

State of the Bay 2018:

Saldanha Bay and Langebaan Lagoon

Barry Clark

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Bruce Mostert, Jane Turpie, Jane Turpie & Nicolette Vermaak



SBWQFT

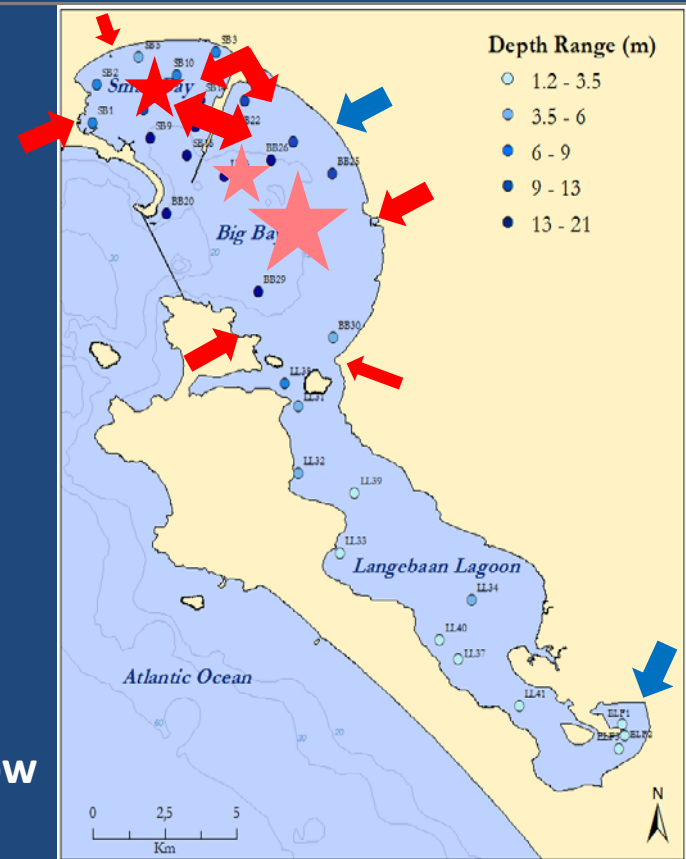
Saldanha Bay Water
Quality Forum Trust



ANCHOR
environmental

State of the Bay Reporting

- Annual assessment of anthropogenic impacts to and ecological health of Saldanha Bay and Langebaan lagoon
- Anthropogenic impacts:
 - Activities and discharges affecting health of the Bay
- Physical Health:
 - Water quality (temperature, salinity, oxygen, nutrients), currents & waves, groundwater inflow
- Ecological health:
 - Concentrations of **contaminants** (e.g. trace metals, bacteria) in **sea water, sediments** and **living organisms in the bay**
 - **Changes in community structure** and abundance of living organisms (macrophytes, invertebrates, fish, birds)



Indicator response times

- Water

Days / Weeks

- Sediments

Weeks / Months

- Living Organisms

- Benthic macrofauna

Months / Years

- Intertidal macrofauna & flora

Months / Years

- Fish

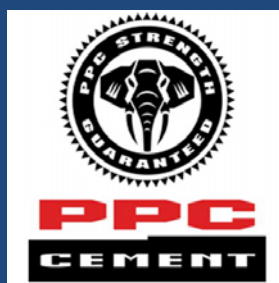
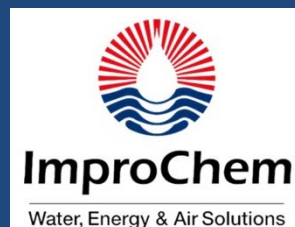
Years / Decades

- Birds

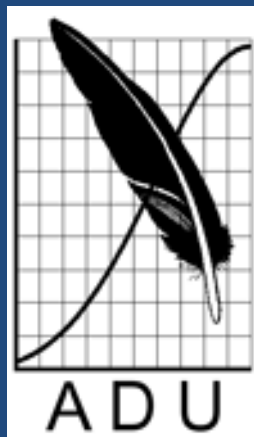
Years / Decades



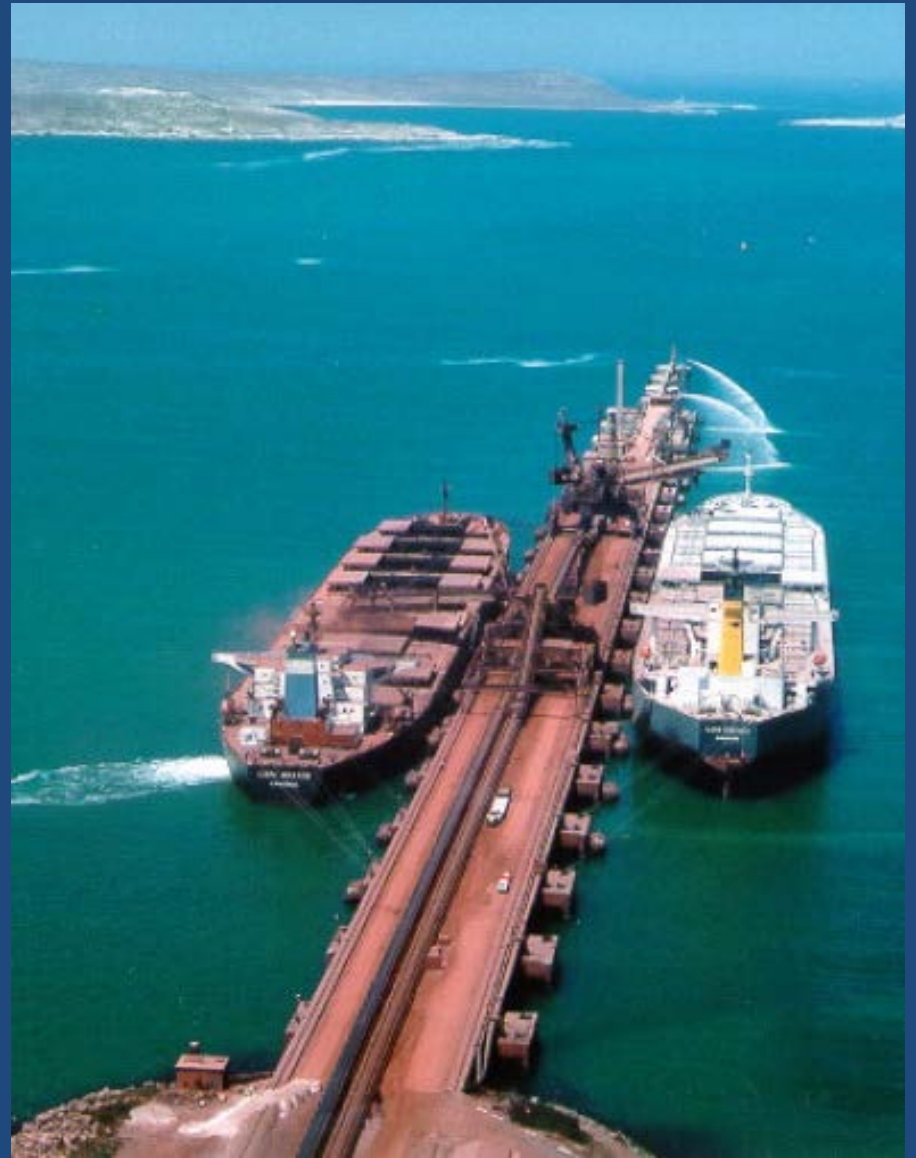
Health category	Ecological perspective	Management perspective
Natural 	No or negligible modification from the natural state	Relatively little human impact
Good 	Some alteration to the physical environment. Small to moderate loss of biodiversity and ecosystem integrity.	Some human-related disturbance , but ecosystems essentially in a good state,, continued regular monitoring is strongly recommended
Fair 	Significant change to the physical environment and associated biological communities; sensitive species may be lost, tolerant or opportunistic species beginning to dominate.	Moderate human-related disturbance with good ability to recover. Management intervention required to ensure no further deterioration takes place.
Poor 	Extensive change to the physical environment and biological communities, majority of sensitive species lost, tolerant or opportunistic species dominate.	High levels of human related disturbance. Urgent management intervention is required to avoid permanent damage to the environment or human health.



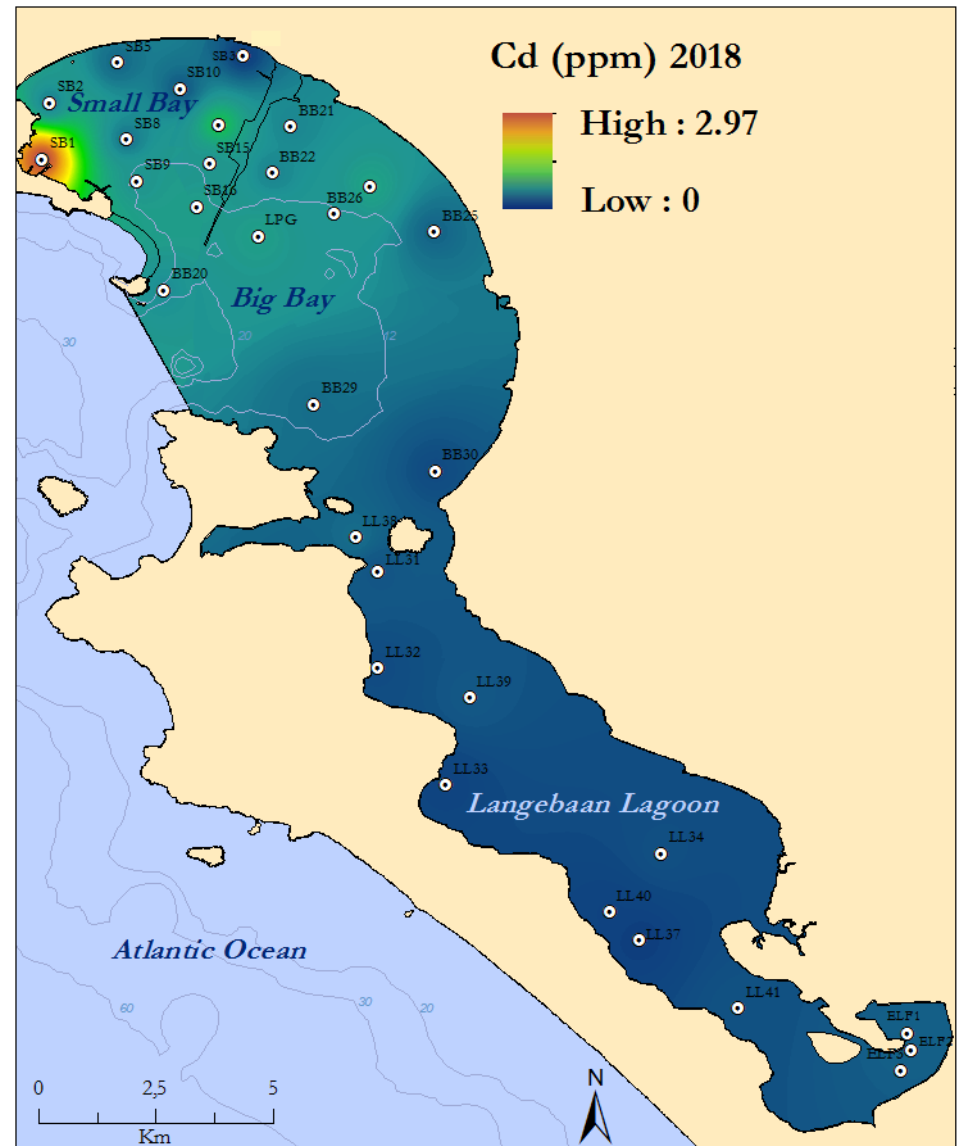
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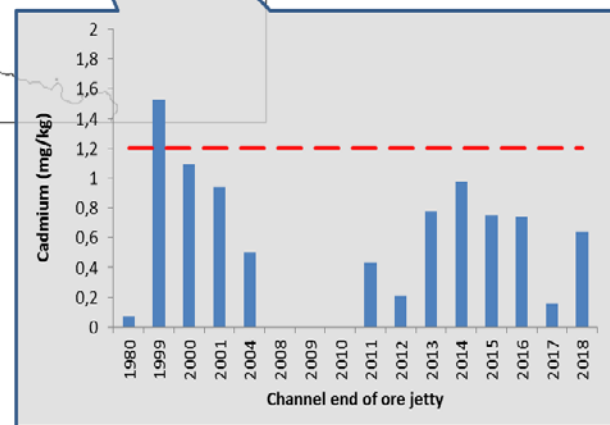
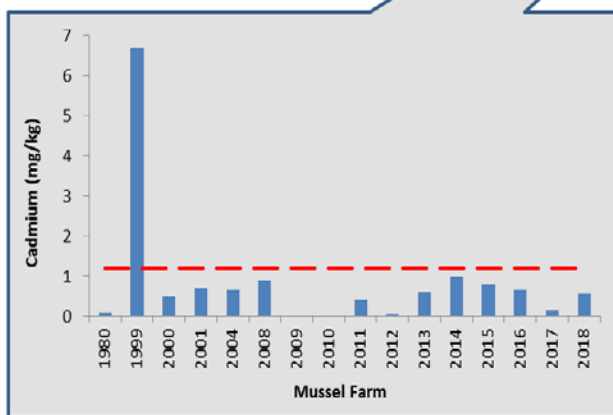
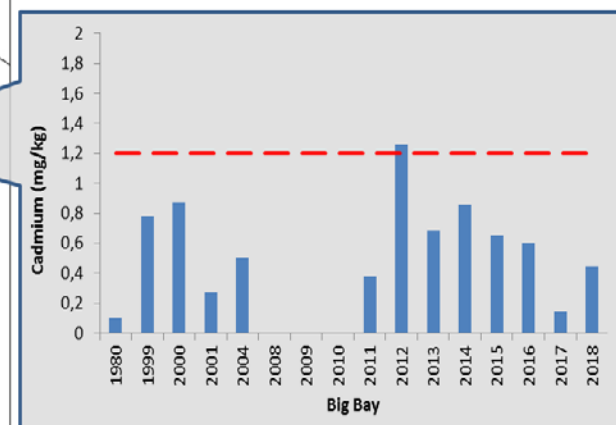
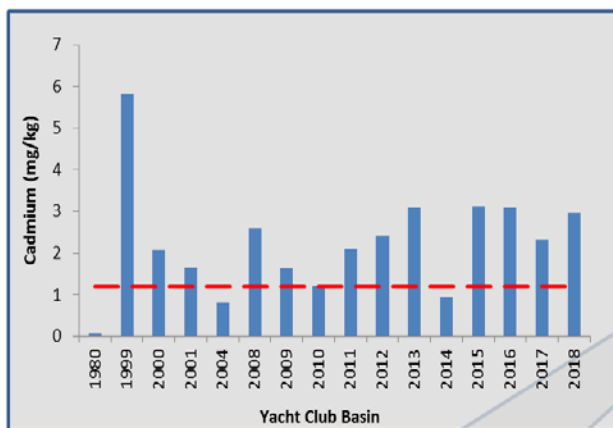
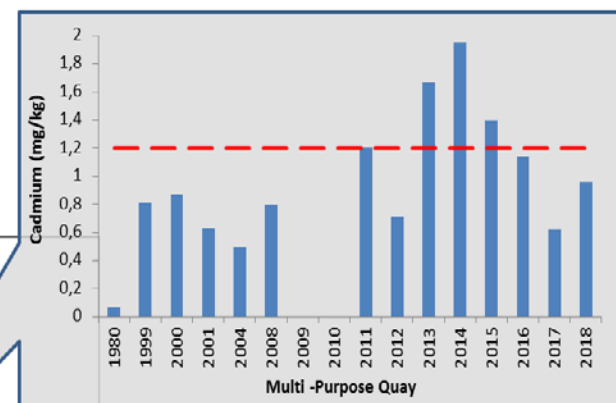
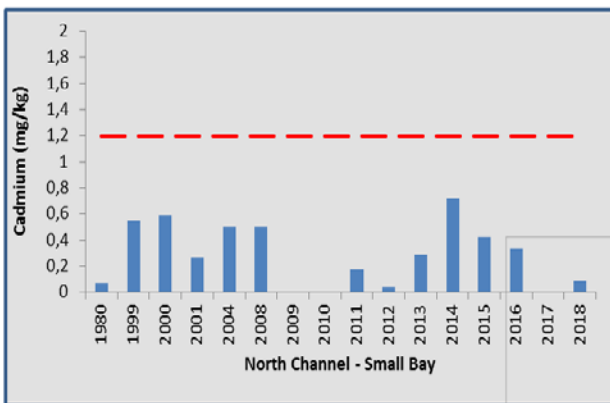
Trace metals in sediment and biota in Saldanha Bay



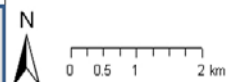
Cadmium

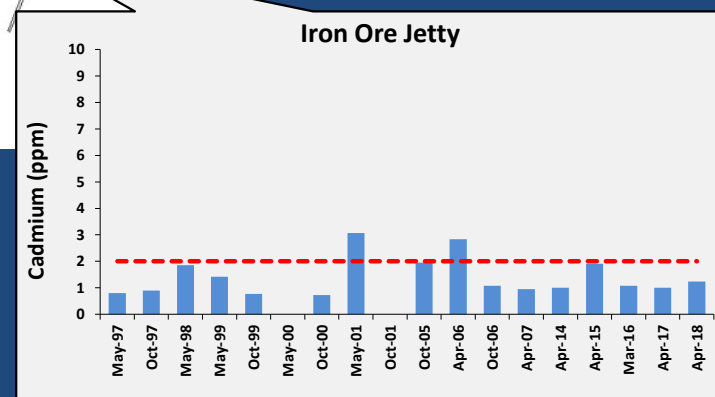
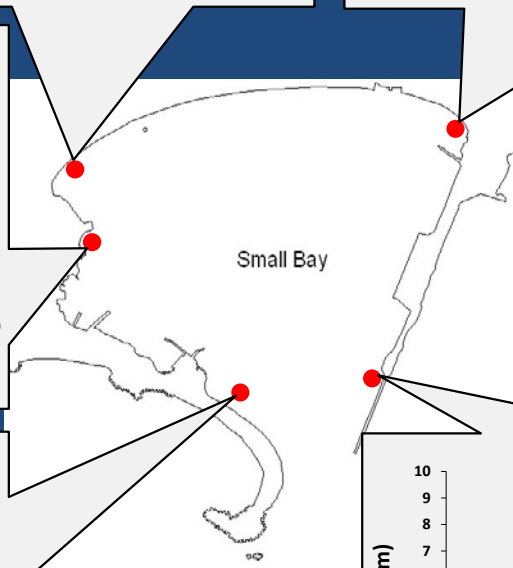
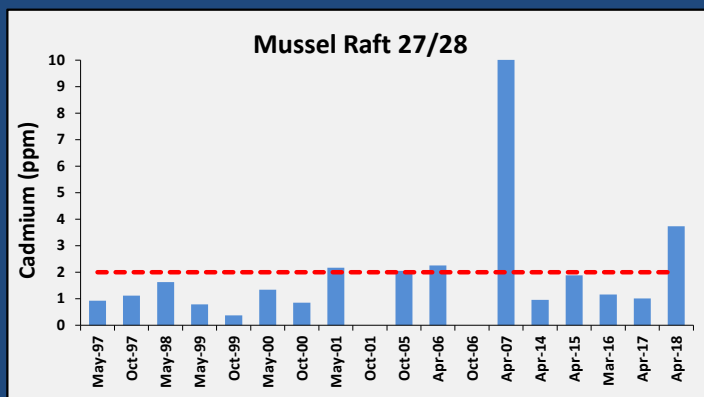
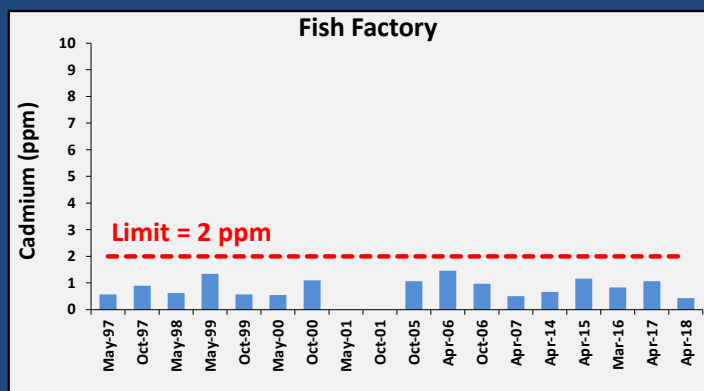
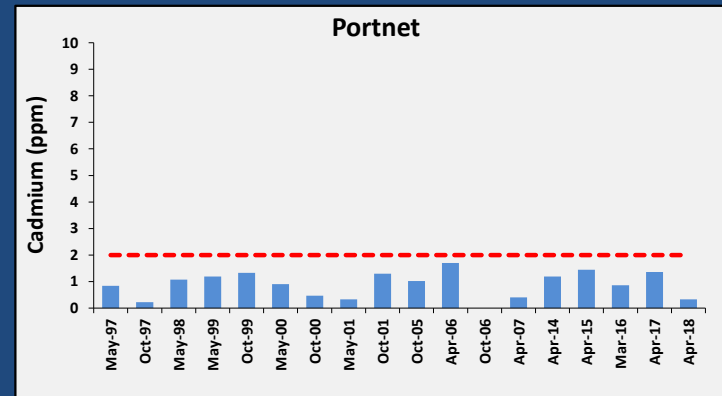
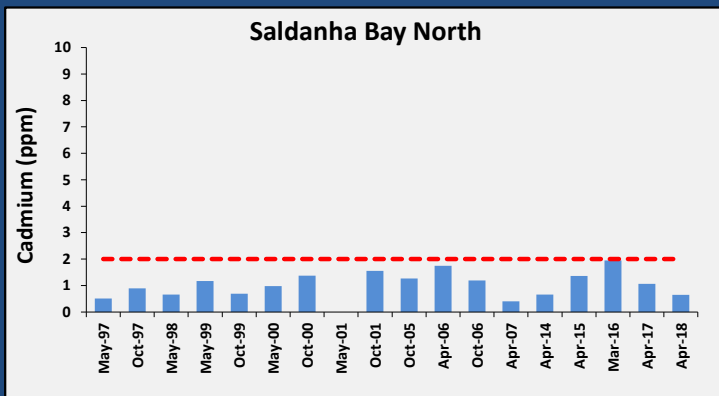


