



# State of the Bay 2019

## Saldanha Bay and Langebaan Lagoon

Barry Clark

Vera Massie, Megan Laird, Ken Hutchings,  
Erika Brown, Aiden Biccard, Kirti Gihwala,  
Anelisa Makhosonke, Bruce Mostert, Jane  
Turpie, Jane Turpie & Nicolette Vermaak

# 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**
  - Concentrations of **contaminants** (e.g. trace metals, bacteria) in **sea water, sediments and living organisms in the bay**
- Ecological health:
  - **Changes in community structure** and abundance of living organisms (macrophytes, invertebrates, fish, birds)







# Indicator response times

- Water... Hours/Days
- Sediments... Weeks/Months
- Living Organisms
  - Macrofauna... Weeks/Months/Years
  - Fish... Months/Years
  - Birds... Years/decades





Health category	Ecological perspective	Management perspective
<b>Natural</b> 	No or negligible modification from the natural state	Relatively little human impact
<b>Good</b> 	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
<b>Fair</b> 	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.
<b>Poor</b> 	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.



Black Mountain



# Thanks ....



**environmental affairs**

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA



ADU



South African  
Weather Service



*Bivalve Shellfish Farmers' Association  
Saldanha*



**agriculture,  
forestry & fisheries**

Department:  
Agriculture, Forestry and Fisheries  
REPUBLIC OF SOUTH AFRICA



*National Port Operations  
Port Terminals*



**SBWQFT**  
Saldanha Bay Water  
Quality Forum Trust



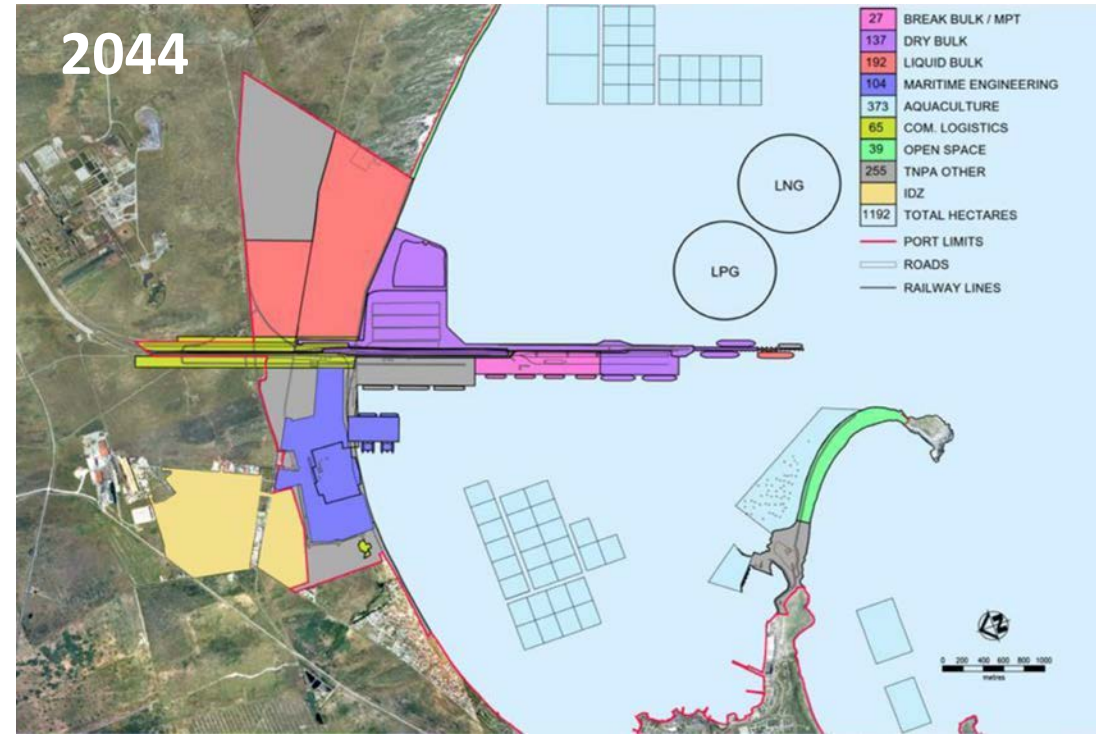
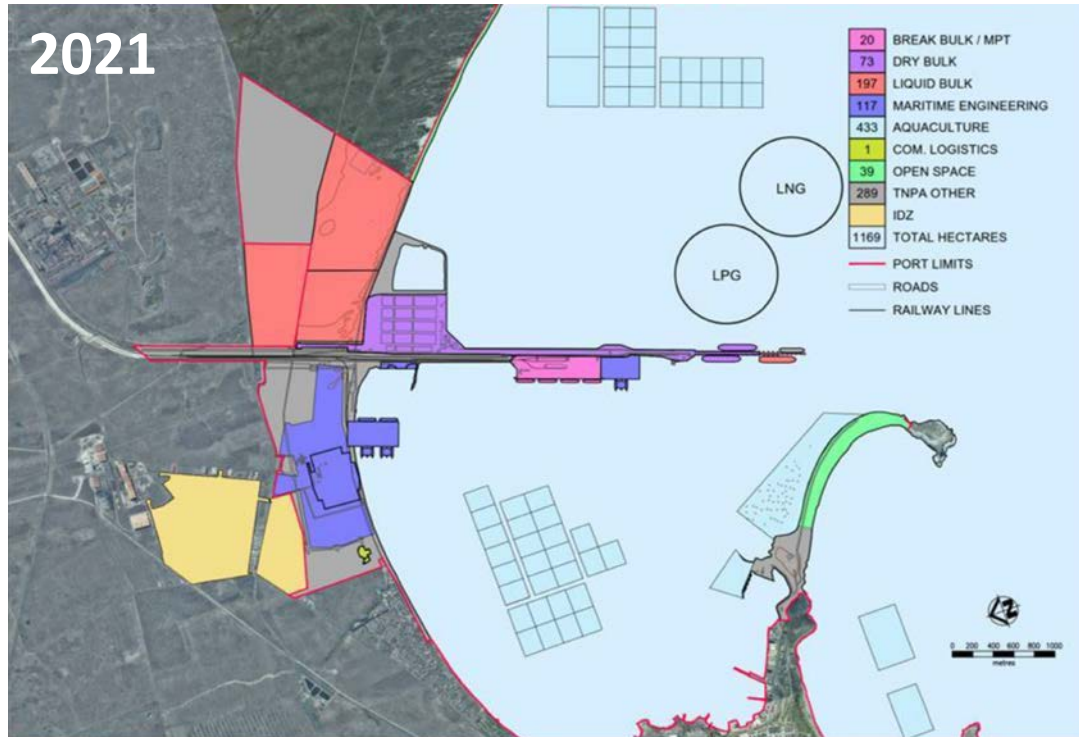
**water & sanitation**

