Commentary on our big day out February 5ᵗʰ 2015

This was our first feb data day. Dr Jonathan Kim and myself ventured out on the day to collect samples and make observations.

What was the day like?

Air temperature was 14 ℃, it was cool day with a building W/SW wind. At our first sites #81/2 the wind was gusty about 10knots but by the time we moved to #85, the wind was gusting around 25 knots and the conditions were very difficult in exposed positions. The wind continued to build. 50% ccv early in the day, the sky was quite overcast 100% ccv by 1.00.

There was a lesson about our clip boards and sheets of paper. I lost all the data sheets off the end of the Ravensbourne Boat club wharf!! The rest of the data was written on the back of a hand or the solid and reliable note book.

** Recommend we purchase proper field note books!!! Water proof

Tide and harbour conditions.

All observations and sample collection occurred between 0940 and 1340. Low water at Dunedin was at 1230. All samples and observations were carried out between mid tide and close to low water.

41 mm of rain has fallen over the last 10 days. There would have been extra point and non point freshwater/storm water flowing into the harbour.

Water flow from the Leith was normal, about 0.38 cumecs. This is close to the median flow.

Is there anything unusual ?

Gathering the samples on a choppy day does need some thought. Some collectors got very wet, waves up to 30-50 cms were running down the harbour.

Seaweeds.

No data

Animals

No data

Conditions of the surface water and does the water have any real or apparent colour?

It was very challenging conditions to do the monitoring in exposed positions. The surface became progressively rougher. Early there were small waves being swept down the harbour, these developed into reasonable waves and white caps. The surface had no unusual colours but the clarity deteriorated as the day progressed.

Water temperature

The water temperature ranged from.11.7 ℃ (#88) – 16.4 ℃ (#86). Many readings around 15.5 ℃. The water temperatures are noticeably warmer than Dec 13ᵗʰ. The temperature pattern is uniform about the sites.

14.6 ℃ at PML. (Portobello Marine Lab)

[Dec 13ᵗʰ 10.9 ℃ (#89) – 12.9 ℃ (#85).]

Salinity

At the head of the harbour 33.1 (#84) -34.00 ppt (#87) . The pattern is normal, it is still tricky measuring the salinity at the mouth of the Leith, as the freshwater mixes with the seawater.
[Dec 13th 33.8 (#810)-34.21 ppt (#85)]
Open sea salinity 34.998 ppt!!!
Salinity readings more accurate.

pH
All sites tested. Range was 7.42 (#83) – 8.35 (#88)
The values favoured pH values slightly less than on Nov . More acidic ???
[Nov 22nd 7.84 (#85) – 8.16 (#86)]

Turbidity
All sites tested. Range was 1.57 NTU (#85) – 46.5 NTU (#89).
The values are higher than usual due to the strong wind mixing sediment with the water column. The colour of water at #87 (Mac bay marina), was khaki and the turbidity high compared with other times for this site.

*** Why is turbidity important?? .*
 Light is essential for photosynthesis, increased turbidity will inhibit PS deeper in the water column. Increased surface area will increase the solubility of nutrients?especially phosphates/heavy metals. Presence of significant amounts of fine particles in the water column will act against filter feeders!!, may block up their siphons/filters.

Guideline values </= 5.6 NTU ANZECC&ARMCANZ (2000)
5 sites   #81/2/3/4/6/7/8/9 exceeded this value

Dissolved oxygen (DO) mg L^{-1} and % saturation.
The range of DO readings shows a range from a limited range of sites 7.61 mg L^{-1} (#810)- 11.53 (#88) mg L^{-1}
Some of the open water sites have high concentration of dissolved oxygen.
% saturation range 91.7% (#87) – 107.6 % (#86)
Similar range and values for Dec 13th . The water was well oxygenated and saturated with oxygen.
All sites have DO concentrations that will support as healthy biological community.
[Dec 13th 7.78 mg L^{-1} (#87)- 11.04 (#86) mg L^{-1} and 90.3% (#87) – 108.5 % (#84)]

Chlorophyll a.
Range 0.77 µg/L (#82) – 13.59 µg/L (#89)
The readings are similar to Dec 13th, being in the low to medium values. Higher readings were noted at #87 (macbay marina), a localised and small bloom ?? and #89 (Somerville's creek)

Values above 5.0 are classified in estuaries as a matter for concern, possible algal blooms???

 [Dec 13th 1.09 µg/L (#84) – 4.08 µg/L (#85)]

LOW ENVIRONMENTAL HEALTH CATEGORY for open water

0-2 (µg L^{-1}) low
>2-5 medium
>5-10 high
>10 very high

DRP (dissolved reactive phosphate)

Range of 0.47 µmol L^{-1}(#81/2) – 1.38 µmol L^{-1} (#88).
All the values are similar to Dec 13th concentrations.
This supports the idea that the sediment is a reservoir of phosphorus, when the sediment particles are suspended in the water more phosphorus is liberated into the water column.

#88/9 exceeded   Guideline values. !!!**.**

 [Dec 13th 0.30 µmol L^{-1}(#81/2/3) – 1.48 µmol L^{-1} (#89).]