Cadmium

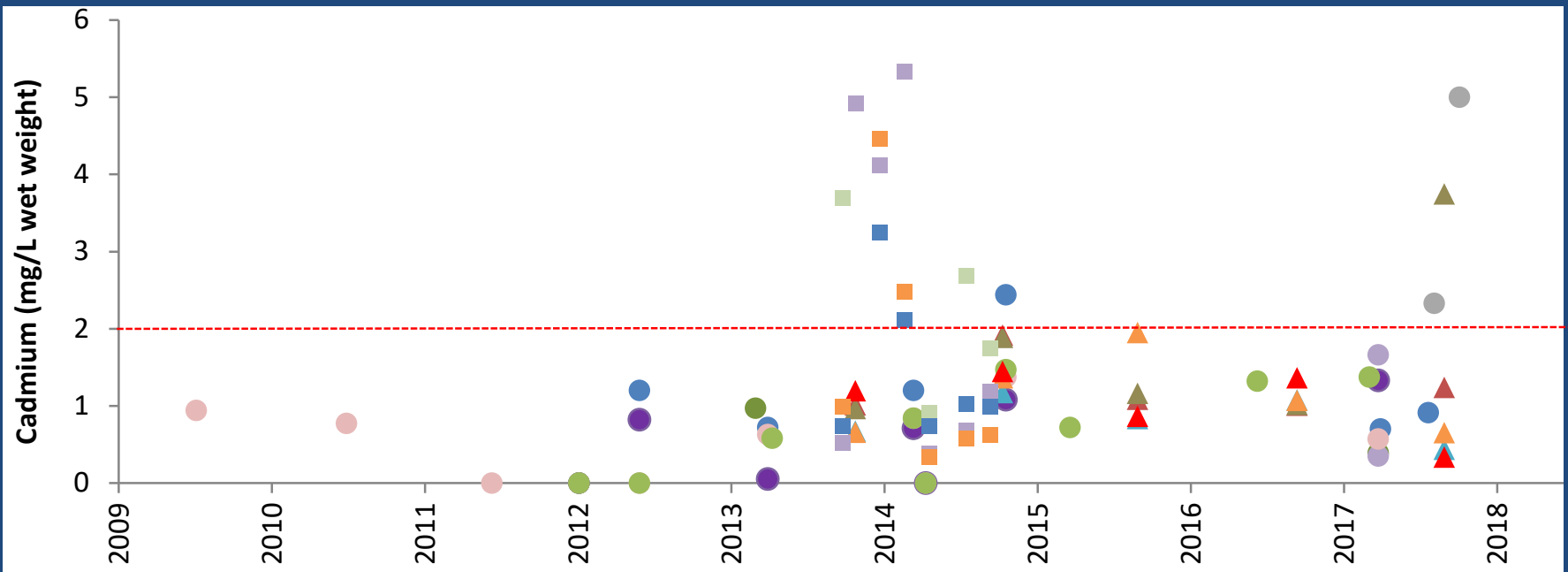


Sediment

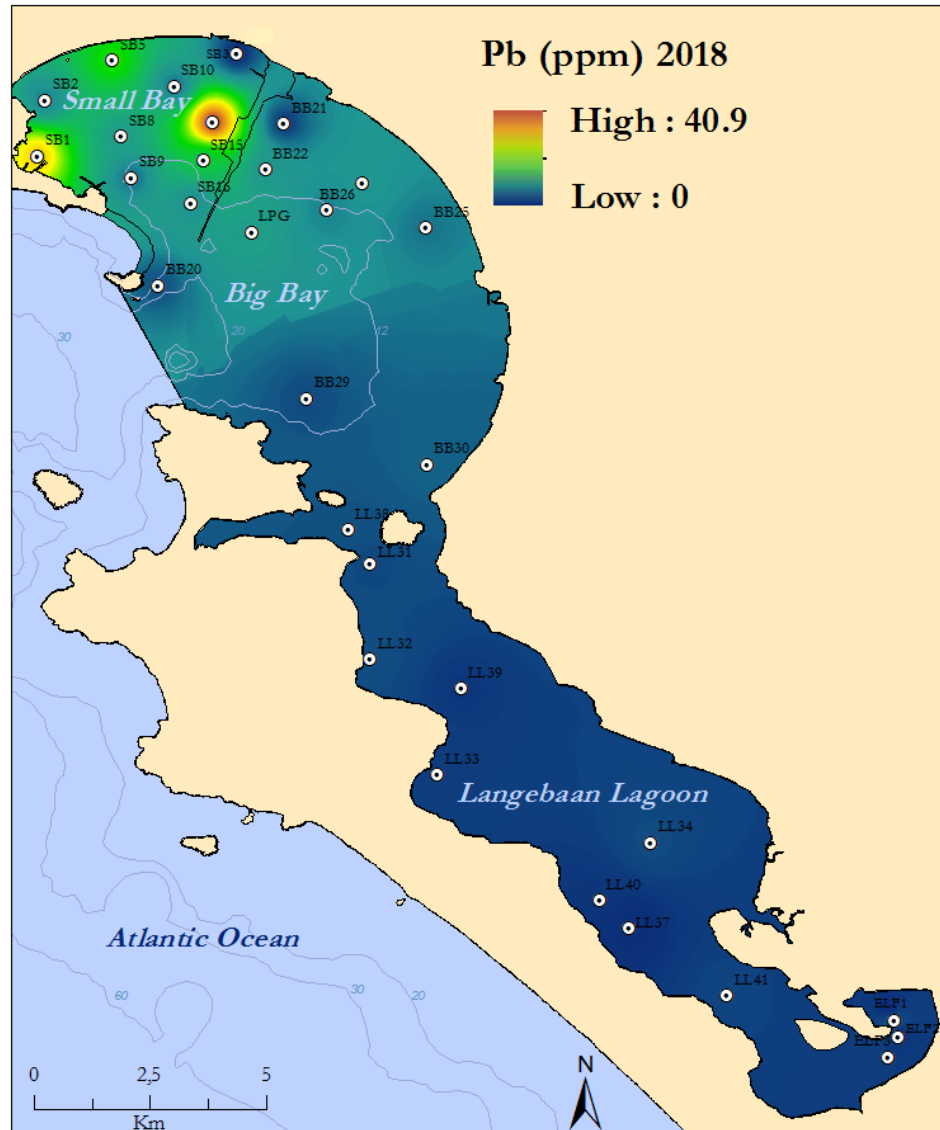




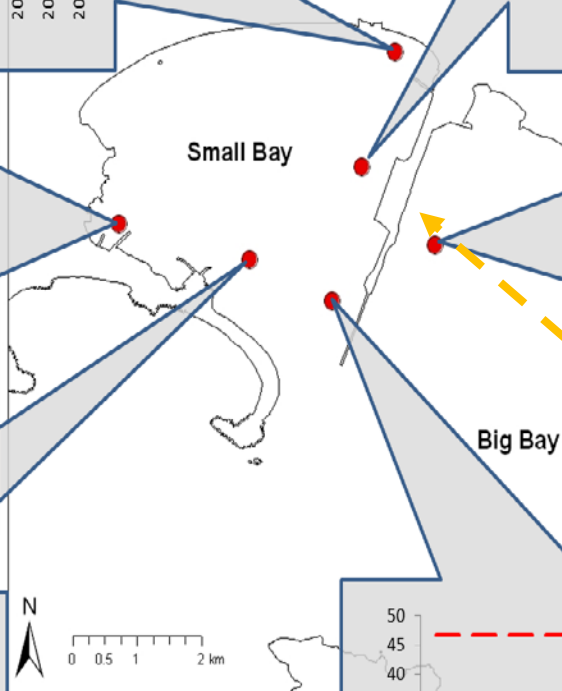
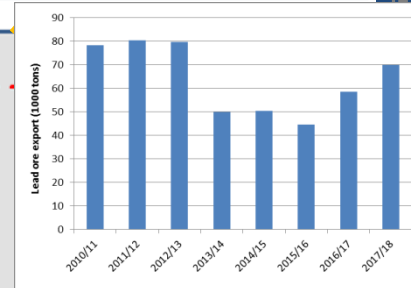
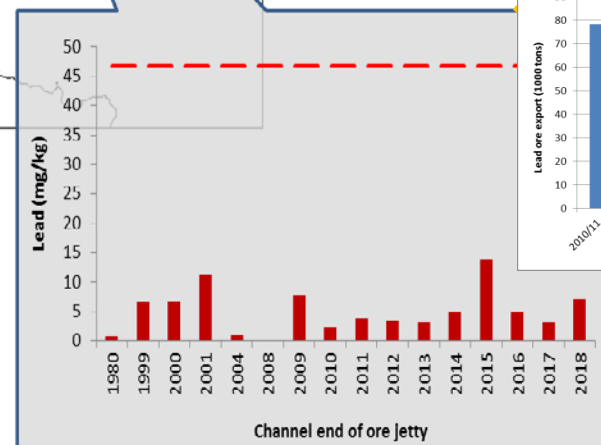
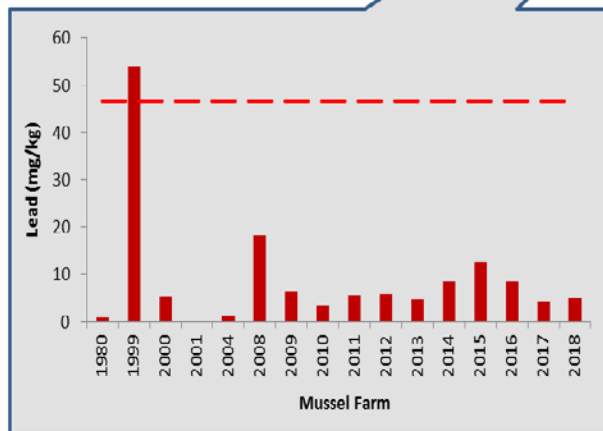
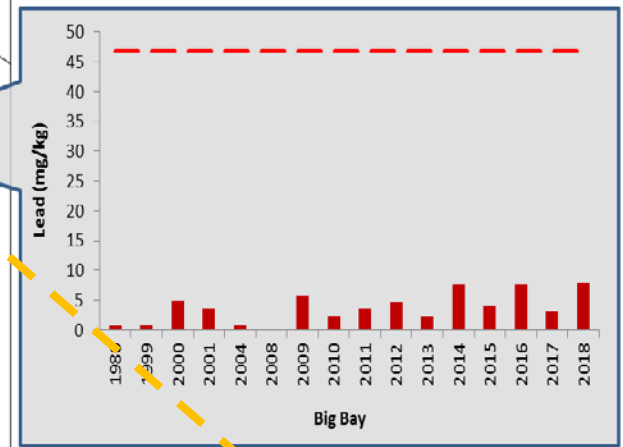
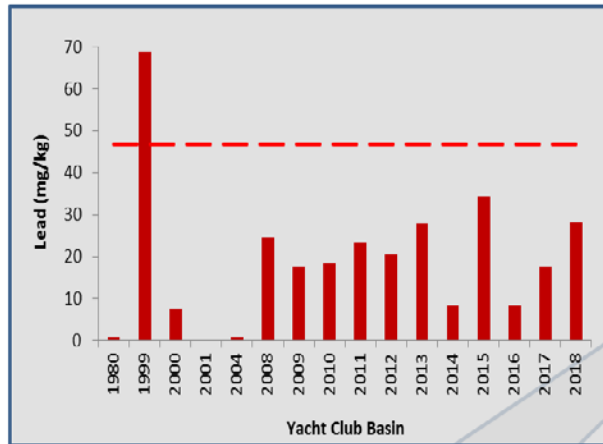
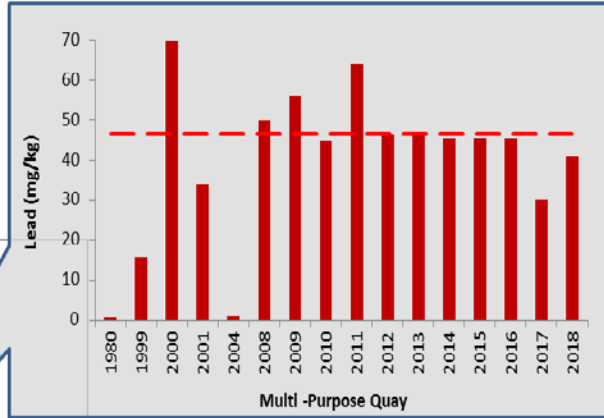
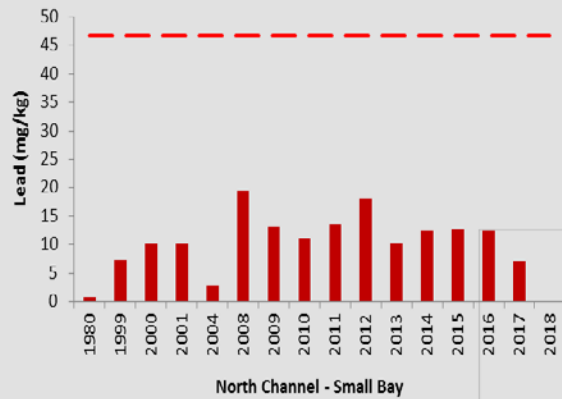
Cadmium: Farmed oysters



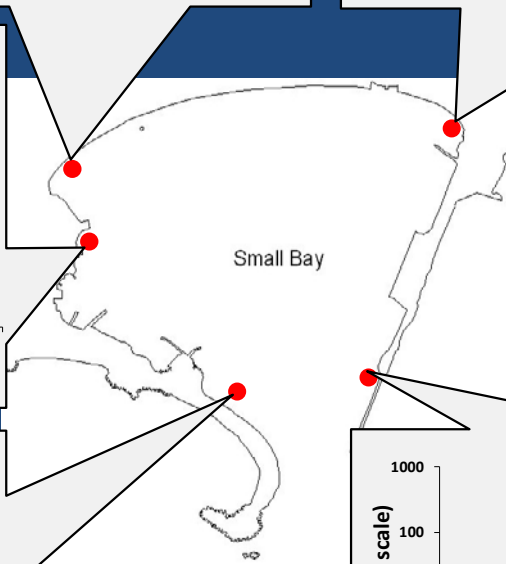
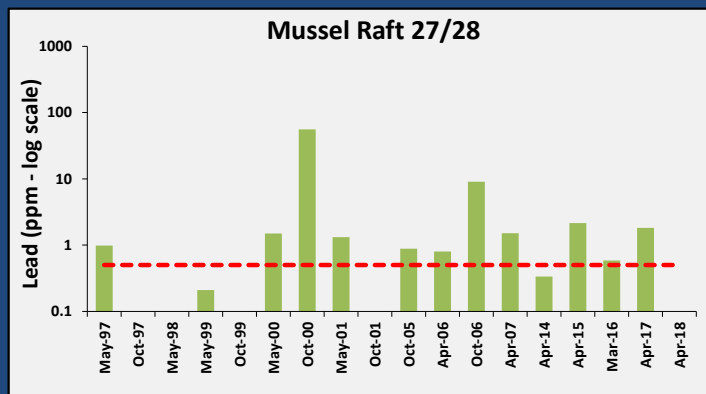
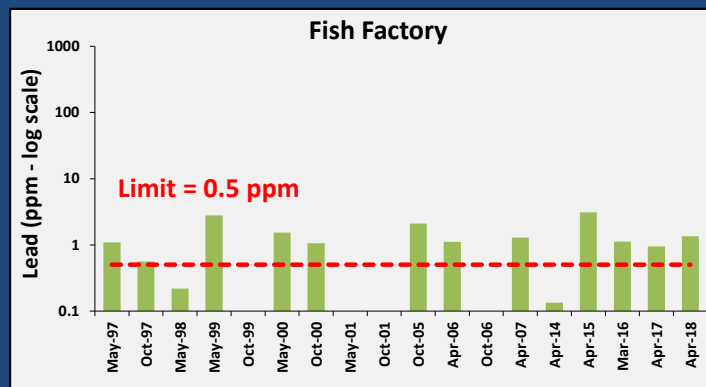
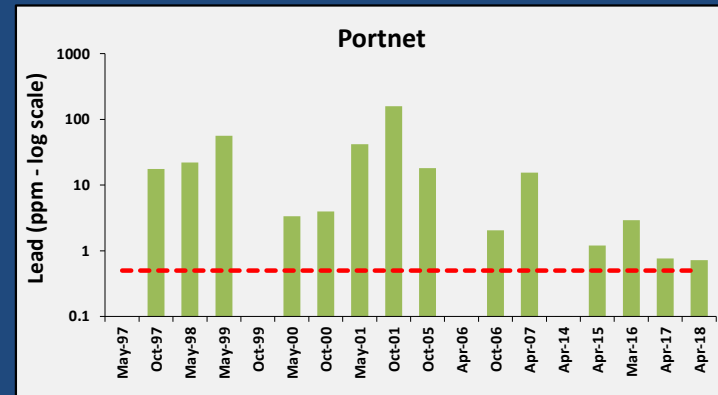
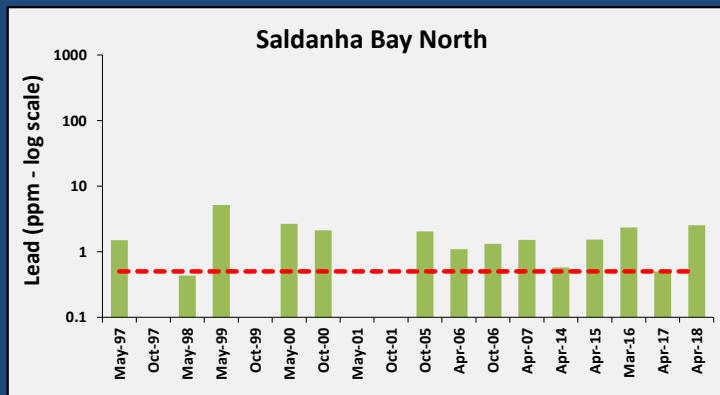
Lead