Department:  
Water and Sanitation  
REPUBLIC OF SOUTH AFRICA

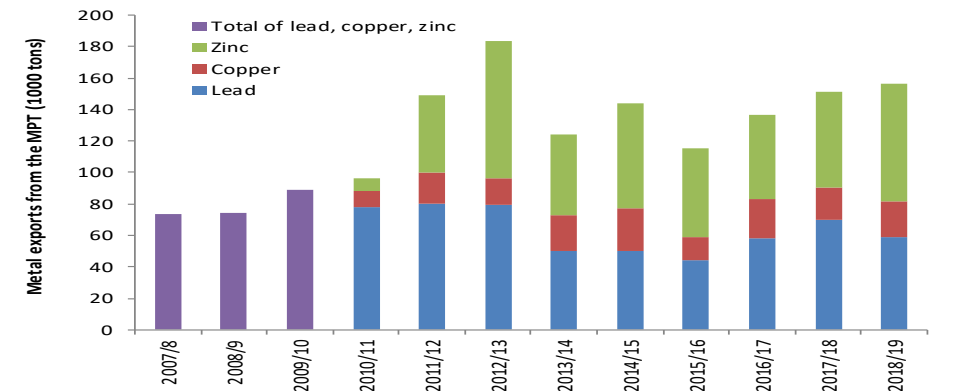
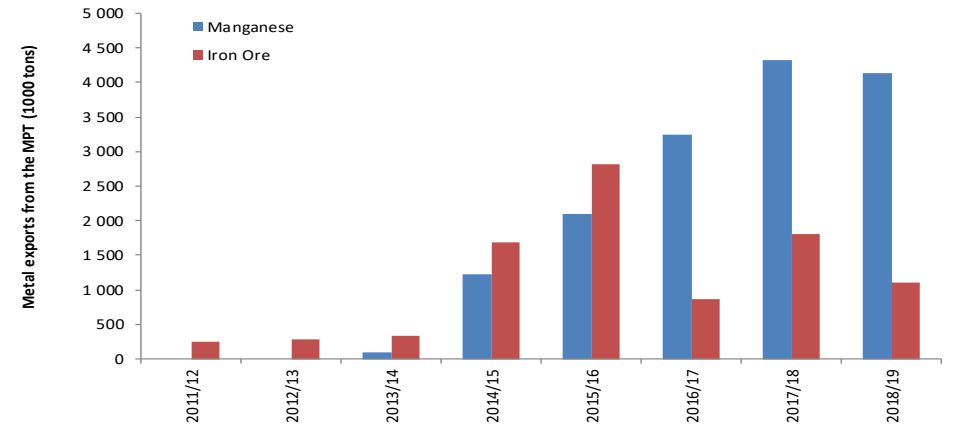
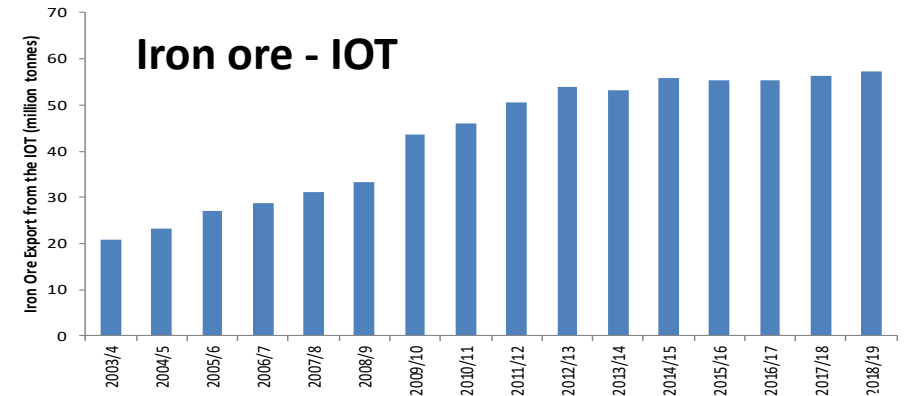
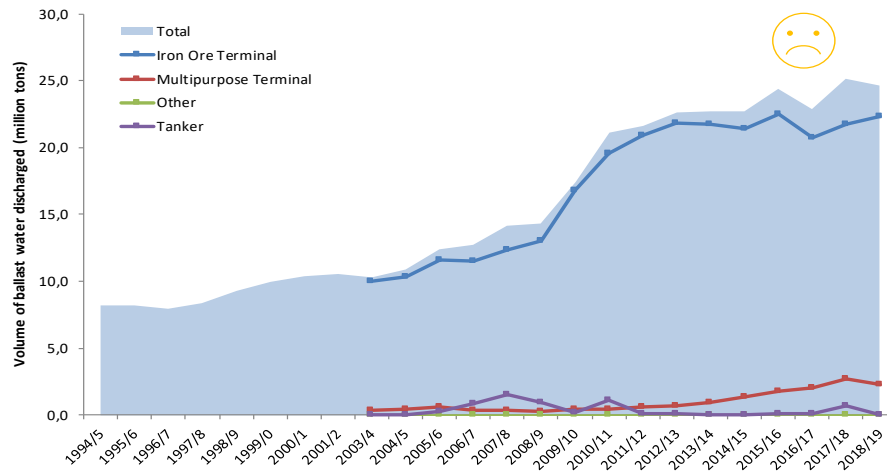
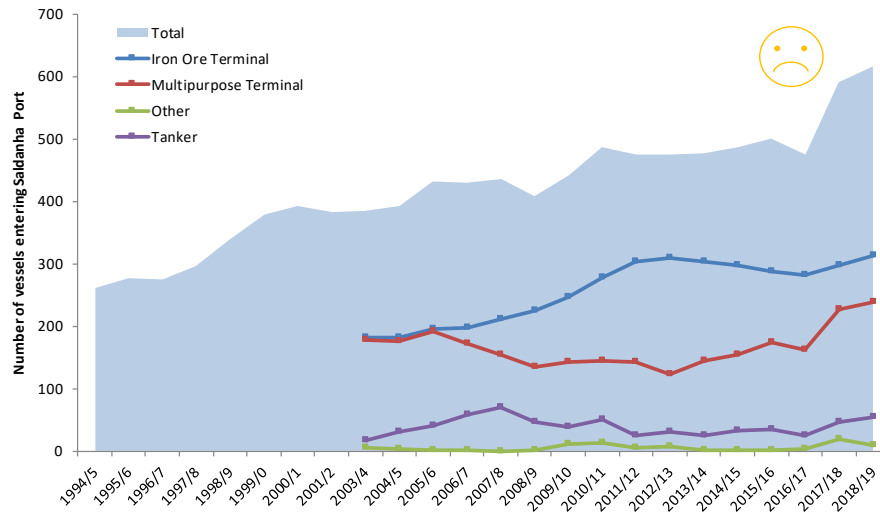


