

Commentary on our big day out March 20th 2015

Good first day out by some new teams, it is very pleasing to see that some teams are having a good look at the biology of their areas, well done.

What was the day like?

Air temperature was close to 14 °C, it was cool day with light wind, E/NE about 10-15 km/hr. Ccv between 40-70%.

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

Tide and harbour conditions.

All observations and sample collection occurred between 0950 and 1140. Low water at Dunedin was at 1200. The tide was very low, sandbanks being exposed at the Waters of Leith site, first time we have seen this! All samples and observations were carried out on an ebbing tide and close to low water. This was a good day to observe what is going on in the intertidal zone.

6 mm of rain has fallen over the last 10 days, little extra point and non point freshwater/storm water flowing into the harbour.

Water flow from the Leith was normal to low , about 0.249 cumecs. This is lower than the median flow.

Is there anything unusual ?

The very low tide did expose the observers to mudflats and some rubbish that is usually hidden by the tide.

Seaweeds. Well done some very good observations at #81/2/3/4/5/6.

Check the data

Animals

Check the data

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

Surface conditions quite benign, generally calm with low ripples.

Water temperature

The water temperature ranged from 11.0 °C (#88) – 13.8 °C (#89). Many readings around 13 °C. The water temperatures are cooler than Feb 5th and the range is less. The temperature pattern shows the upper harbour cooling down.

[Feb 5th 11.7 °C (#88) – 16.4 °C (#86).]

Salinity

At the head of the harbour 34.03 (#87) -34.71 ppt (#81/2) . The pattern is normal, it is still tricky measuring the salinity at the mouth of the Leith, as the freshwater mixes with the seawater.

[Feb 5th 33.1 (#84) -34.00 ppt (#87)]

Open sea salinity 34.998 ppt!!!

Salinity readings more accurate.

pH

All sites tested. Range was 6.64 (#86) – 8.46 (#88)
pH range larger than our feb readings with two readings below 7.
[Feb 5th 7.42 (#83) – 8.35 (#88)]

Turbidity

All sites tested. Range was 2.07 NTU (#87) – 17.4 NTU (#86).
The range was much less than feb 5th, this is not surprising as the wind was less and the water column not being agitated as much at the surface. The samplers have to be careful collecting their samples at low tide and avoid including sediment in their samples.
[Feb 5th 1.57 NTU (#85) – 46.5 NTU (#89).]

**** 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 \leq 5.6 NTU ANZECC&ARMCANZ (2000)

6 sites #81/2/6/8/9/10 exceeded this value

Dissolved oxygen (DO) mg L⁻¹ and % saturation.

The range of DO readings shows a range from all sites 5.5 mg L⁻¹ (#89)- 10.61 mg L⁻¹(#88)
Some of the open water sites have high concentration of dissolved oxygen.
% saturation range 61.0% (#89) – 106.5 % (#81/2)
Similar range and values for Feb 5th with the exceptions of #89, this has been observed at this site before. .Generally the water was well oxygenated and saturated with oxygen. All sites have DO concentrations that will support as healthy biological community.
[Feb 5th 7.61 mg L⁻¹ (#810)- 11.53 (#88) mg L⁻¹and 91.7% (#87) – 107.6 % (#86)]

Chlorophyll a.

Range 0.70 µg/L (#87) – 4.60 µg/L (#86)
The readings have a smaller range than Feb 5th , eight sites have low readings. Medium values. noted at #86 (Leith), and #89 (Somerville's creek)
#81 had a medium value, while #82 was low, was there sediment in the sample, sometimes sediments will had extra chlorophyll to the samples. Both are taken from the same site.

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

[Feb 5th 0.77 µg/L (#82) – 13.59 µg/L (#89)]

LOW ENVIRONMENTAL HEALTH CATEGORY for open water

0-2 ($\mu\text{g L}^{-1}$) low
>2-5 medium
>5-10 high
>10 very high

DRP (dissolved reactive phosphate)

Range of $0.59 \mu\text{mol L}^{-1}$ (#84) – $1.93 \mu\text{mol L}^{-1}$ (#89).
All the values are similar to Feb 5th concentrations.