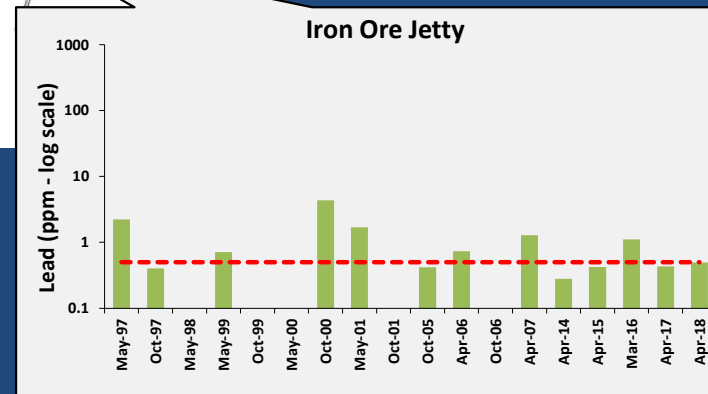
Lead



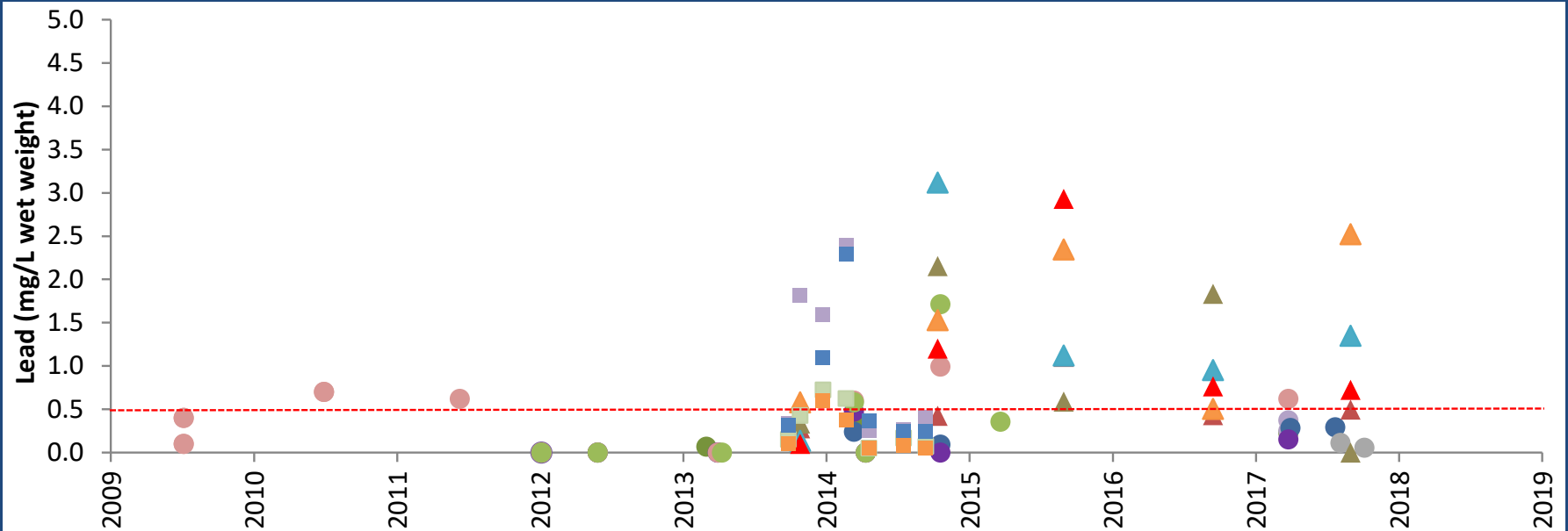
Sediment



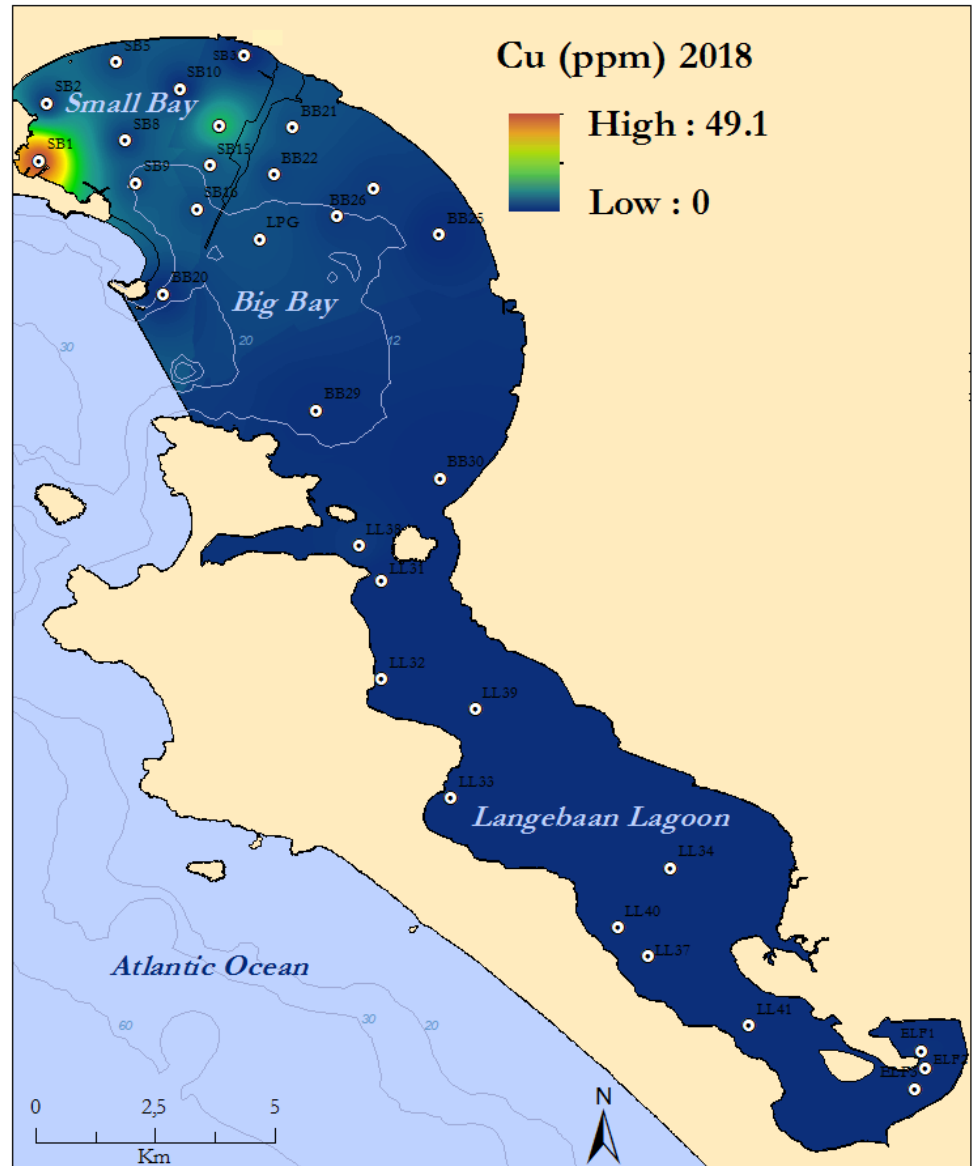
Lead:
Mussels
collected from
the shoreline



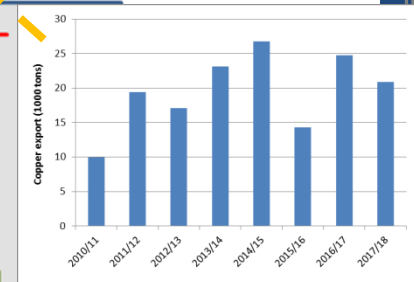
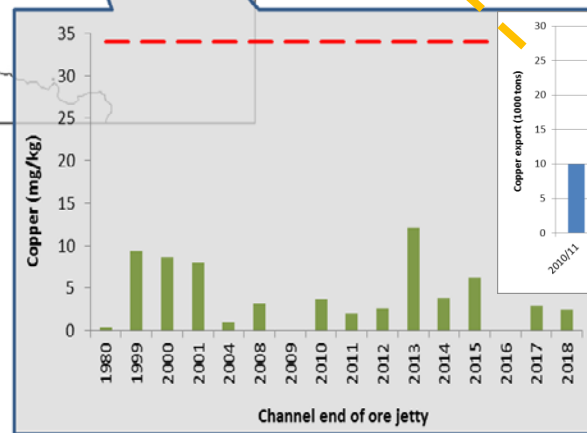
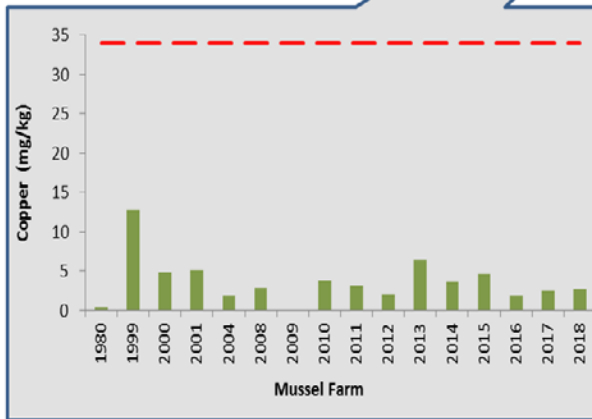
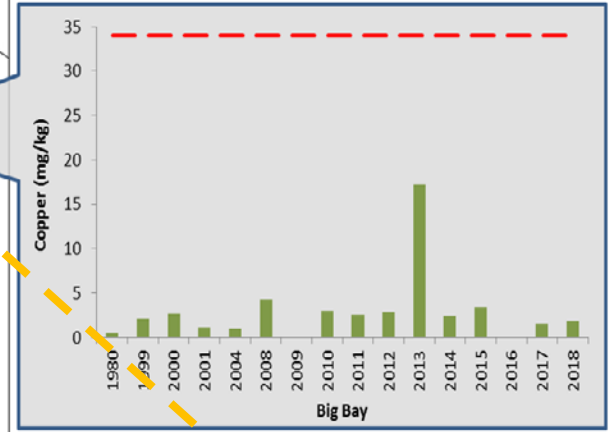
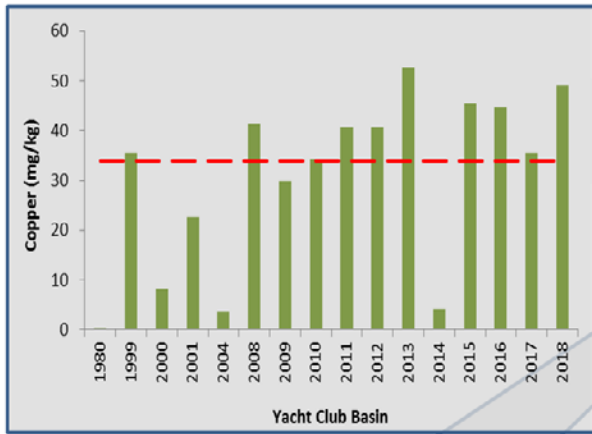
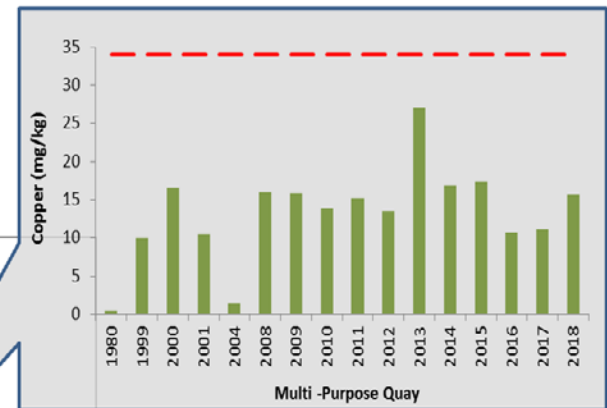
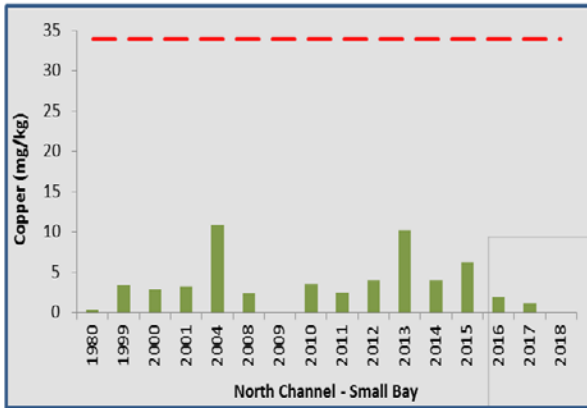
Lead:
Farmed oysters



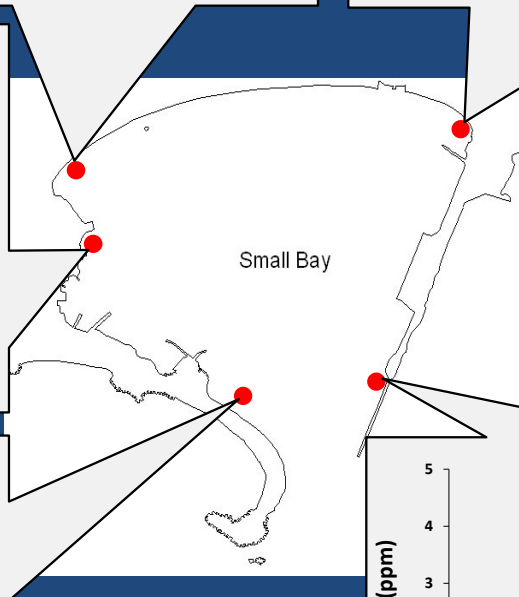
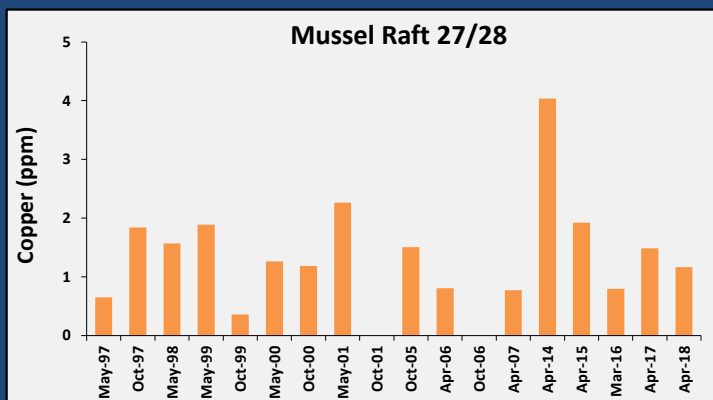
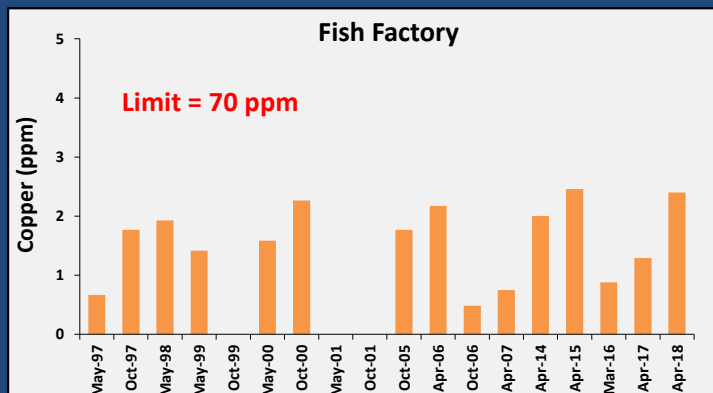
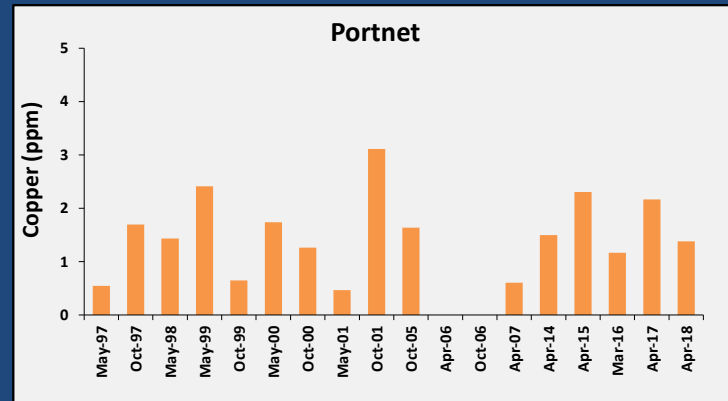
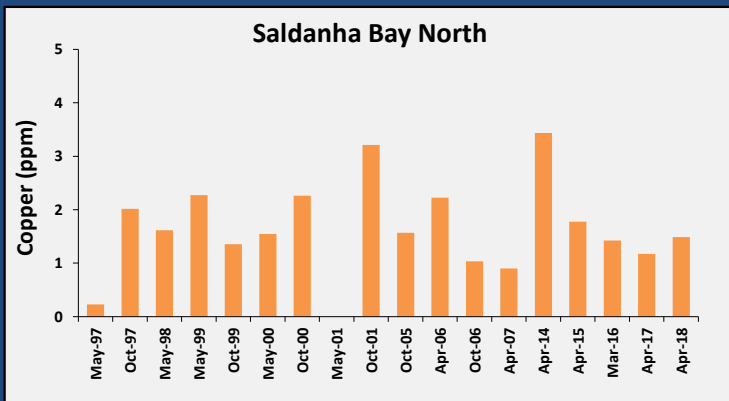
Copper



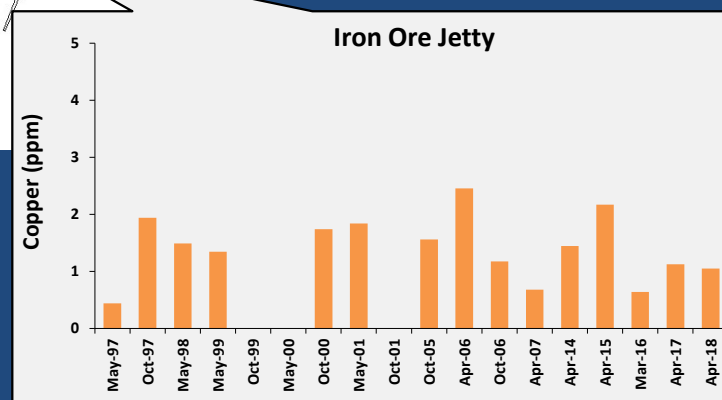
Copper



Sediment

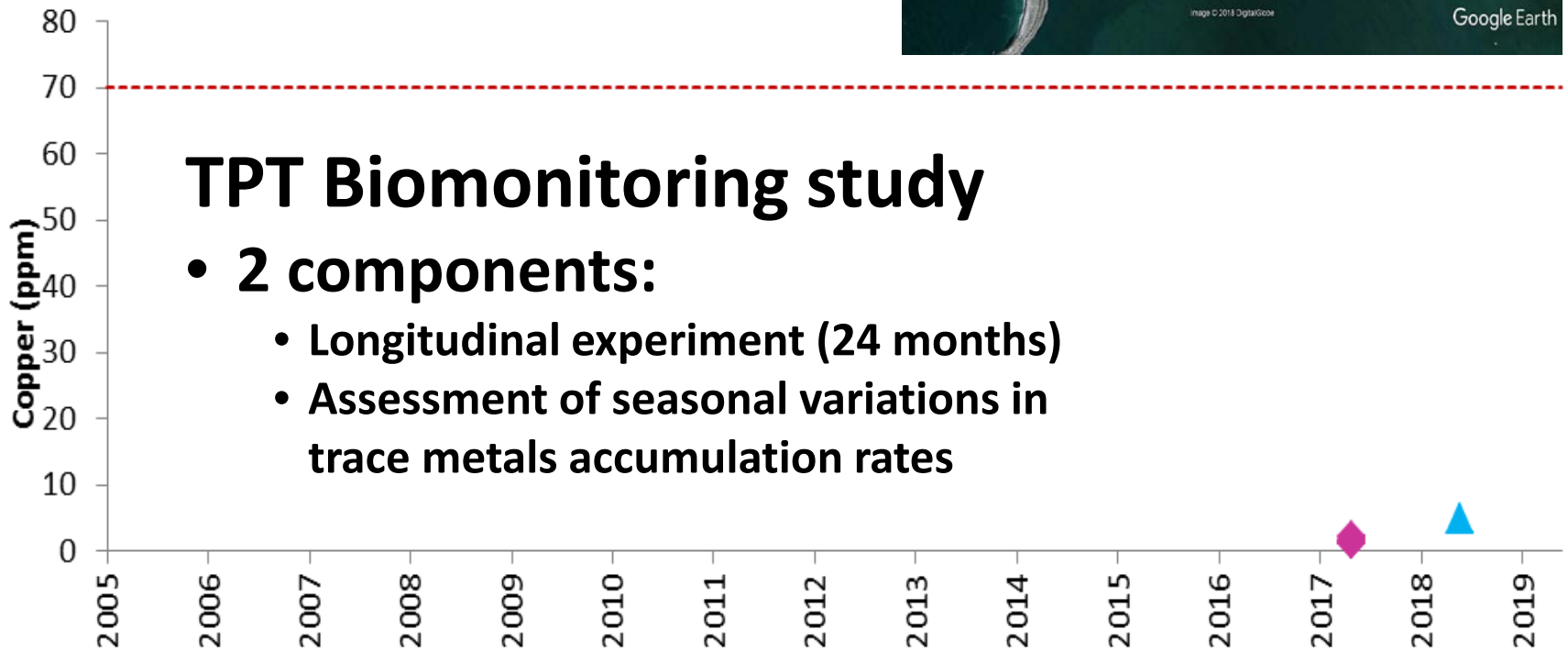


Copper:
Mussels
collected from
the shoreline



Copper:

Farmed oysters

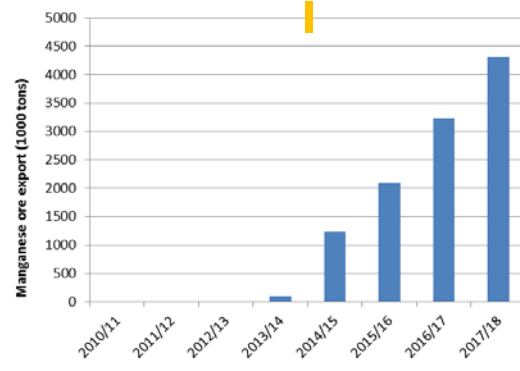
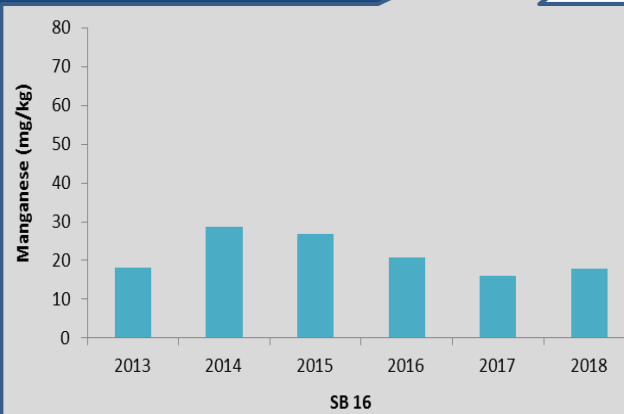
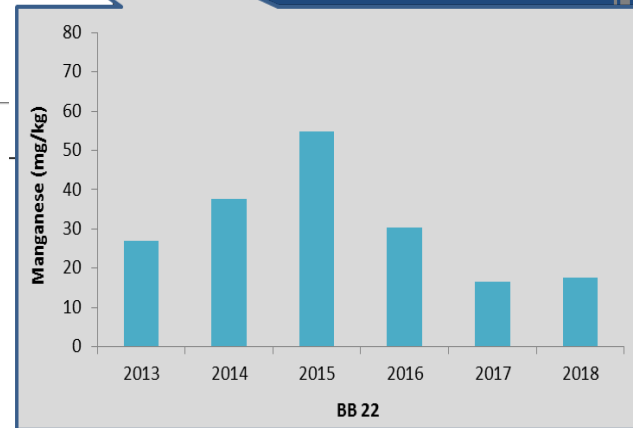
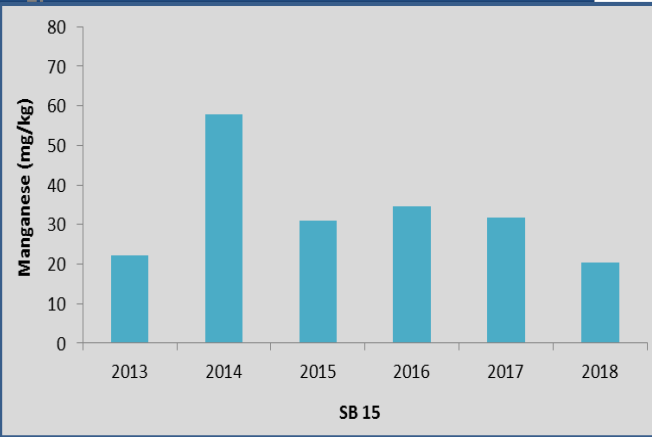
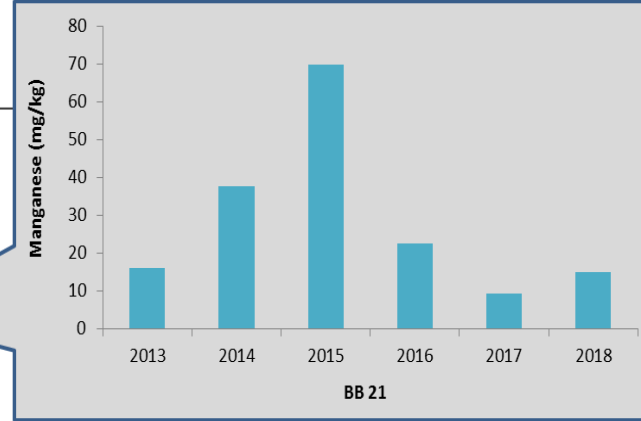
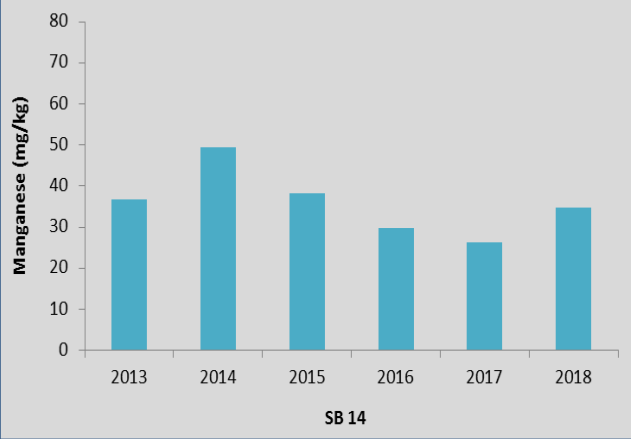


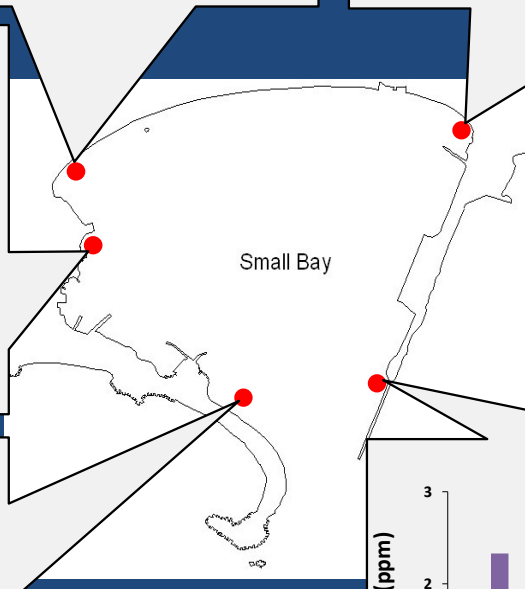
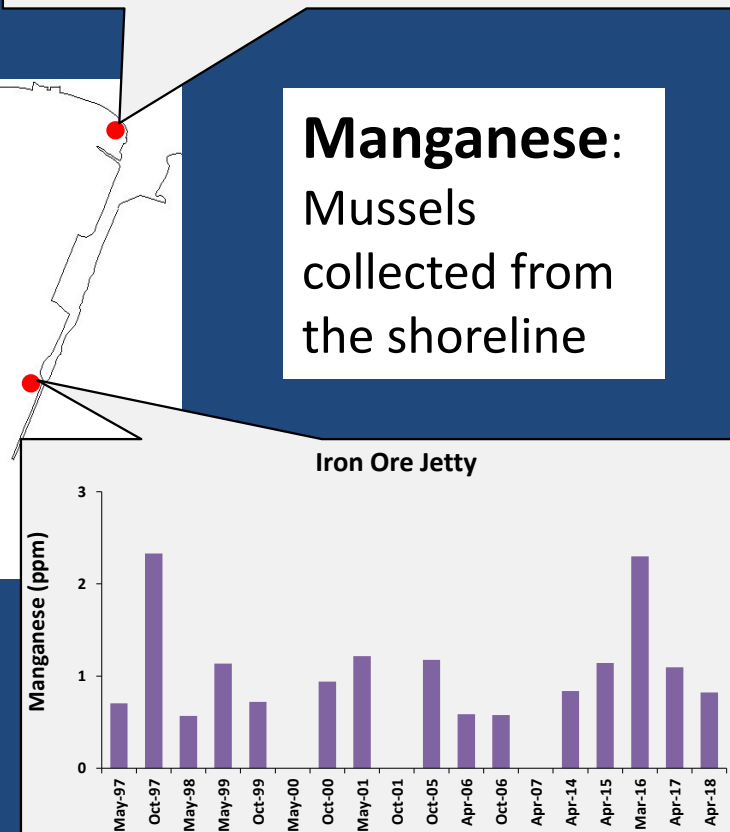
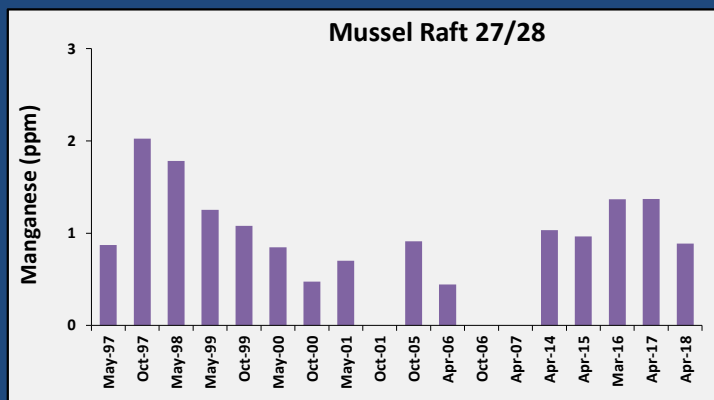
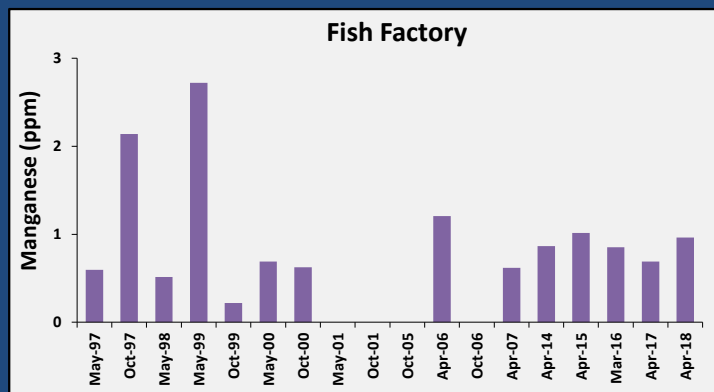
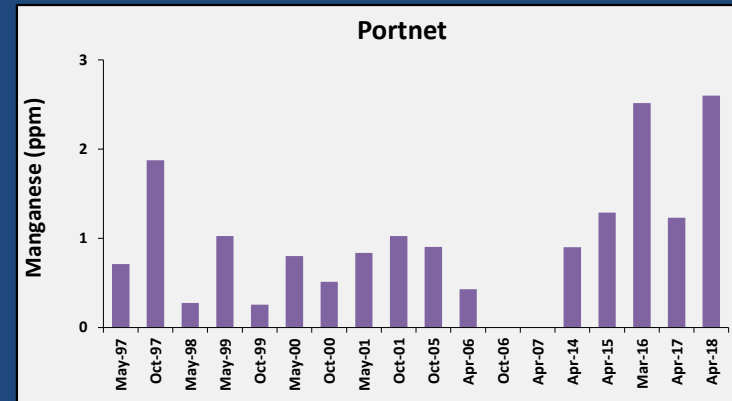
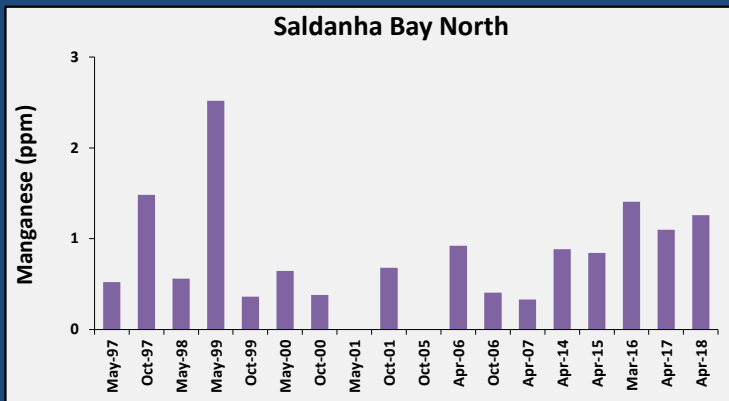
SBWQFT
Saldanha Bay Water
Quality Forum Trust