**ANCHOR**  
environmental

# Port development

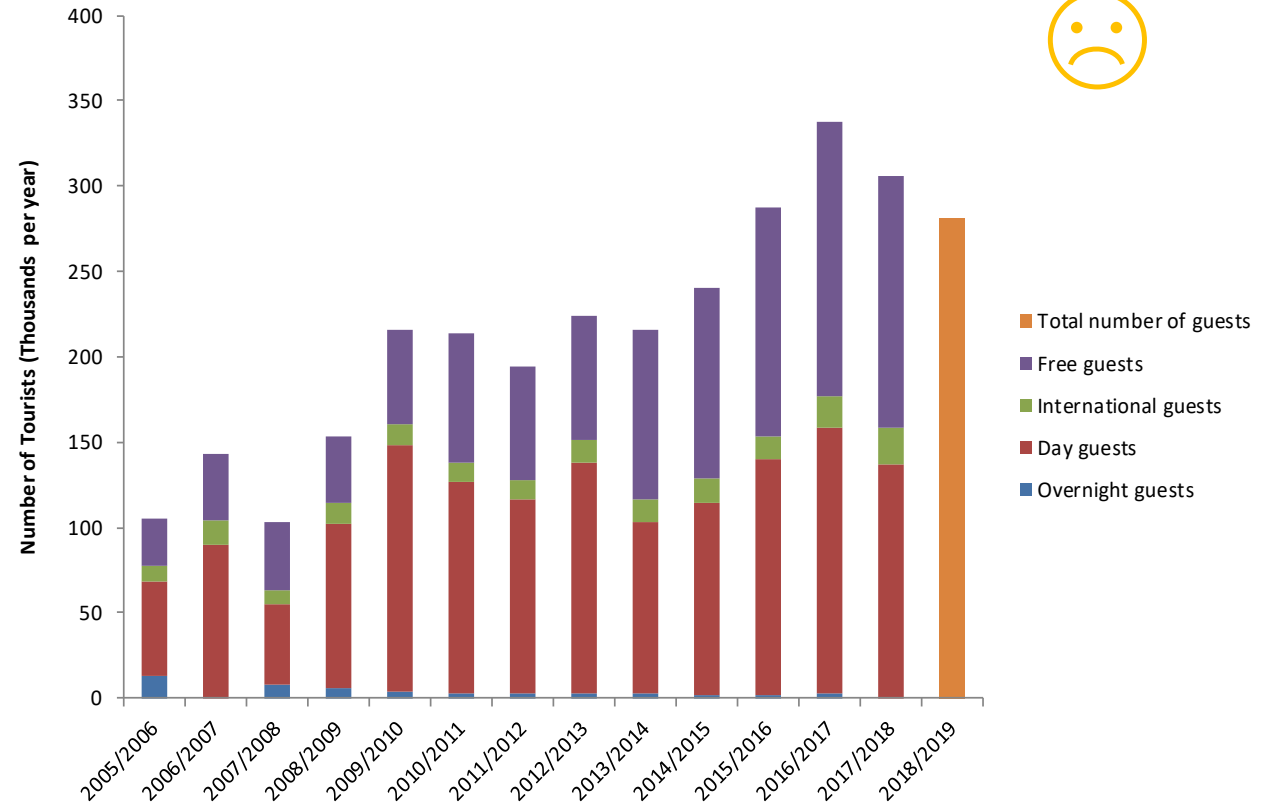