#86/8/9 exceeded Guideline values. !!!.

[Feb 5th $0.47 \mu\text{mol L}^{-1}$ (#81/2) – $1.38 \mu\text{mol L}^{-1}$ (#88)]

GUIDELINE value $0.97 \mu\text{mol L}^{-1}$ (= $0.0301 \text{ mg P L}^{-1}$)

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.

0.22 (#84) – $20.09 \mu\text{mol L}^{-1}$ (#83) Open water sites . Most sites around $1-2 \mu\text{mol L}^{-1}$, an unusual spike around Port Chalmers marina.

$5.06 \mu\text{mol L}^{-1}$ (#89) – $13.67 \mu\text{mol L}^{-1}$ (#88) Storm water /discharge sites.

NNN concentrations at open water sites are similar than Feb 13th and lower compared with mid winter values.

The sites that are discharging water into the harbour have lower NNN than Feb 5th 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??

[Feb 5th 0.82 (#85) – $6.50 \mu\text{mol L}^{-1}$ (#84) Open water sites

$8.72 \mu\text{mol L}^{-1}$ (#86) – $13.69 \mu\text{mol L}^{-1}$ (#88) Storm water $31.54 \mu\text{mol L}^{-1}$ (#89) Discharge sites]

#83/88 exceed guidelines.

GUIDELINE value $11.3 \mu\text{mol L}^{-1}$ (= $0.158 \text{ mg N L}^{-1}$)

LOW/MED ENVIRONMENTAL HEALTH CATEGORY !!!!!

Enterococci

All sites were below the guideline values except for sites #88 (Macbay storm water) and #89 (Somervilles stream), 540 and 150 cells per 100mL respectively. #86 number was unsure.

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

SUMMARY OF DATA.

DATE: 05/02/2015

| | |
|--|--|
| <p>What is the weather like?</p> <ul style="list-style-type: none"> • <i>Air temperature</i> • <i>Wind speed and direction</i> • <i>Cloud cover</i> | <p>1 14oC, North, light breeze, 40% ccv 3 15oC, North, light wind 4 15oC, 5 NE, 10-15, 70% ccv, fine 6 NE, 10 kph, 70-80% ccv 7 11.9oC, Easterly, 10kph, 45% ccv 8 13.0oC, 5kph, 40% ccv 9 13.5-14.5, 9 kph, gusts 10 13.5</p> |
| <p>What is the time, and what stage is the tide? <i>What is the condition of the Leith ?</i> <i>Check websites (Met service and Port otago)</i></p> | <p>1 low tide, 0950 3 1010, low water 4 LW 1040 5 Very low tide 6 Vv low, exposed mudflats, low flow 7 0945, low tide 8 low 9 10.34 10 1055, mid/low</p> |
| <p>Is there anything unusual to report (dead crabs, nasty smell, coloured sheen on the water)?</p> <ul style="list-style-type: none"> • Discharge pipes • Any star fish/other animals ?? • Rubbish or litter. | <p>1 none 3 boats, some litter 4 some rubbish 5 little rubbish 6 Long term litter exposed 7 _ 8 rat, unpleasant smell rubbish, gumboots, pipe, milk 9 bottles 10 no</p> |

| | |
|---|--|
| <ul style="list-style-type: none"> Special seaweeds | See data sheets |
| f=few | |
| s=some | |
| m=many | |
| Animals | See data sheets |
| What condition is the surface of the water? | 1 small ripples 3 calm 4 fine 5 stream of foam, some white caps 6 low ripples, 7 ripply 8 foam 9 fairly calm 10 fast flowing |
| Does the water have any real, or apparent colour? | 1 green blue 3 Green/Blue 4 clear 5 geen-gray 6 Greyish 7 grey-green 8 – 9 murky green/ brown =mud 10 clear |