Manganese

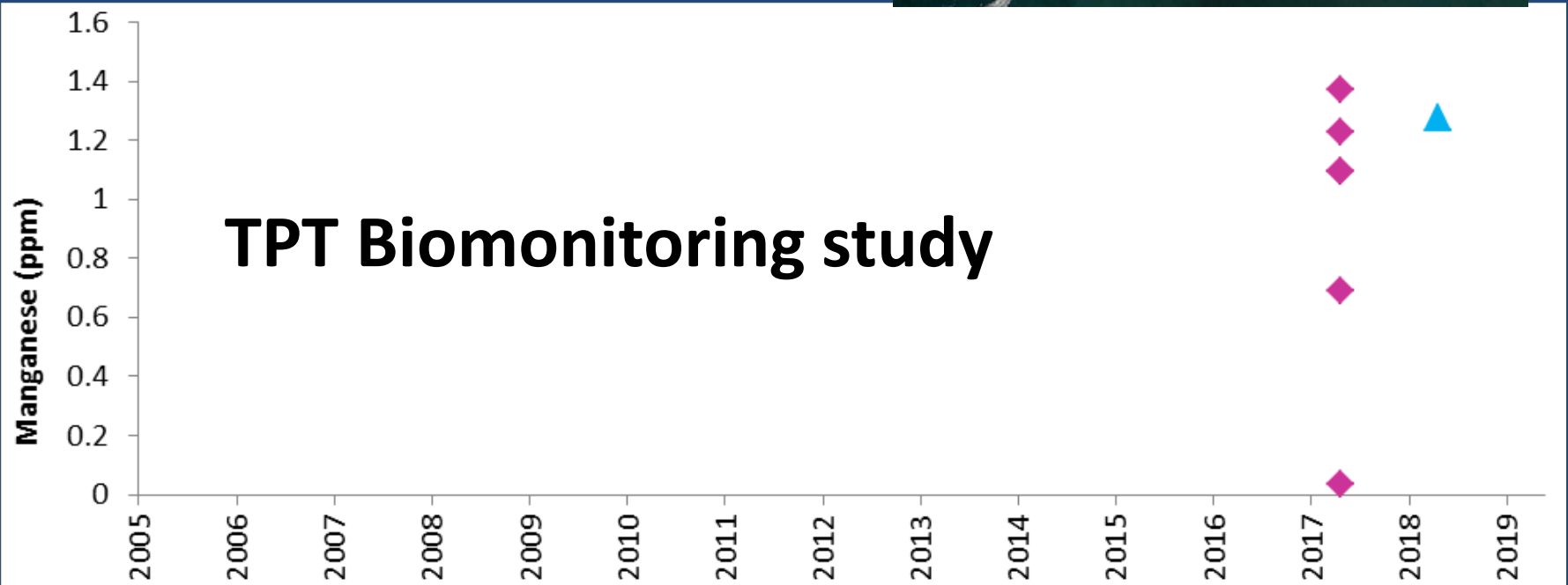
Sediment



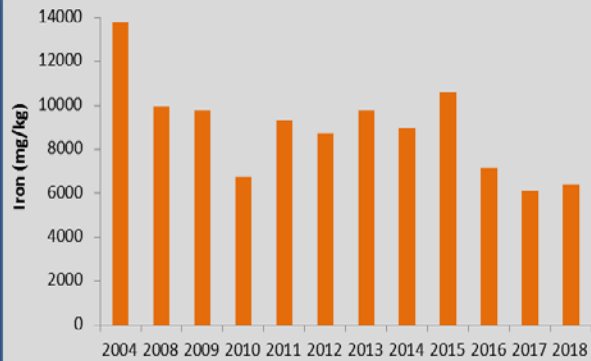


Manganese:
Mussels
collected from
the shoreline

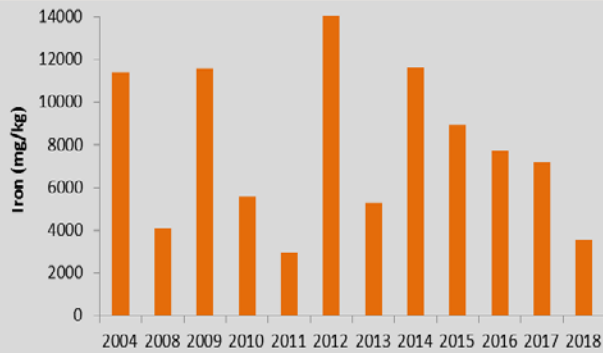
Manganese: Farmed oysters



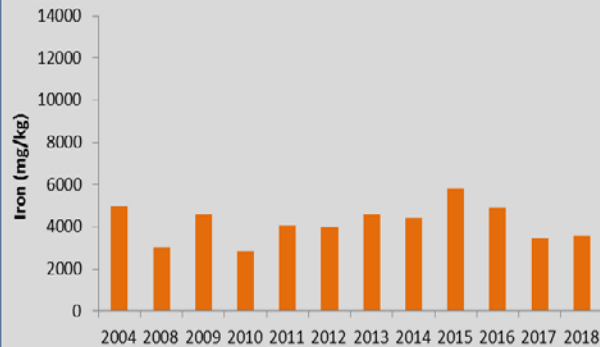
IRON



SB 14



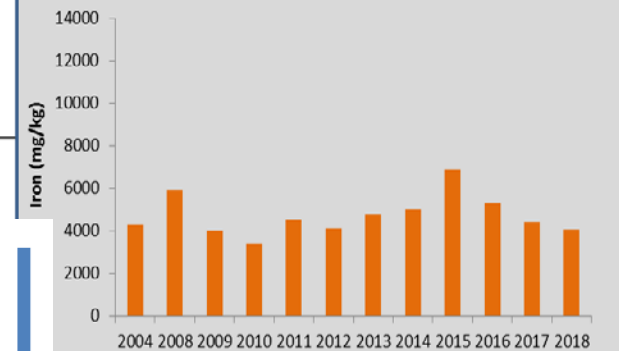
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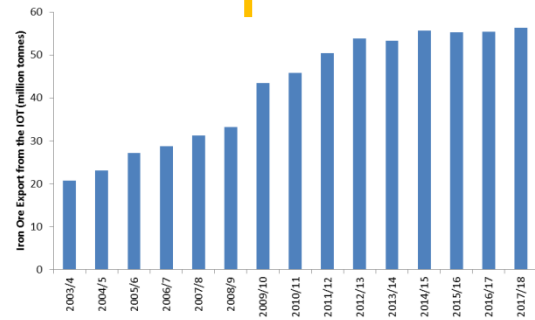
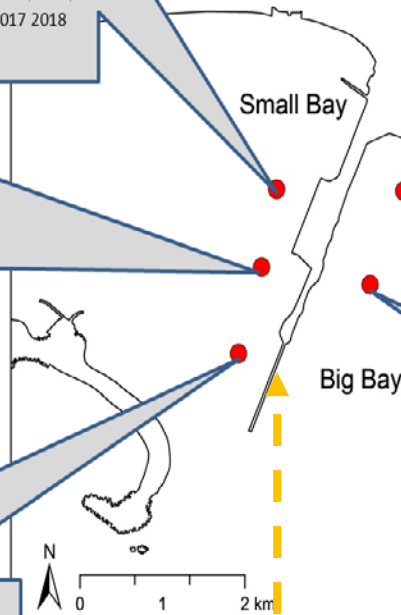
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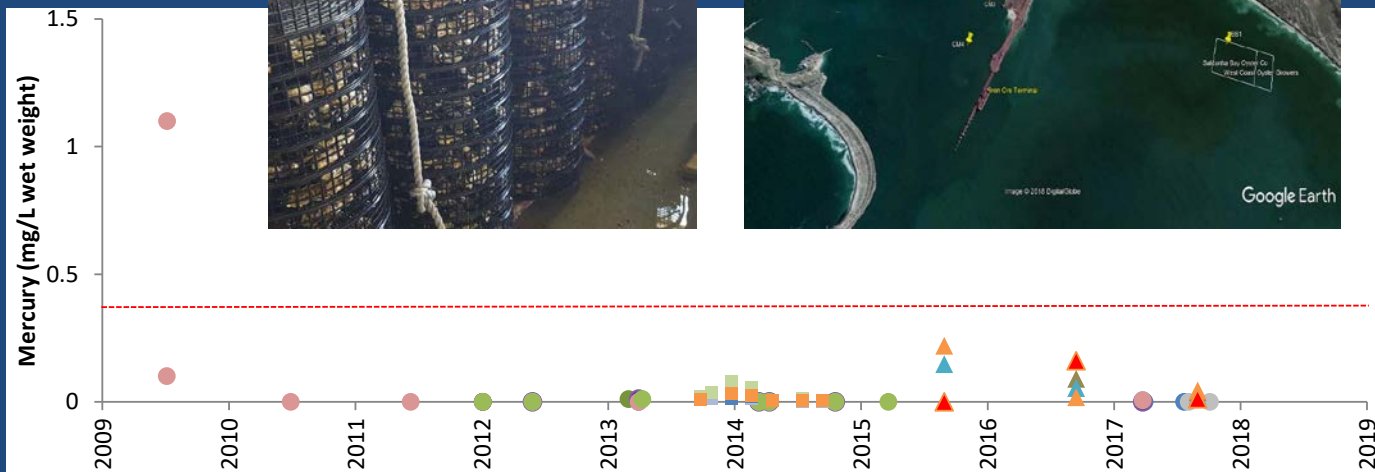
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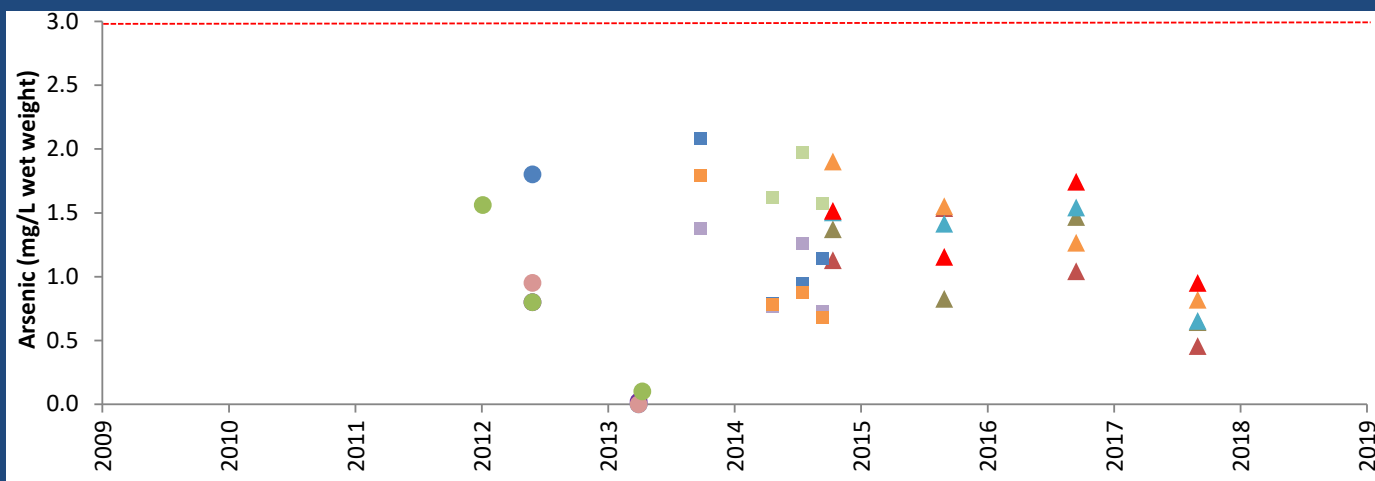
BB 22



Mercury: Farmed oysters

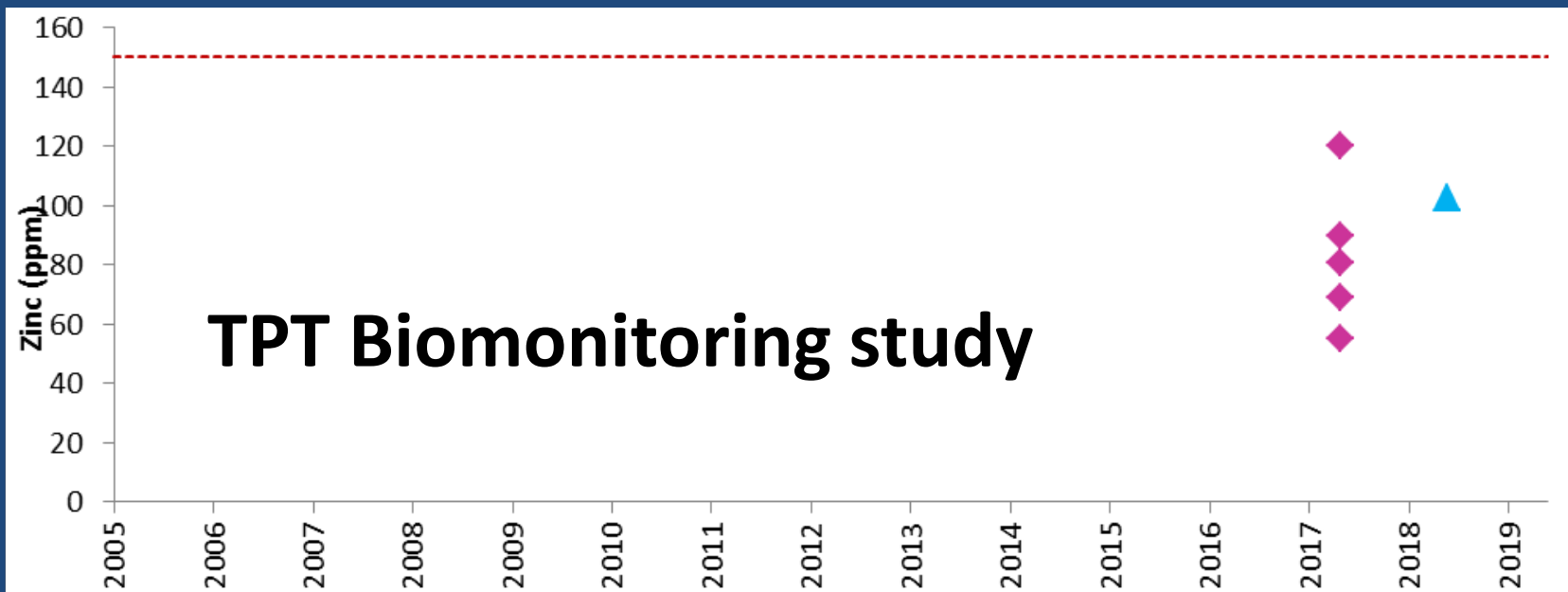


Arsenic: Farmed oysters



Zinc:

Farmed oysters

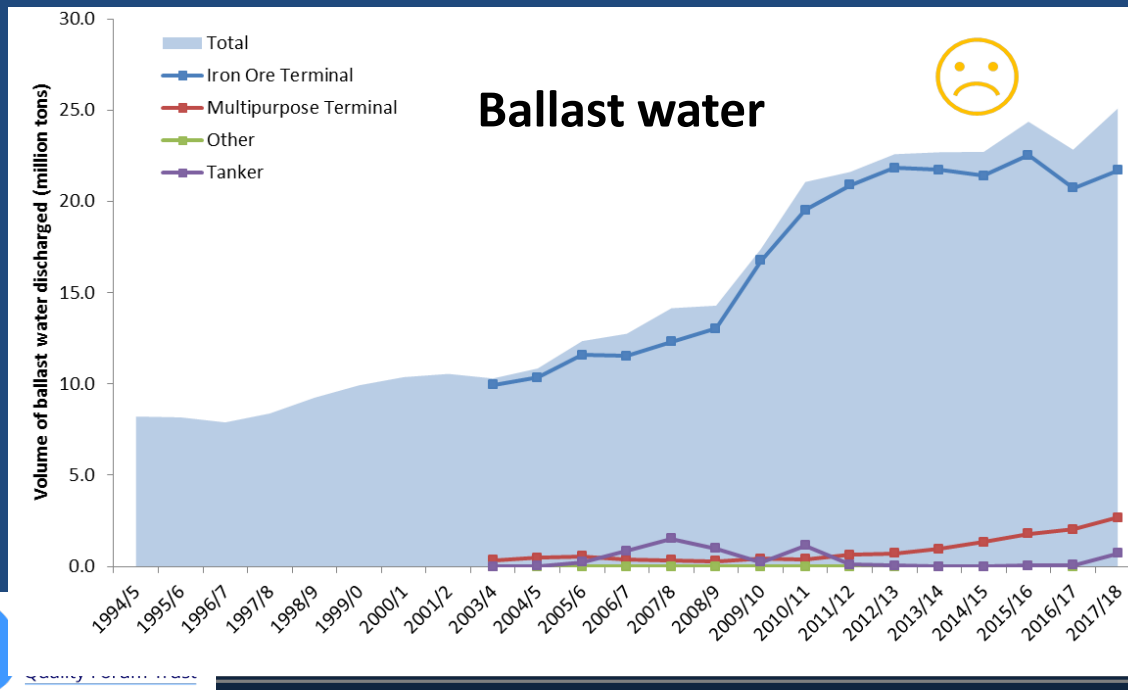
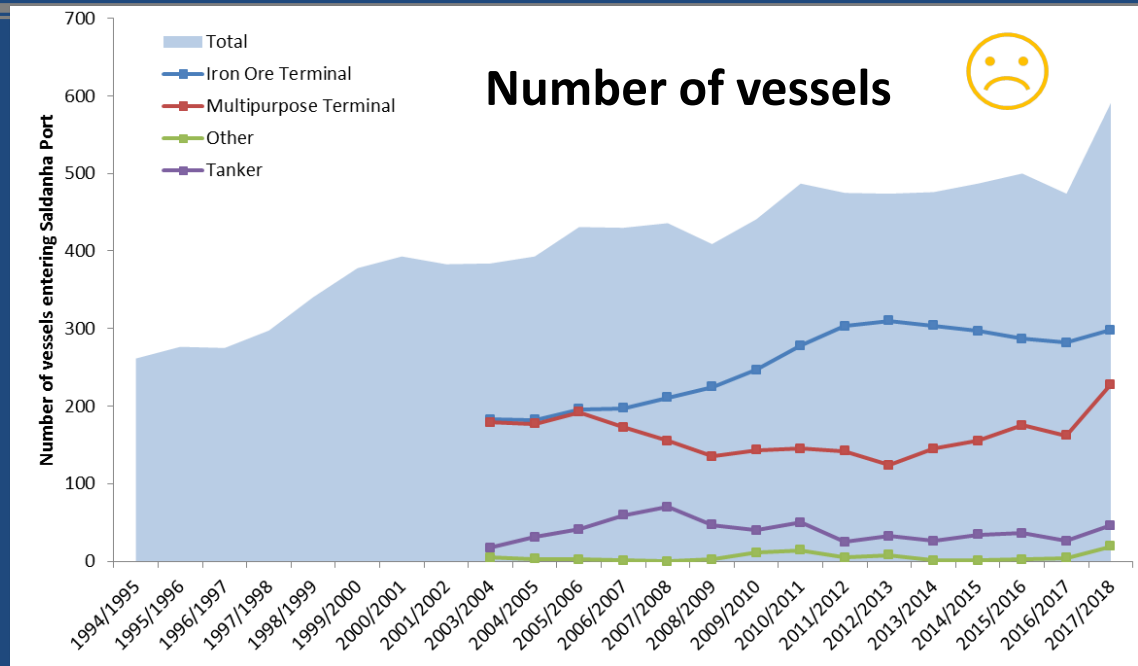


Waste water inputs

- Ballast water
- Storm water
- Treated sewage (includes some industrial effluent)
- Industrial effluent
 - Fish Processing Plants
 - Brine from RO plant

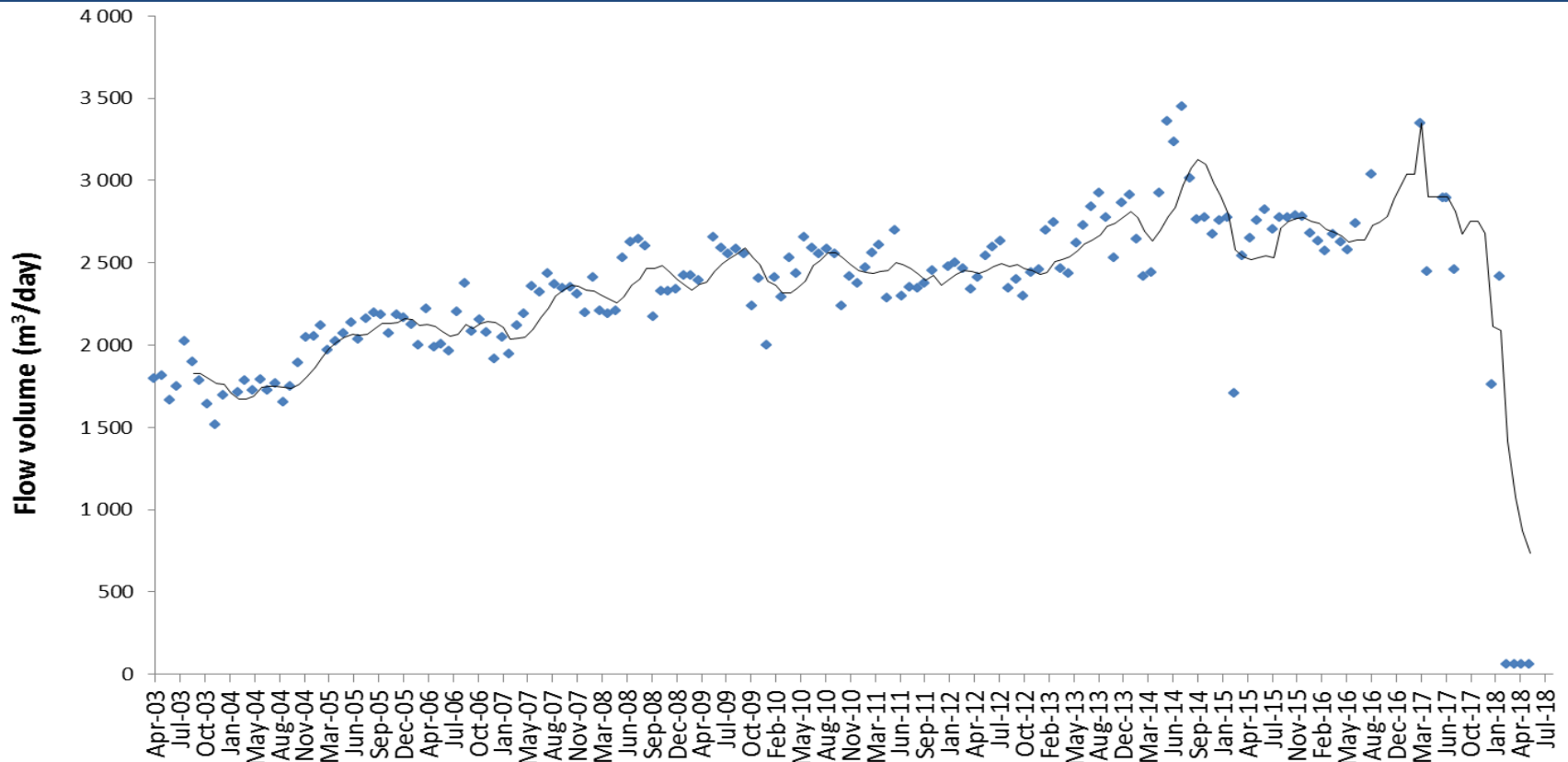


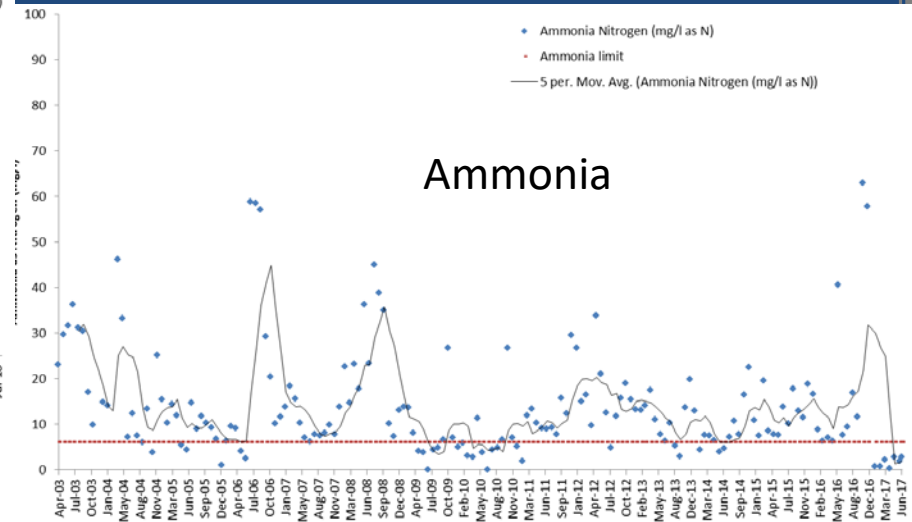
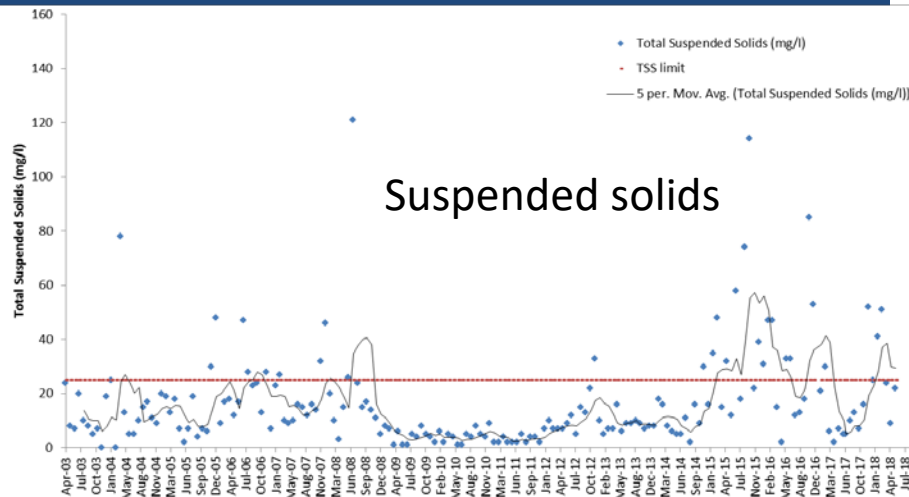
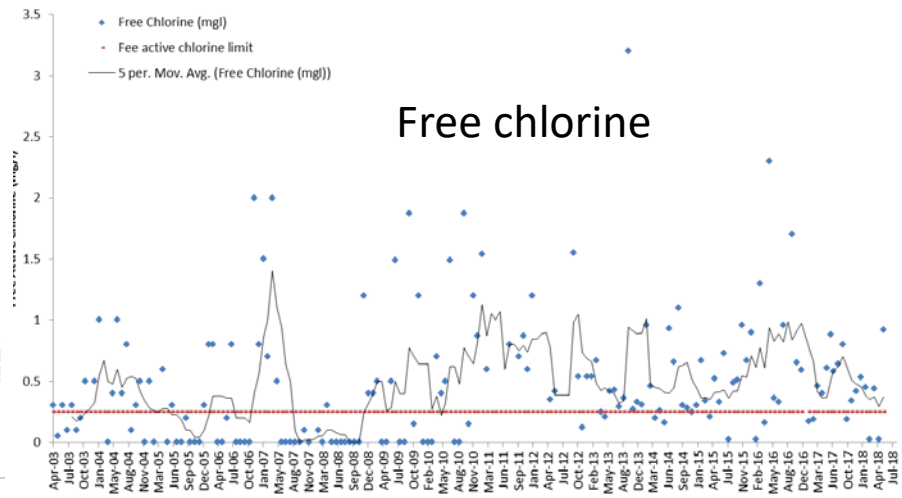
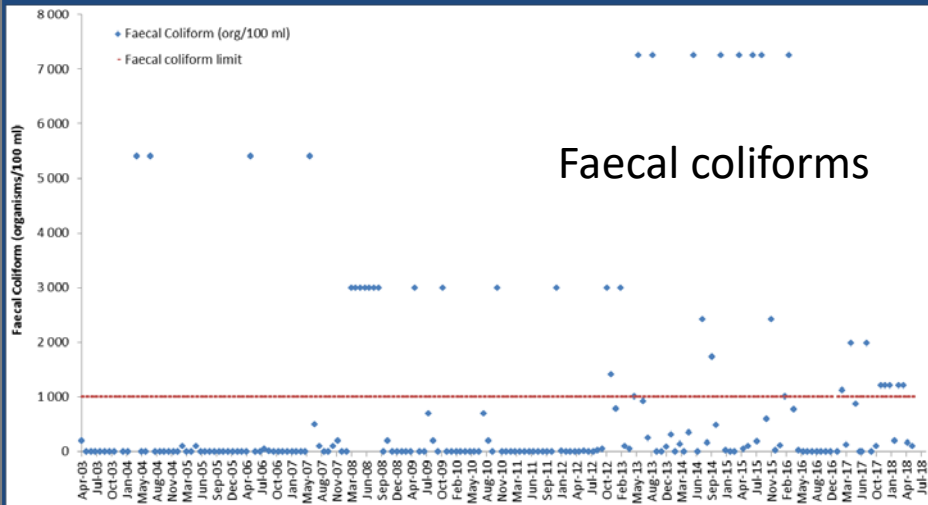
Vessel traffic & ballast water discharge