# Port operations

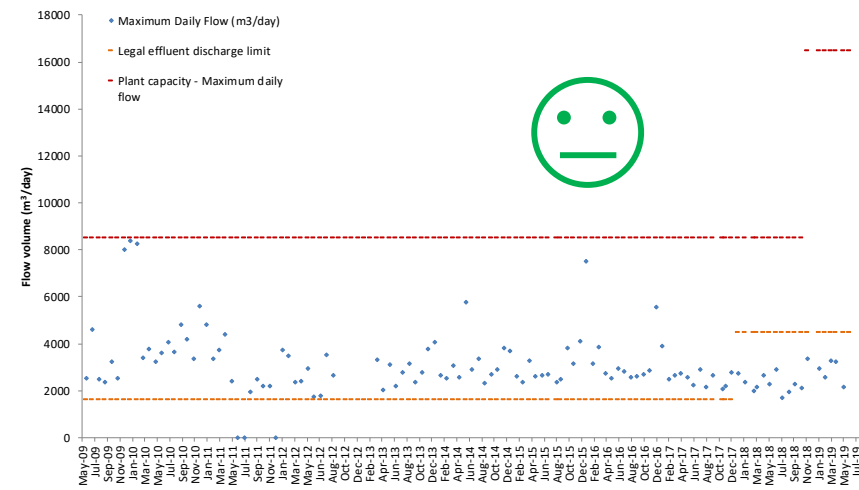
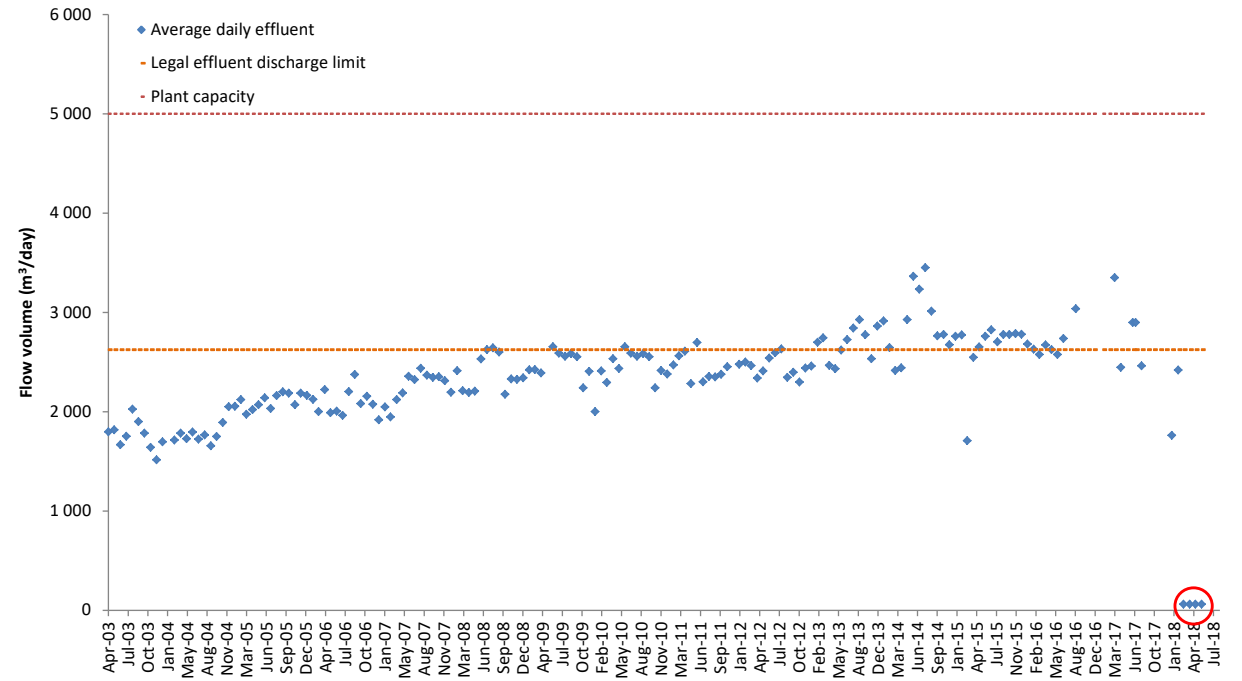