Understanding Estuarine Processes

SITE: _____ DATE: _____

| | | |
|--|----|------|
| What is the water temperature ? | 81 | 14 |
| | 82 | 14 |
| | 83 | 13.5 |
| | 84 | 12.9 |
| | 85 | 13.3 |
| | 86 | 13 |
| | 87 | 13.1 |
| | 88 | 11 |
| | 89 | 13.8 |

| | | | |
|--|-----|-------|-------|
| | 810 | 12.5 | °C |
| What is the salinity of the sample ? | 81 | 34.71 | ppt |
| | 82 | 34.71 | |
| | 83 | 34.71 | |
| | 84 | 34.61 | |
| | 85 | 34.41 | |
| | 86 | 17.23 | |
| | 87 | 34.03 | |
| | 88 | 0.11 | |
| | 89 | 31.89 | |
| | 810 | 34.24 | |
| What is the electrical conductivity of the sample ? | | | mS/cm |
| <p>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</p> | | | |
| What is the pH of the sample ? | 81 | 7.56 | |
| | 82 | 6.535 | |
| | 83 | 7.965 | |
| | 84 | 8.03 | |
| | 85 | — | |
| | 86 | 6.64 | |
| | 87 | 8.045 | |
| | 88 | 8.46 | |
| | 89 | 7.675 | |
| | 810 | — | |
| What is the water turbidity? | 81 | 8.575 | |
| | 82 | 5.91 | |
| | 83 | 2.075 | |
| | 84 | 2.54 | |

| | | |
|---|---|--------------|
| | 85 3.39 86 17.4 87 2.07 88 9.045 89 14.7 810 10.44 | |
| | | NTU |
| What is the oxygen concentration of your sample ? Measure both methods mg/L and % saturation | 81 8.84 82 8.84 83 7.81 84 9.02 85 8.7 86 9.72 87 7.42 88 10.61 89 5.5 810 7.76 | |
| | | mg/L |
| | 81 106.5 82 106.5 83 93.3 84 105.9 85 102.3 86 102.1 87 87.2 88 96.5 89 61 810 89 | |
| | | % saturation |
| What is the chlorophyll a concentration of the sample ? <ul style="list-style-type: none"> <i>Record the volume of water filtered</i> | 81 5.17 ??? 82 1.46 83 1.03 84 1.74 85 2.33 86 4.60 87 0.70 88 1.06 89 4.54 810 2.11 | |
| | | µg/L |