Saldanha WWTW

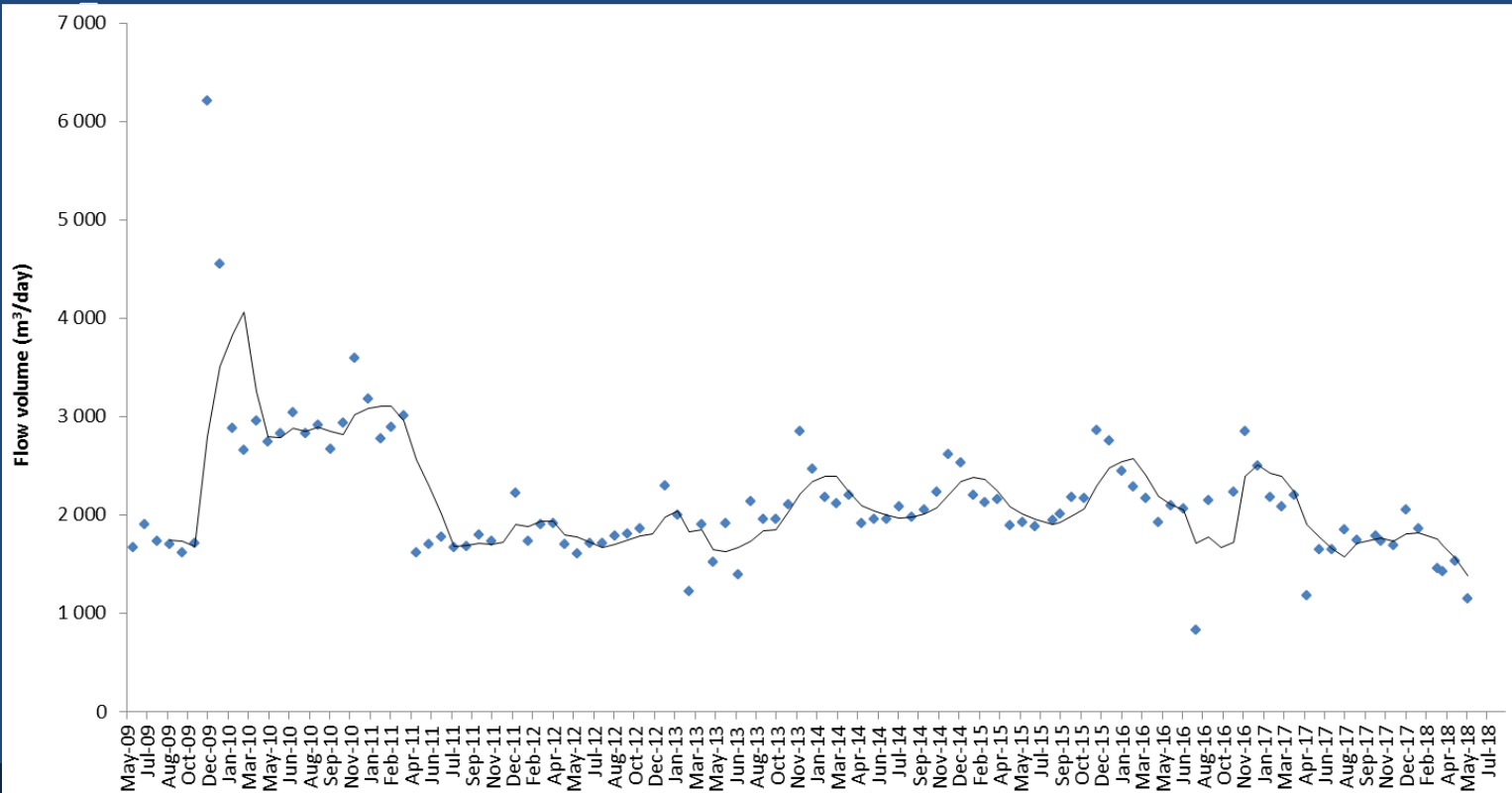
- Applied for and are awaiting CWDP from DWS
- Major upgrades completed as part of the IDZ Development
- Arcelor Mittal upgraded their RO plant, can now treat all effluent produced at the Saldanha WWTW

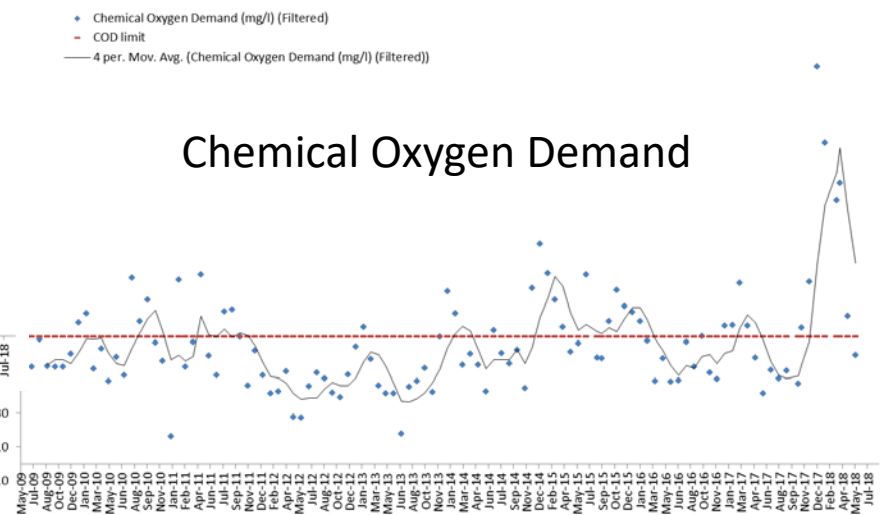
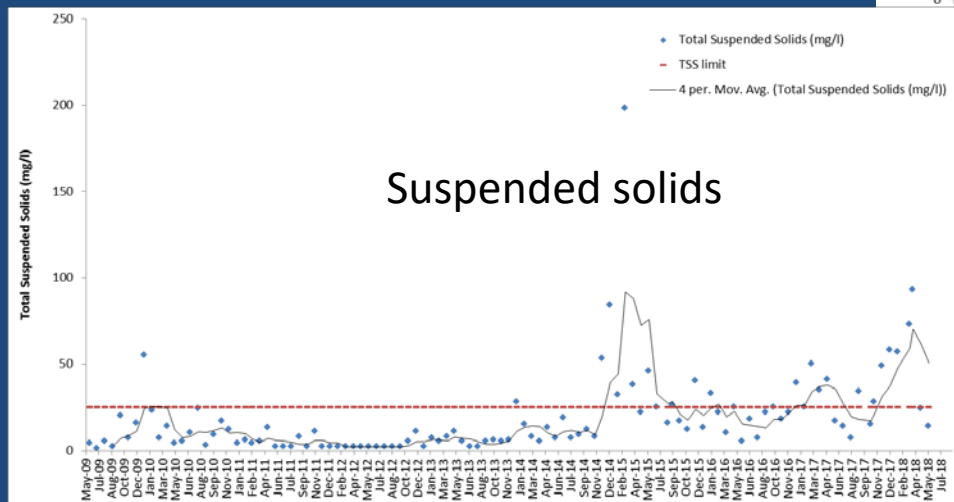
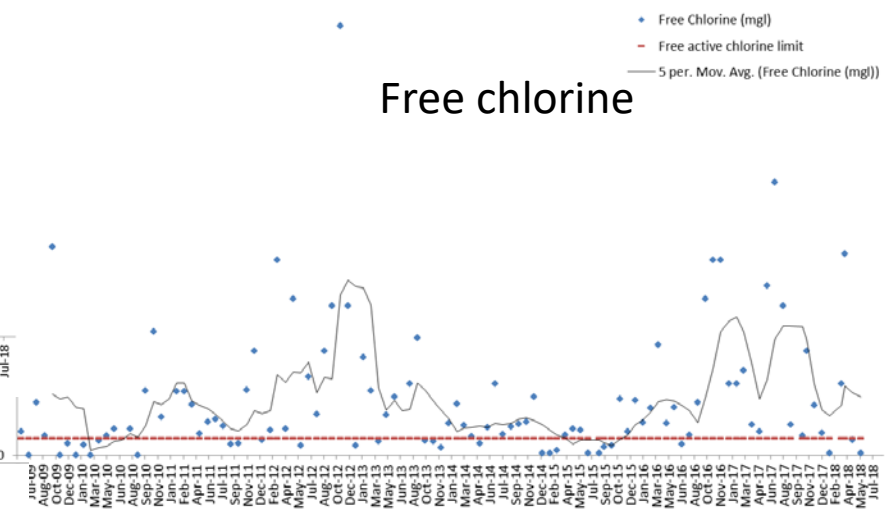
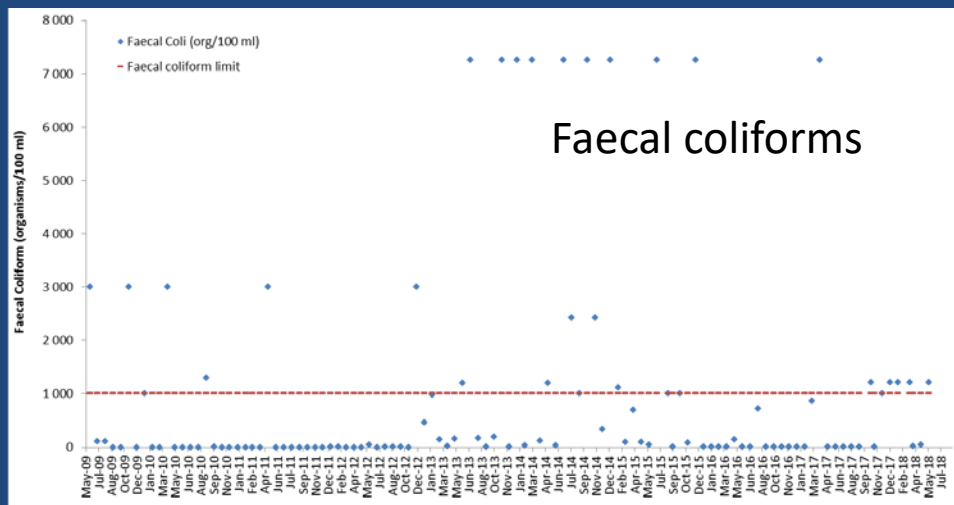




Langebaan WWTW

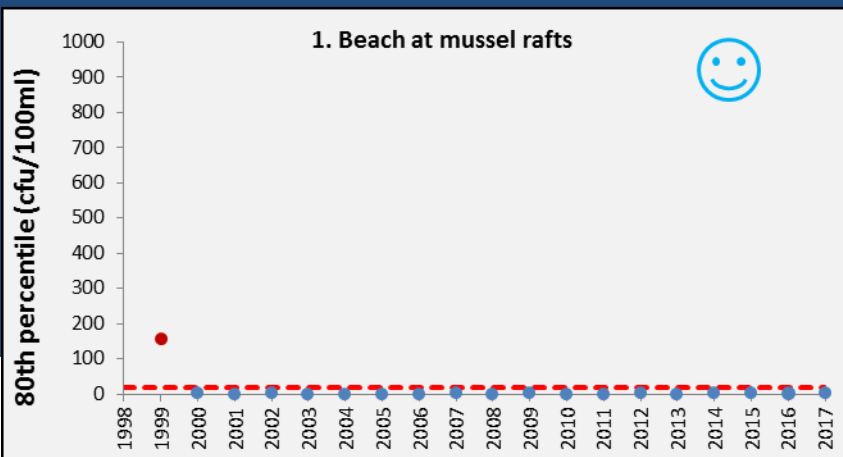
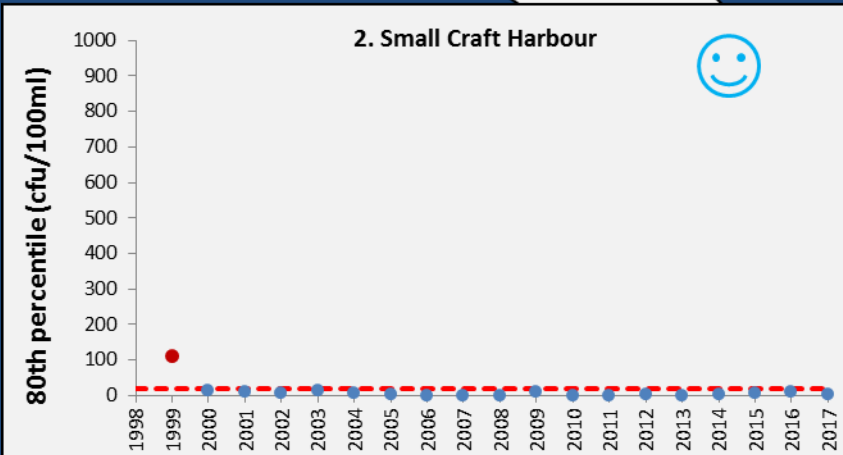
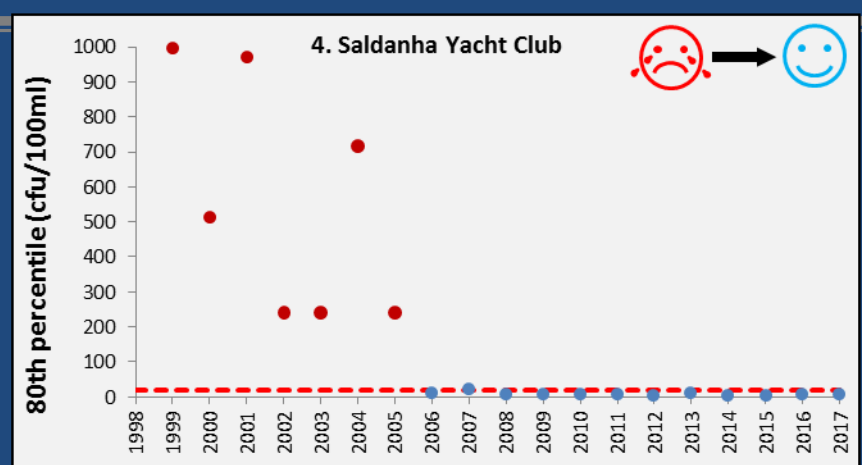
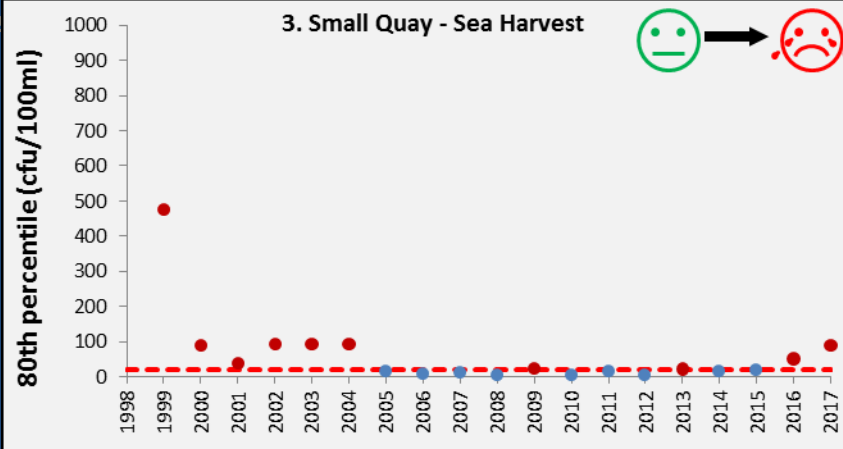
- Have received a CWDP from DWS
- Very pronounced seasonal signal in effluent volume, recent reduction due to drought
- Major upgrades completed in 2017/8
- Most (all?) of the effluent used to irrigate golf course at Langebaan Country