GUIDELINE value 0.97 µ mol L^{-1} (= 0.0301 mg P L^{-1})
HIGH ENVIRONMENTAL HEALTH CATEGORY
** We need to be careful with the prep of the mixed reagent, at the first attempt, colour looked good, reaction occurred but the readings kept climbing, suggesting the reaction was continuing.

NNN (total dissolved nitrates and nitrites)

Variable readings from different sites.
0.82 (#85) – 6.50 µmol L^{-1}(#84) Open water sites
8.72 µmol L^{-1}(#86) – 13.69 µmol L^{-1}(#88) Storm water 31.54 µmol L^{-1}(#89) Somervilles
NNN concentrations at open water sites are higher than Dec 13th and lower compared with mid winter values.
The sites that are discharging water into the harbour have lower NNN than Dec 13th levels.
Is this a seasonal pattern ?

Assume that more NNN being utilised by the phytoplankton. Chloro a levels are low reflecting the low concentration of nutrients. ?? Hypothesis.
The phytoplankton will draw down the NNN in the water, is there biological activity developing in the harbour??

[Dec 13th BDL (#87) – 0.87 µmol L^{-1}(#84) Open water sites
5.8 µmol L^{-1}(#86) – 7.8 µmol L^{-1}(#88) Storm water 16.52 µmol L^{-1}(#89) Discharge sites]

#88/89 exceed guidelines.
GUIDELINE value 11.3 µ mol L^{-1} (=0.158 mg N L^{-1})
LOW/MED ENVIRONMENTAL HEALTH CATEGORY !!!!!!

Enterococci

 No data gathered on Feb 5th.

Guideline value 140 cells per 100mL of sample indicated *Enterococci* bacteria

SUMMARY OF DATA.

DATE: **05/02/2015**

What is the weather like? • *Air temperature* • *Wind speed and direction* • *Cloud cover*	
What is the time, and what stage is the tide? *What is the condition of the Leith ?* *Check websites (Met service and Port otago)*	
Is there anything unusual to report (dead crabs, nasty smell, coloured sheen on the water)? • **Discharge pipes** • **Any star fish/other animals ??** • **Rubbish or litter.**	
• ***Special seaweeds***	

	f=few	See data sheets
	s=some	
	m=many	
Animals		See data sheets
What condition is the surface of the water?		
Does the water have any real, or apparent colour?		

Understanding Estuarine Processes

SITE: _____ DATE:

What is the water temperature ?	#81+2	_
	#82	_
	#83	_
	#84	_
	#85	15.5
	#86	16.4
	#87	15.7
	#88	11.7
	#89	14.2
	#810	15.4
		°C

What is the salinity of the sample ?	#81+2	33.90	
	#82	33.90	
	#83	33.80	
	#84	33.10	
	#85	33.70	
	#86	33.80	
	#87	34.00	
	#88	0.80	
	#89	7.04	
	#810	33.90	
			ppt
What is the electrical conductivity of the sample ? ***NOTE: record the first conductivity, this is the actual conductivity at this temperature, the next reading is the specific conductance, the conductivity adjusted by the instrument to 25 ° C***	#81+2	40.686	
	#82	40.970	
	#83	40.958	
	#84	40.529	
	#85	42.035	
	#86	42.961	
	#87	42.464	
	#88	1.018	
	#89	9.706	
	#810	40.968	
			mS/cm
What is the pH of the sample ?	#81+2	7.51	
	#82	7.49	
	#83	7.42	
	#84	7.63	
	#85	7.51	
	#86	7.83	
	#87	7.7	
	#88	8.35	
	#89	7.7	
	#810	7.65	
What is the water turbidity?	#81+2	4.92	
	#82	4.3	
	#83	3.56	
	#84	8.63	
	#85	1.57	
	#86	3.38	

	#87	24.9
	#88	13.8
	#89	46.5
	#810	9.11
		NTU
What is the oxygen concentration of your sample *? Measure both methods mg/L and % saturation*	#81+2 _ #82 _ #83 _ #84 _ #85 7.87 #86 8.76 #87 8.18 #88 11.53 #89 9.27 #810 7.61 mg/L #81+2 _ #82 _ #83 _ #84 _ #85 96.1 #86 107.6 #87 100.8 #88 106 #89 94 #810 91.7 % saturation	
What is the chlorophyll a concentration of the sample ? • ***Record the volume of water filtered***	#81+2 1.14 #82 0.77 #83 0.71 #84 2.05 #85 2.14 #86 2.05 #87 5.74 #88 2.91 #89 13.59 #810 1.53 µg/L 0-2 low >2-5 medium	

	>5-10 high >10 very high
****NNN	#81+2 1.93 #82 1.86 #83 4.06 #84 6.50 #85 0.82 #86 8.27 #87 1.88 #88 13.96 #89 31.54 #810 1.96 µmol/L
****DRP	#81+2 0.47 #82 0.48 #83 0.59 #84 0.59 #85 0.63 #86 0.85 #87 0.65 #88 1.37 #89 1.15 #810 0.71 µmol/L
What is the enterococci count in the sample ?	No data colonies indicated /100mL