| | | | | | | | | | | | | | | | | | | | | | |
|--|--|----|------|----|------|----|-------|----|------|----|------|----|------|----|------|----|-------|----|------|-----|------|
| | 0-2 low >2-5 medium >5-10 high >10 very high | | | | | | | | | | | | | | | | | | | | |
| ****NNN | <table> <tr><td>81</td><td>2.73</td></tr> <tr><td>82</td><td>2.25</td></tr> <tr><td>83</td><td>20.09</td></tr> <tr><td>84</td><td>0.22</td></tr> <tr><td>85</td><td>0.29</td></tr> <tr><td>86</td><td>8.85</td></tr> <tr><td>87</td><td>1.33</td></tr> <tr><td>88</td><td>13.67</td></tr> <tr><td>89</td><td>5.06</td></tr> <tr><td>810</td><td>1.26</td></tr> </table> <p style="text-align: right;">μmol/L</p> | 81 | 2.73 | 82 | 2.25 | 83 | 20.09 | 84 | 0.22 | 85 | 0.29 | 86 | 8.85 | 87 | 1.33 | 88 | 13.67 | 89 | 5.06 | 810 | 1.26 |
| 81 | 2.73 | | | | | | | | | | | | | | | | | | | | |
| 82 | 2.25 | | | | | | | | | | | | | | | | | | | | |
| 83 | 20.09 | | | | | | | | | | | | | | | | | | | | |
| 84 | 0.22 | | | | | | | | | | | | | | | | | | | | |
| 85 | 0.29 | | | | | | | | | | | | | | | | | | | | |
| 86 | 8.85 | | | | | | | | | | | | | | | | | | | | |
| 87 | 1.33 | | | | | | | | | | | | | | | | | | | | |
| 88 | 13.67 | | | | | | | | | | | | | | | | | | | | |
| 89 | 5.06 | | | | | | | | | | | | | | | | | | | | |
| 810 | 1.26 | | | | | | | | | | | | | | | | | | | | |
| ****DRP | <table> <tr><td>81</td><td>0.70</td></tr> <tr><td>82</td><td>0.63</td></tr> <tr><td>83</td><td>0.94</td></tr> <tr><td>84</td><td>0.59</td></tr> <tr><td>85</td><td>0.84</td></tr> <tr><td>86</td><td>0.95</td></tr> <tr><td>87</td><td>0.80</td></tr> <tr><td>88</td><td>1.28</td></tr> <tr><td>89</td><td>1.93</td></tr> <tr><td>810</td><td>0.72</td></tr> </table> <p style="text-align: right;">μmol/L</p> | 81 | 0.70 | 82 | 0.63 | 83 | 0.94 | 84 | 0.59 | 85 | 0.84 | 86 | 0.95 | 87 | 0.80 | 88 | 1.28 | 89 | 1.93 | 810 | 0.72 |
| 81 | 0.70 | | | | | | | | | | | | | | | | | | | | |
| 82 | 0.63 | | | | | | | | | | | | | | | | | | | | |
| 83 | 0.94 | | | | | | | | | | | | | | | | | | | | |
| 84 | 0.59 | | | | | | | | | | | | | | | | | | | | |
| 85 | 0.84 | | | | | | | | | | | | | | | | | | | | |
| 86 | 0.95 | | | | | | | | | | | | | | | | | | | | |
| 87 | 0.80 | | | | | | | | | | | | | | | | | | | | |
| 88 | 1.28 | | | | | | | | | | | | | | | | | | | | |
| 89 | 1.93 | | | | | | | | | | | | | | | | | | | | |
| 810 | 0.72 | | | | | | | | | | | | | | | | | | | | |
| What is the enterococci count in the sample ? | <table> <tr><td>81</td><td>0</td></tr> <tr><td>82</td><td>0</td></tr> <tr><td>83</td><td>1</td></tr> <tr><td>84</td><td>2</td></tr> <tr><td>85</td><td>5</td></tr> <tr><td>86</td><td>10?</td></tr> <tr><td>87</td><td>12</td></tr> <tr><td>88</td><td>540</td></tr> <tr><td>89</td><td>150</td></tr> <tr><td>810</td><td>10</td></tr> </table> <p style="text-align: right;">colonies indicated /100mL</p> | 81 | 0 | 82 | 0 | 83 | 1 | 84 | 2 | 85 | 5 | 86 | 10? | 87 | 12 | 88 | 540 | 89 | 150 | 810 | 10 |
| 81 | 0 | | | | | | | | | | | | | | | | | | | | |
| 82 | 0 | | | | | | | | | | | | | | | | | | | | |
| 83 | 1 | | | | | | | | | | | | | | | | | | | | |
| 84 | 2 | | | | | | | | | | | | | | | | | | | | |
| 85 | 5 | | | | | | | | | | | | | | | | | | | | |
| 86 | 10? | | | | | | | | | | | | | | | | | | | | |
| 87 | 12 | | | | | | | | | | | | | | | | | | | | |
| 88 | 540 | | | | | | | | | | | | | | | | | | | | |
| 89 | 150 | | | | | | | | | | | | | | | | | | | | |
| 810 | 10 | | | | | | | | | | | | | | | | | | | | |