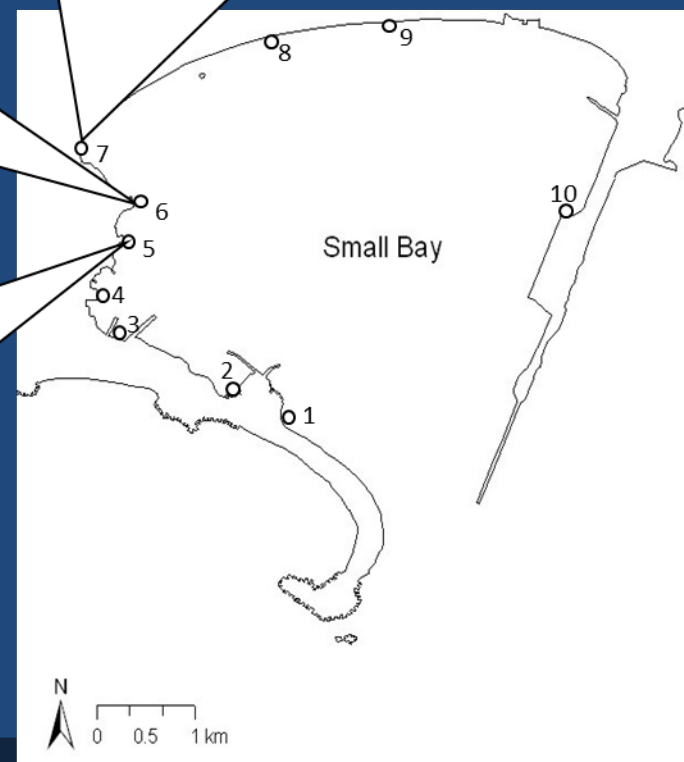
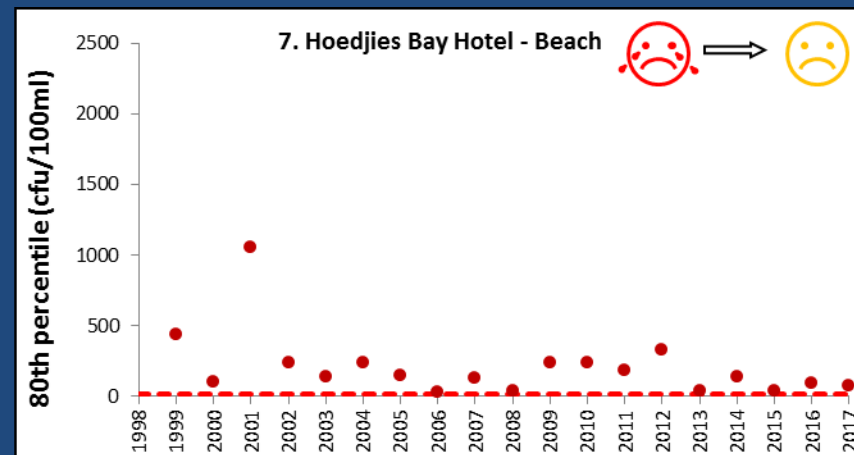
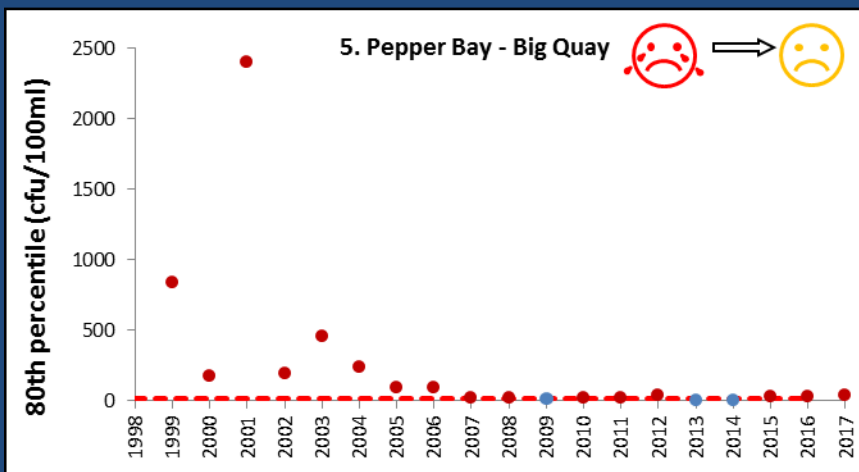
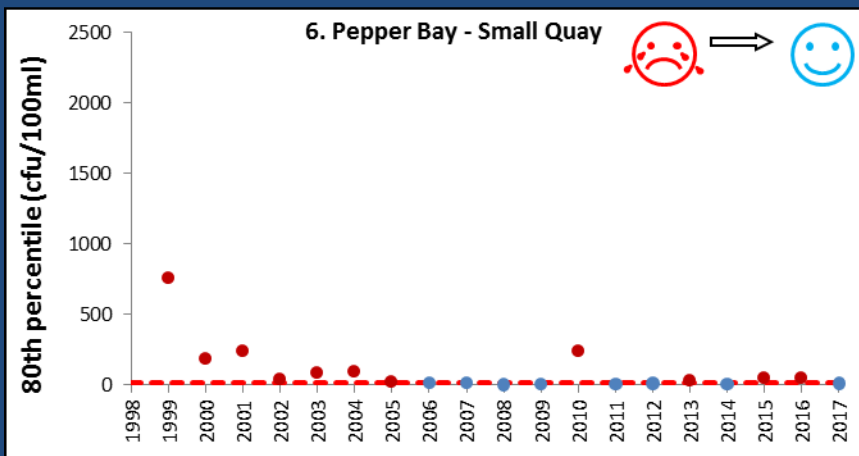


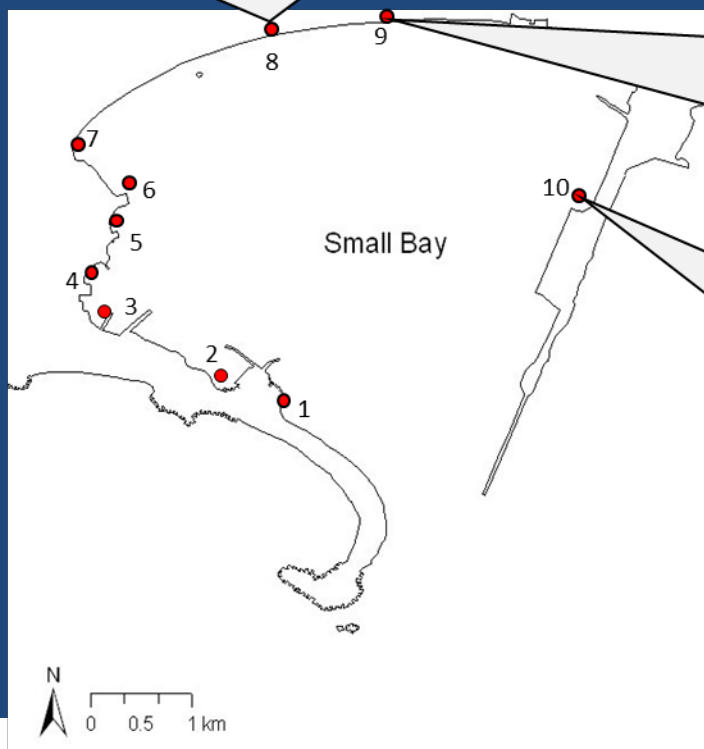
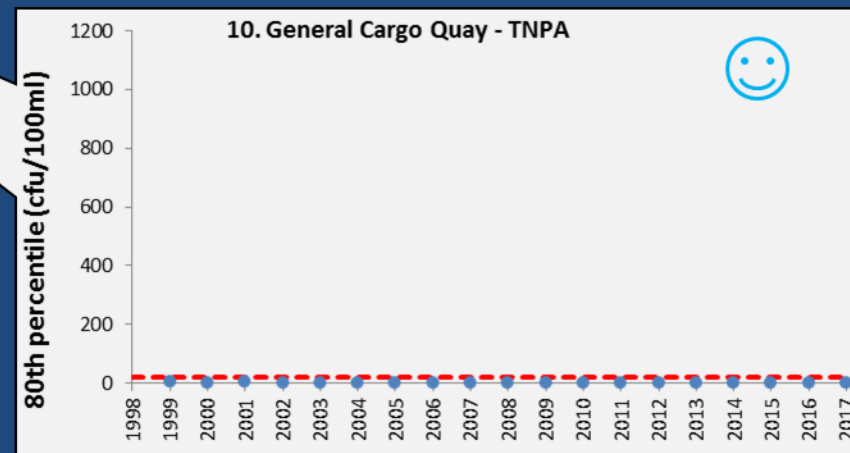
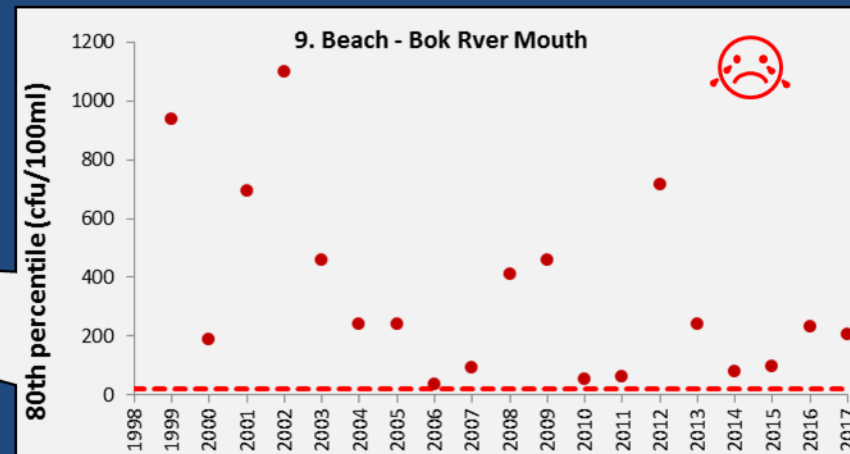
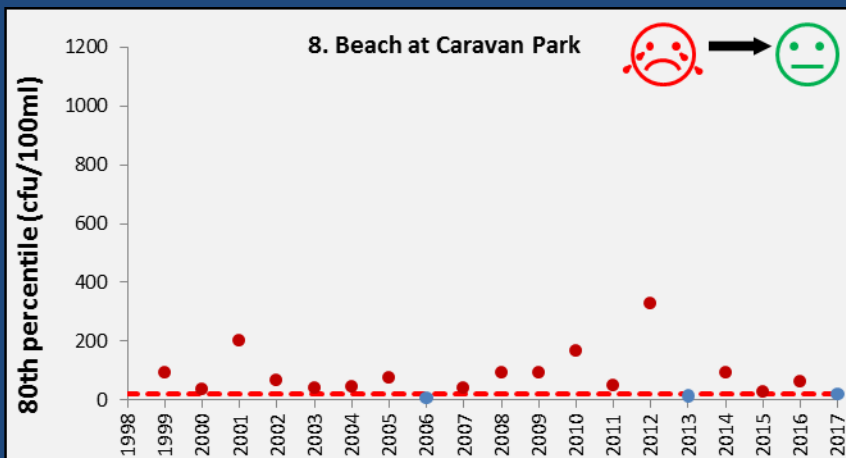


Faecal coliforms at 20 sites along the shoreline in Small Bay, Big Bay and Langebaan Lagoon, 1999-2016

	Site	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Small Bay	1. Beach at Mussel Rafts	Fair	Fair	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.
	2. Small Craft Harbour	Ex.	Fair	Good	Ex.	Ex.	Ex.	Good	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Good	Ex.	Ex.	Ex.	Ex.	Ex.
	3. Sea Harvest - Small Quay	Fair	Fair	Ex.	Ex.	Fair	Ex.	Fair	Ex.	Ex.	Ex.	Good	Ex.	Fair	Ex.	Ex.	Ex.	Ex.	Ex.	Fair
	4. Saldanha Yacht Club	Poor	Poor	Poor	Fair	Poor	Poor	Poor	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.
	5. Pepper Bay - Big Quay	Poor	Fair	Poor	Fair	Fair	Fair	Fair	Poor	Ex.	Ex.	Fair	Ex.	Ex.	Good	Ex.	Ex.	Ex.	Ex.	Ex.
	6. Pepper Bay - Small Quay	Poor	Fair	Fair	Good	Ex.	Good	Ex.	Ex.	Good	Ex.	Good	Good	Ex.	Good	Fair	Fair	Ex.	Ex.	Ex.
	7. Hoedjies Bay Hotel - Beach	Fair	Fair	Poor	Fair	Good	Poor	Poor	Good	Fair	Ex.	Fair	Fair	Poor	Poor	Fair	Good	Fair	Good	Fair
	8. Beach at Caravan Park	Fair	Fair	Fair	Poor	Ex.	Fair	Poor	Ex.	Good	Poor	Fair	Fair	Fair	Poor	Good	Fair	Ex.	Fair	Fair
	9. Bok River Mouth - Beach	Poor	Fair	Poor	Poor	Poor	Poor	Poor	Ex.	Fair	Poor	Poor	Good	Ex.	Poor	Fair	Good	Ex.	Poor	Poor
	10. General Cargo Quay - TNPA	Ex.	Fair	Ex.	Ex.	Ex.	Ex.	Good	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.
Big Bay	11. Seafarm - TNPA	Ex.	Fair	Ex.	Ex.	ND	ND	Ex.	Ex.	Ex.	ND	Ex.	ND	ND	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.
	12. Mykonos - Paradise Beach	Ex.	Fair	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.
	13. Mykonos - Harbour	Fair	Fair	Ex.	Ex.	Fair	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Fair	Ex.	Ex.	Good	Fair	Ex.	Ex.
	14. Leentjiesklip	ND	ND	Good	Fair	Good	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Fair	Ex.	Good	Ex.	Ex.	Ex.
Langebaan Lagoon	15. Langebaan North - Leentjiesklip	Ex.	Fair	Good	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Poor	Good	Ex.	Good	Ex.	Good
	16. Langebaan - Main Beach	ND	ND	Fair	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Good	Ex.	Ex.	Ex.	Ex.	Ex.	Fair	Ex.	Ex.
	17. Langebaan Yacht Club	ND	ND	ND	ND	ND	Poor	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Good	Ex.	Ex.	Fair	Good
	18. Tooth Rock	ND	ND	ND	ND	ND	Fair	Ex.	Ex.	Ex.	Ex.	Fair	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.
	19. Kraalbaai North	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.
	20. Kraalbaai South	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.





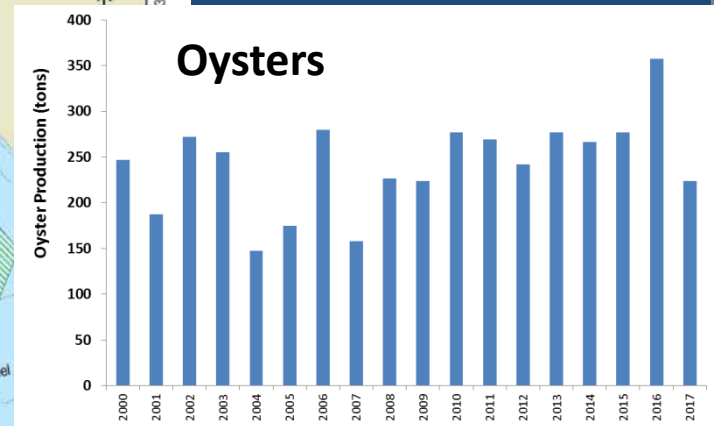
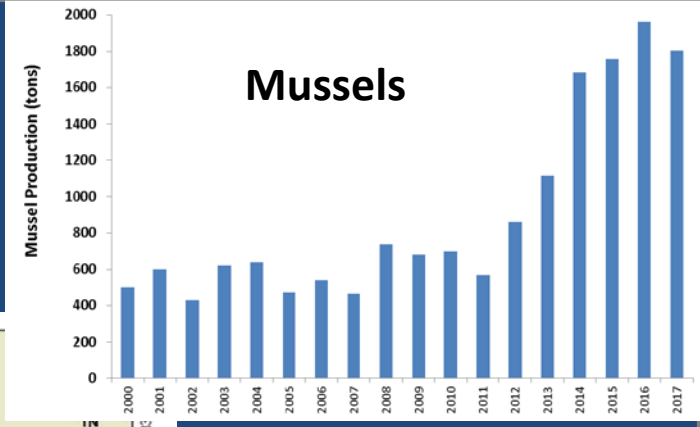
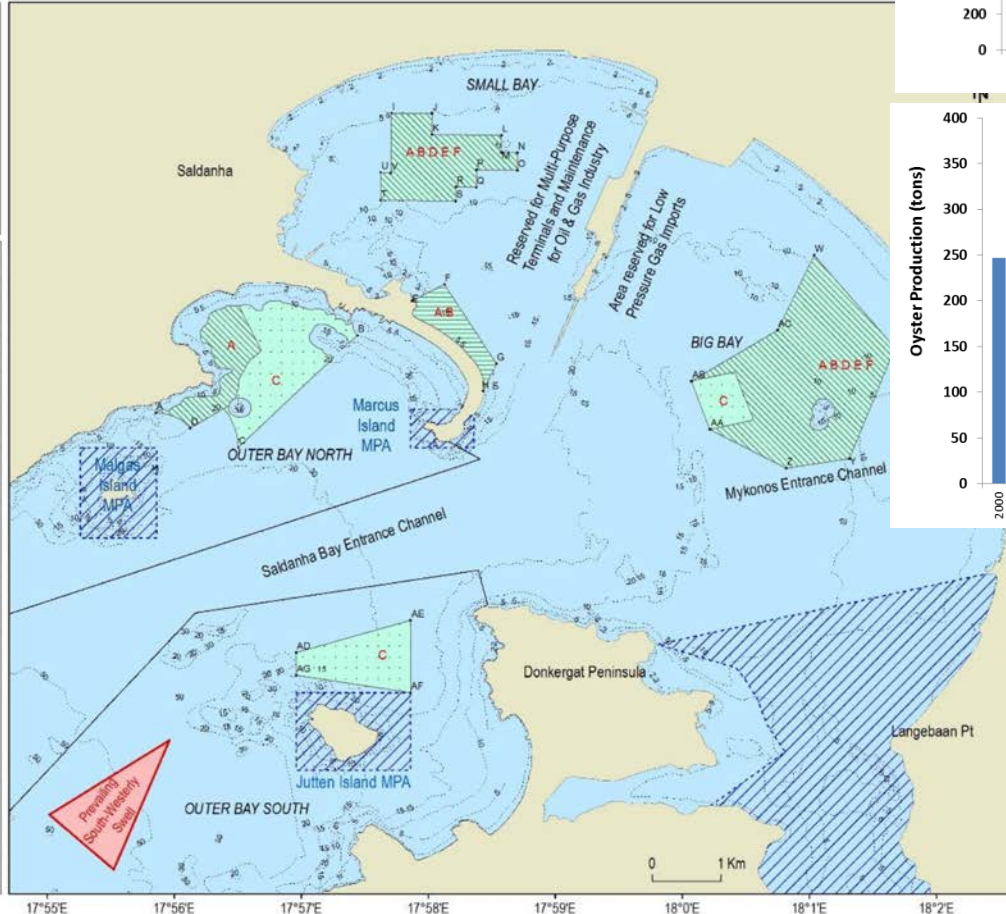


Mariculture in Saldanha Bay

- EA authorisation for the DAFF ADZ has been upheld, now 884 ha of space for aquaculture (up from 464 ha)
- Bivalves (mussels & oysters) & finfish (experimental)



Point	LATITUDE	LONGITUDE
	DEG MIN SEC	DEG MIN SEC
A	33° 2' 32.1"	17° 55' 51.3"
B	33° 1' 56.04"	17° 57' 26.52"
C	33° 2' 48.06"	17° 56' 30.24"
D	33° 2' 38.18"	17° 56' 7.56"
E	33° 1' 38.9"	17° 57' 52.2"
F	33° 1' 32.22"	17° 58' 7.62"
G	33° 2' 9.18"	17° 58' 32.22"
H	33° 2' 21.9"	17° 58' 25.92"
I	33° 0' 12.6"	17° 57' 42.6"
J	33° 0' 12.78"	17° 58' 1.8"
K	33° 0' 22.5"	17° 58' 1.68"
L	33° 0' 22.8"	17° 58' 34.5"
M	33° 0' 30.9"	17° 58' 34.38"
N	33° 0' 31.02"	17° 58' 42.12"
O	33° 0' 39.12"	17° 58' 42"
P	33° 0' 38.88"	17° 58' 22.74"
Q	33° 0' 46.98"	17° 58' 22.62"
R	33° 0' 46.92"	17° 58' 13.02"
S	33° 0' 53.4"	17° 58' 12.9"
T	33° 0' 53.34"	17° 57' 37.32"
U	33° 0' 40.2"	17° 57' 37.38"
V	33° 0' 40.28"	17° 57' 42.24"
W	33° 1' 18.6"	18° 1' 2.28"
X	33° 2' 1.86"	18° 1' 40.44"
Y	33° 2' 53.4"	18° 1' 18.84"
Z	33° 2' 57.84"	18° 0' 49.08"
AA	33° 2' 39.72"	18° 0' 13.02"
AB	33° 2' 17.22"	18° 0' 4.32"
AC	33° 1' 53.52"	18° 0' 44.94"
AD	33° 4' 23.58"	17° 56' 57.66"
AE	33° 4' 8.7"	17° 57' 51.66"
AF	33° 4' 42.36"	17° 57' 51.66"
AG	33° 4' 34.26"	17° 56' 57.66"



Emerging issue.....