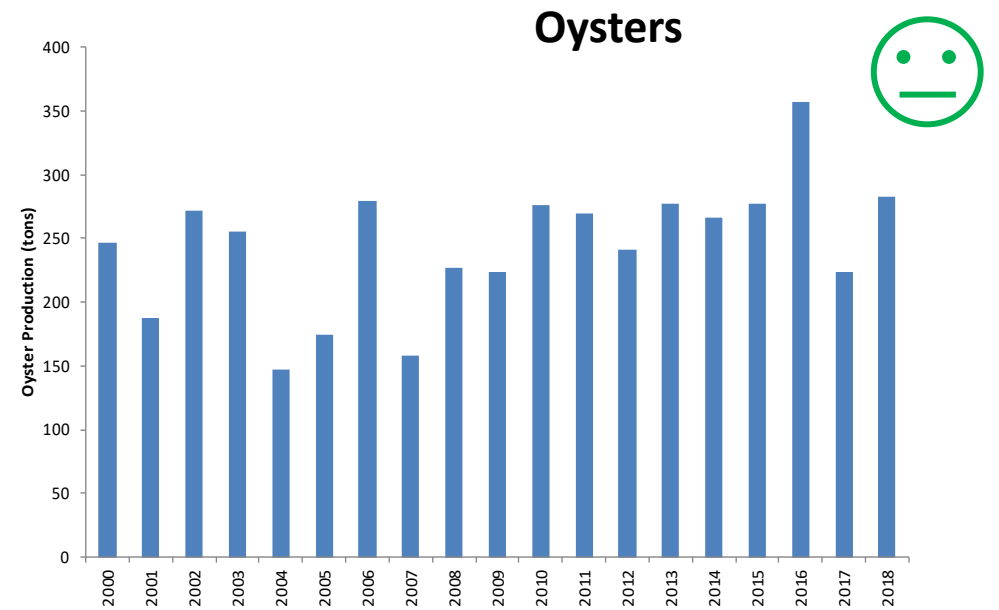
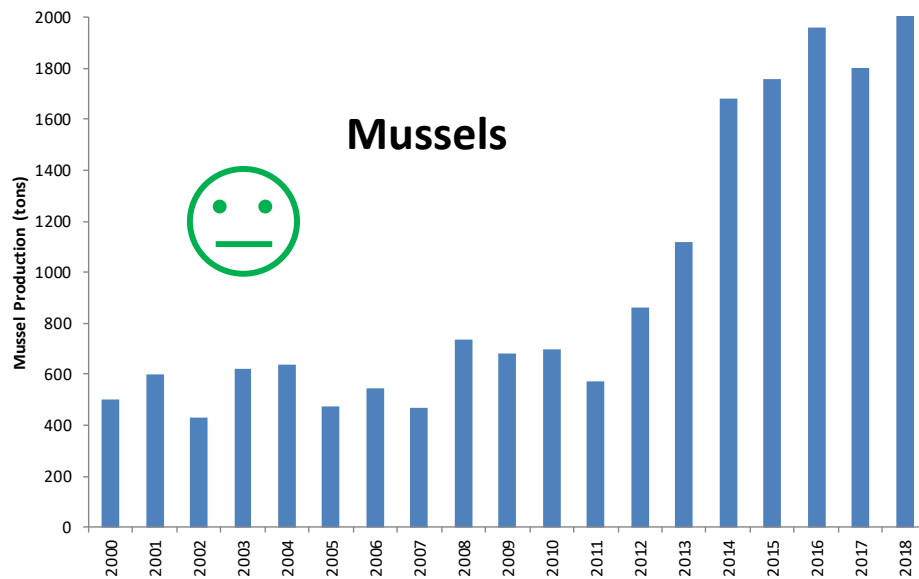
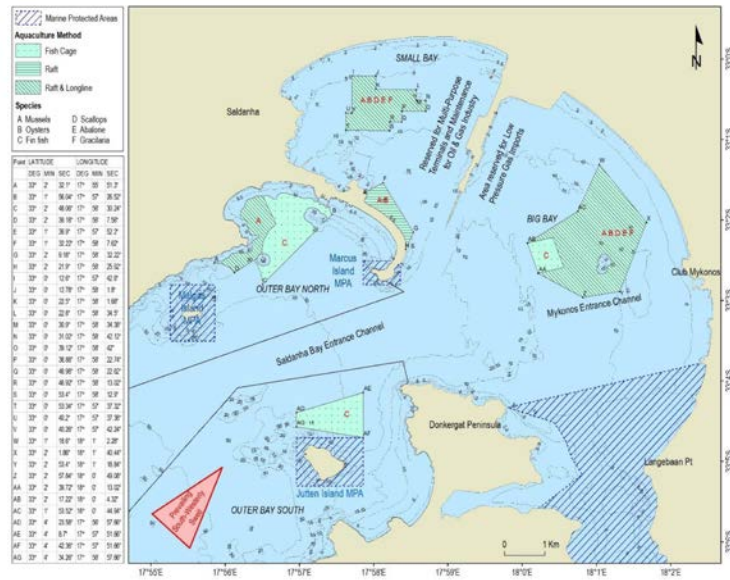
# Visitor numbers – West Coastal National Park



