>Date</b>
<b>Observers</b>	<b>Page</b> of
<b>Start Time</b>	<b>Stop Time</b>
<b>Water Temp.</b>	<b>Water Level</b>
<b>Air Temp.</b>	
<b>Remarks and Observations</b>	

Species	Coho			Other species
	Length Tally	Weight	Tally (unmeasured)	Tally (unmeasured)
1			1	Trout
2			2	
3			3	
4			4	Cutthroat Trout
5			5	
6			6	
7			7	Sculpin
8			8	
9			9	
0			0	Stickleback
1			1	
2			2	
3			3	Frogs
4			4	
5			5	
6			6	Crayfish
7			7	
8			8	
9			9	
0			0	

## Appendix II

### 2017 Shelly Creek Smolt Trap Data

Date	Coho Salmon	Rainbow Trout	Cutthroat Trout	Sculpin	Stickleback	Total Fish	Air Temp °C	Water Temp °C	Water Level m
25-Mar	16	5	1	13	9	44	9	5	0.29
26-Mar	1	1	0	6	7	15	8	5	0.27
27-Mar	5	6	0	5	5	21	6.6	6.6	0.27
28-Mar	3	2	0	15	3	23	7.7	8.2	0.25
29-Mar	6	2	1	12	4	25	8	9	0.325
30-Mar	2	1	1	2	0	6	8	8	0.3
31-Mar	1	2	0	12	8	23	8	8	0.27
1-Apr	2	1	0	8	1	12	8	8	0.3
2-Apr	0	3	0	7	0	10	6	7	0.28
3-Apr	1	3	0	10	7	21	3	4.5	0.26
4-Apr	2	1	0	6	1	10	7	6	0.25
5-Apr	0	2	0	8	8	18	9	8	0.44
6-Apr	1	0	1	1	3	6	9	10	0.35
7-Apr	2	2	2	4	3	13	9	9	0.38
8-Apr	0	3	0	0	0	3	9	9	0.43
9-Apr	0	3	1	1	0	5	9	9	0.35
10-Apr	0	0	1	1	0	2	7	7	0.35
11-Apr	0	0	2	2	1	5	7	5	0.375
12-Apr	1	2	0	2	4	9	7	7	0.35
13-Apr	0	0	0	8		8	8	7	0.44
14-Apr	2	0	0	3	1	6	7	8	0.35
15-Apr	1	5	0	4	1	11	7.8	7	0.35
16-Apr	1	3	1	8	4	17	9	7.5	0.3
17-Apr	1	2	1	13	2	19	9	7.8	0.29
18-Apr	2	0	0	2	4	8	8	8.2	0.29
19-Apr	4	4	0	6	4	18	9.2	8.5	0.3
20-Apr	3	2	0	3	1	9	9	8	0.3
21-Apr	3	3	0	13	2	21	9.2	8	0.31
22-Apr	3	3	0	12	6	24	9.7	8.8	0.29
23-Apr	2	2	0	3	5	12	9.4	8.5	0.29
24-Apr	1	3	0	5	3	12	9	8	0.3
25-Apr	19	7	0	7	6	39	10.5	8.5	0.25
26-Apr	4	1	0	6	3	14	9	9	0.25
27-Apr	10	2	0	9	3	24	9	9	0.25
28-Apr	8	2	0	15	2	27	10.9	7.5	0.24
29-Apr	21	7	0	16	3	47	8.4	8	0.23

30-Apr	3	3	0	6	4	16	8.3	8	0.23
1-May	41	4	1	19	2	67	8.4	9	0.21
2-May	6	3	0	1	0	10	8.4	7.7	0.21
3-May	44	0	0	3	2	49	12.5	9.5	0.21
4-May	69	0	0	1	2	72	12	10.1	0.25
5-May	51	4	0	2	4	61	13.9	10.5	0.23
6-May	18	0	1	3	1	23	9	8.4	0.22
7-May	53	5	0	30	2	90	11	8.2	0.2
8-May	49	3	0	21	2	75	10.5	9.3	0.2
9-May	19	1	0	30	4	54	13.4	9	0.2
10-May	32	5	1	22	3	63	12.1	9.7	0.19
11-May	24	1	0	9	2	36	12.2	10.4	0.19
12-May	40	4	0	12	2	58	8.9	9.4	0.19
13-May	12	1	0	23	2	38	11.7	9.1	0.18
14-May	21	2	0	18	1	42	10.4	9.6	0.19
15-May	11	1	0	24	3	39	9.4	9.2	0.19
16-May	6	1	0	7	2	16	7.7	8.7	0.19
17-May	22	3	0	20	5	50	10	9.3	0.19
18-May	15	4	0	11	3	33	12.9	10.1	0.19
19-May	22	0	1	28	7	58	11.9	10.5	0.19
20-May	19	3	0	22	4	48	12.2	10.1	0.18
21-May	12	1	0	43	5	61	13	10.8	0.18
22-May	9	1	1	41	10	62	14.7	10.5	0.18
23-May	11	0	0	14	7	32	14	10.9	0.18
24-May	8	0	0	22	9	39	11.2	9.9	0.18
25-May	10	0	1	3	3	17	11.1	9.6	0.18
<b>Total</b>	<b>755</b>	<b>135</b>	<b>18</b>	<b>683</b>	<b>205</b>	<b>1796</b>			