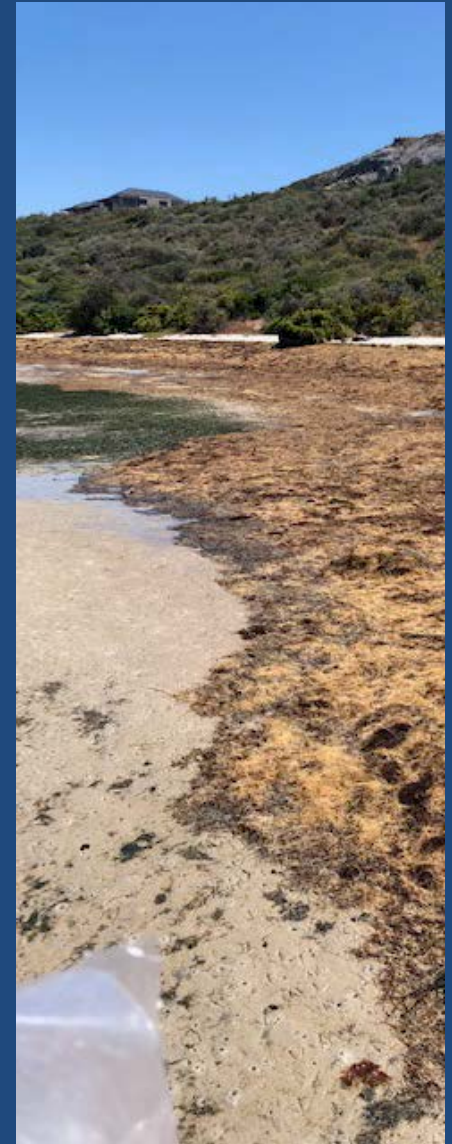
Rainbow trout *Oncorhynchus mykiss*

State of The Bay - Biota

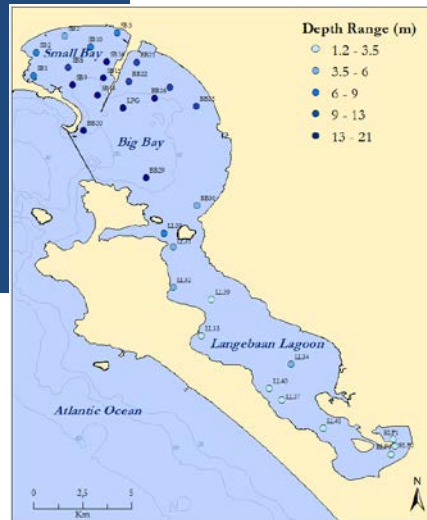
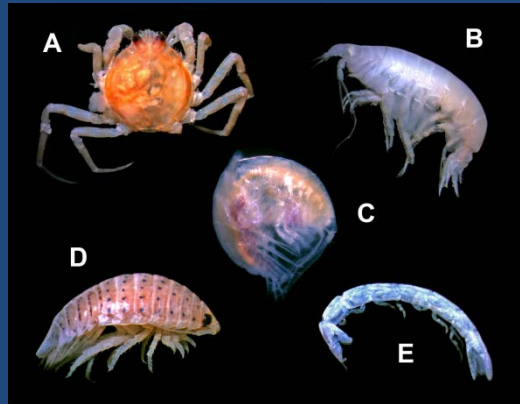
- Algae,
- Seagrass and salt marshes
- Subtidal benthic macrofauna
- Rocky intertidal macrofauna
- Fish
- Birds



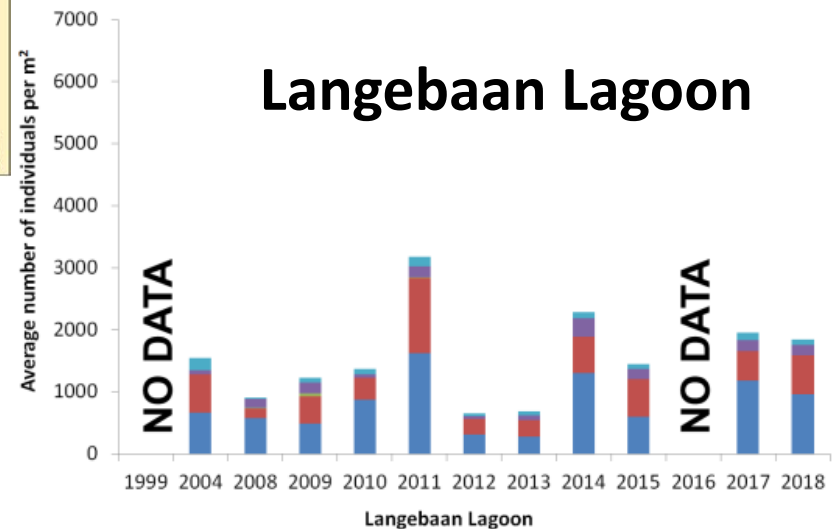
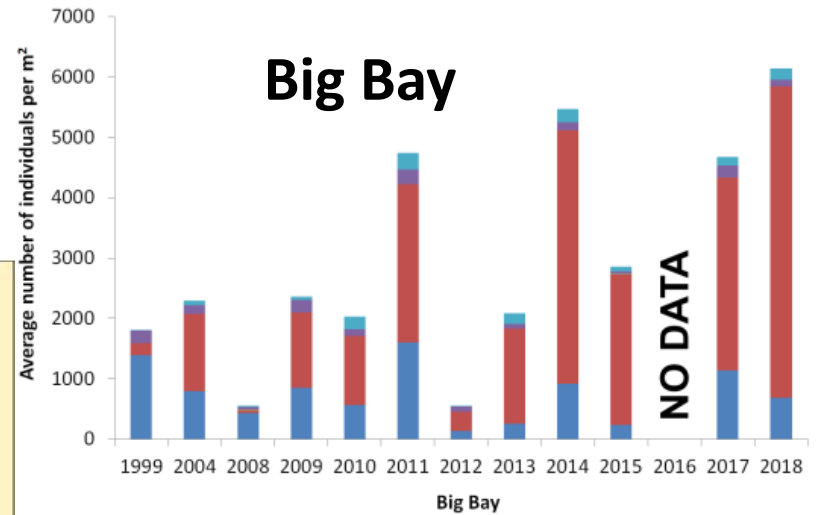
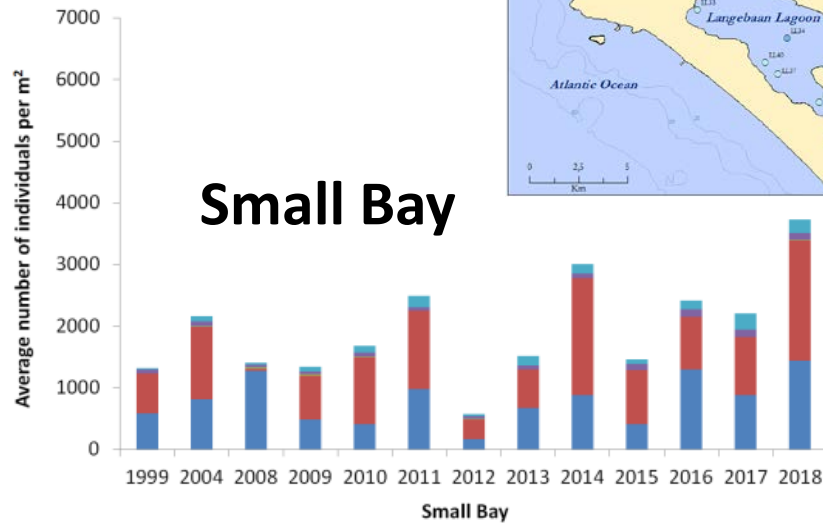
Emerging issue.....



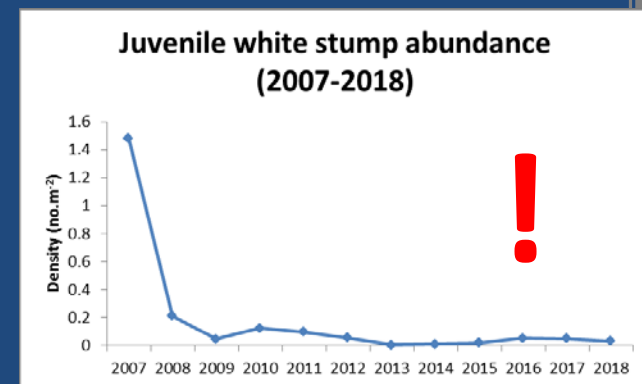
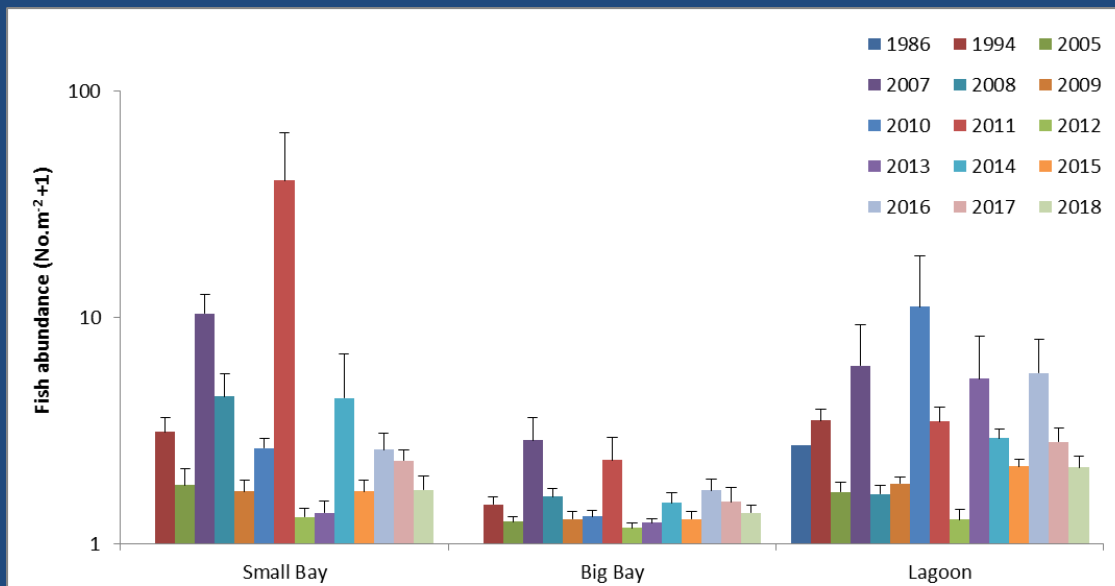
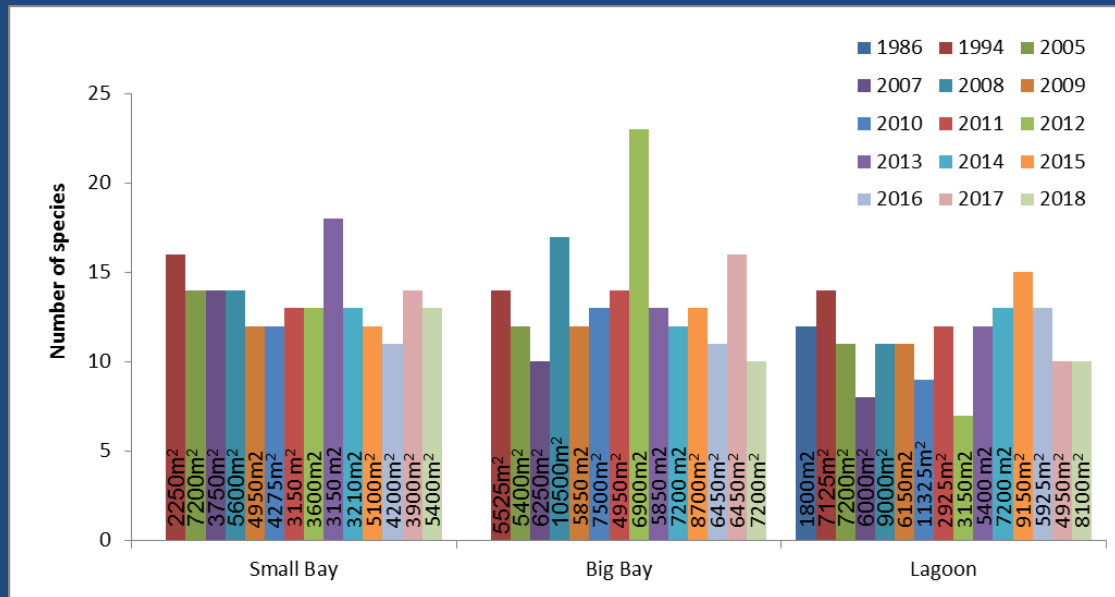
Benthic invertebrates



- SCAVENGER
- PREDATOR
- GRAZER
- FILTER FEEDER
- DETRITIVORE



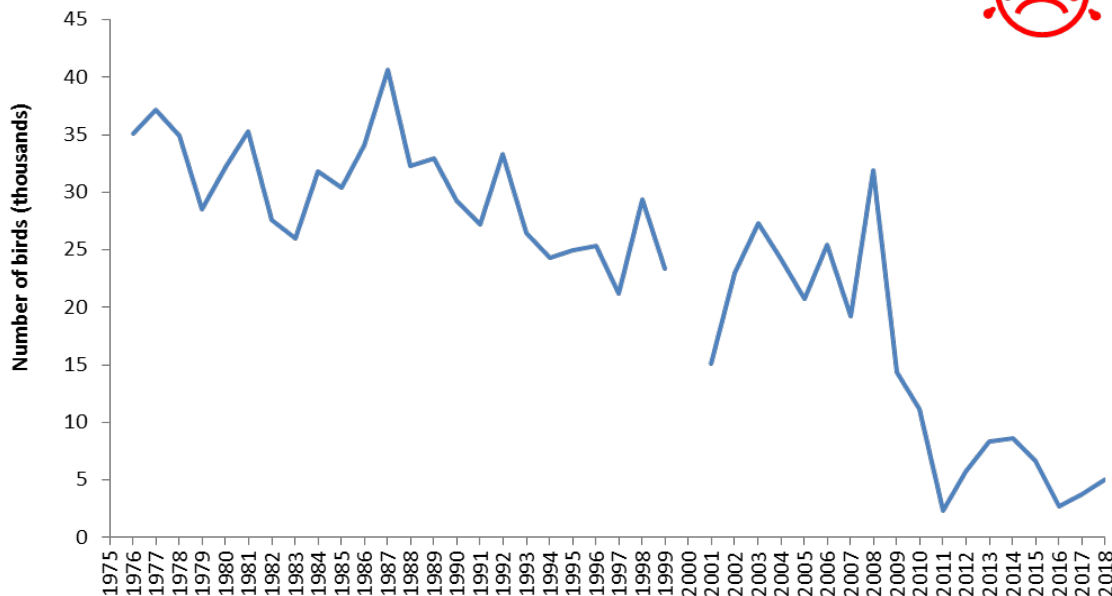
Fish



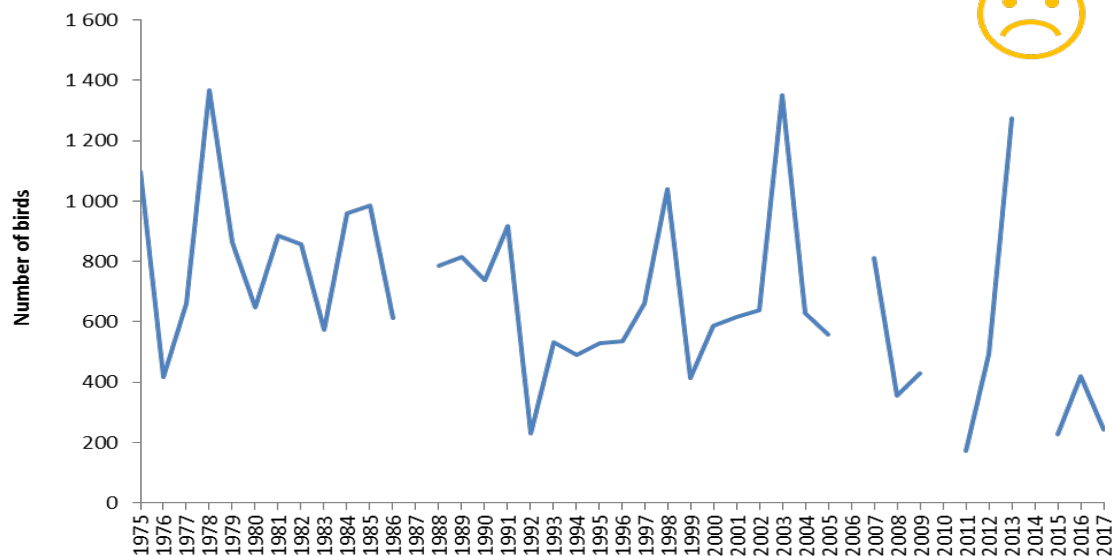
Lagoon birds



Number of migratory waders in summer



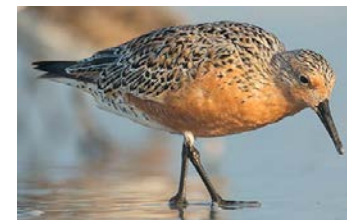
Number of resident waders in winter



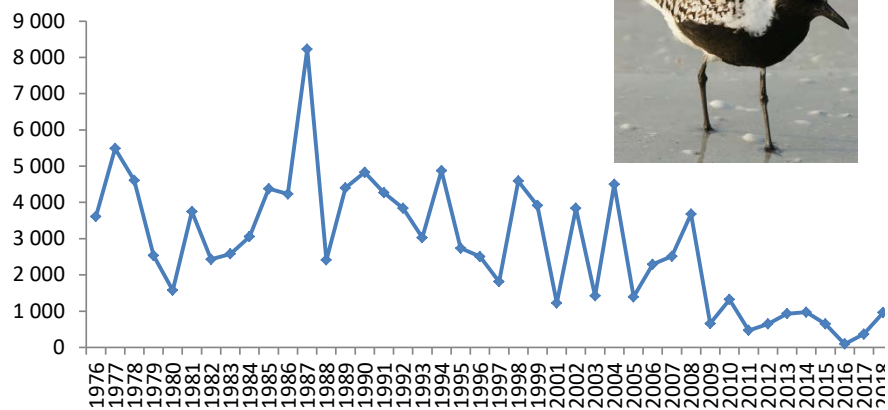
Ruddy Turnstone



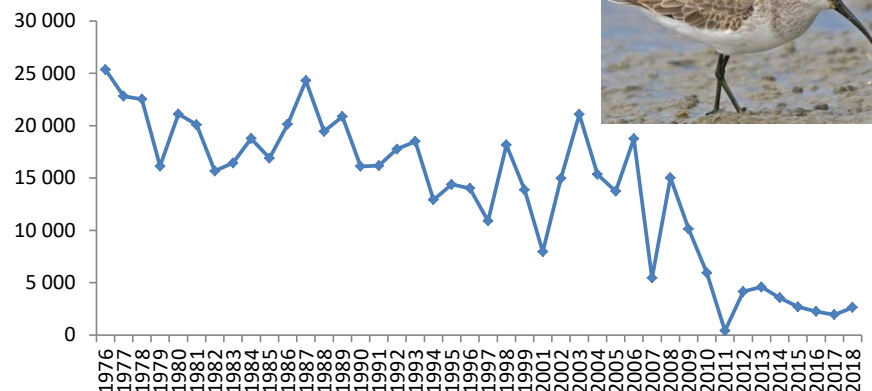
Red Knot



Grey Plover



Curlew Sandpiper



Summary

- Development, shipping traffic, mariculture are increasing in and around the Bay, also some emerging issues...
 - Some encouraging signs though: reuse of waste water
 - Water and sediment quality are improving or at least stable
 - Biota –benthic macrofauna abundance and biomass both increasing, fish populations are stable, but birds (especially migratory waders) are declining
- Overall: Stable/Improving?



A close-up, low-angle shot of a massive ocean wave in the process of crashing. The wave's face is a deep, dark blue-green, showing a distinct barrel shape as it curls over. A thick, turbulent plume of white foam and spray erupts from the base of the wave, dominating the lower left and center of the frame. The water surface in the foreground is dark and textured with small ripples. The overall scene conveys a sense of immense power and natural beauty.

Thank You