# Treated effluent from WWTWs

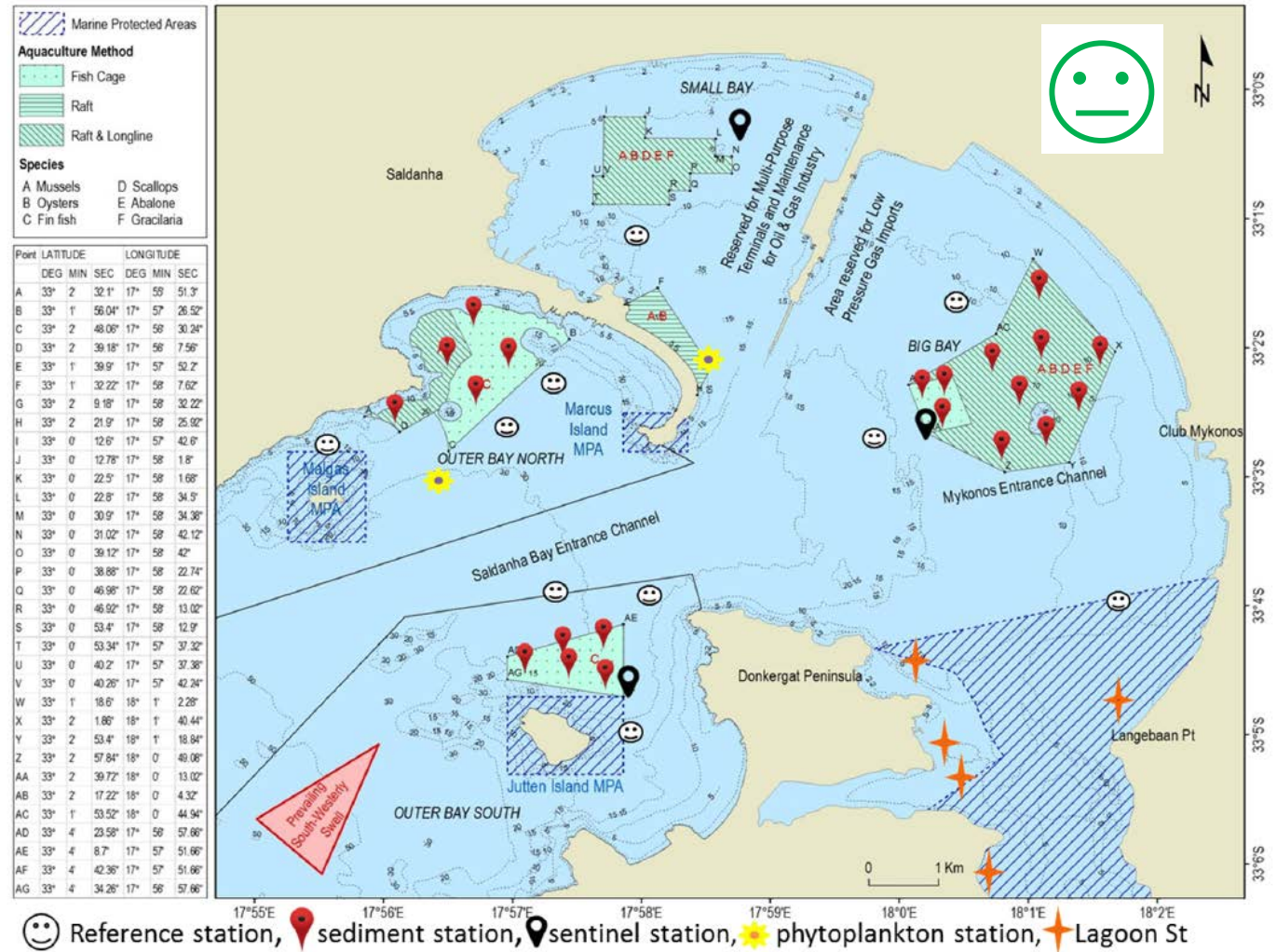


# Mariculture

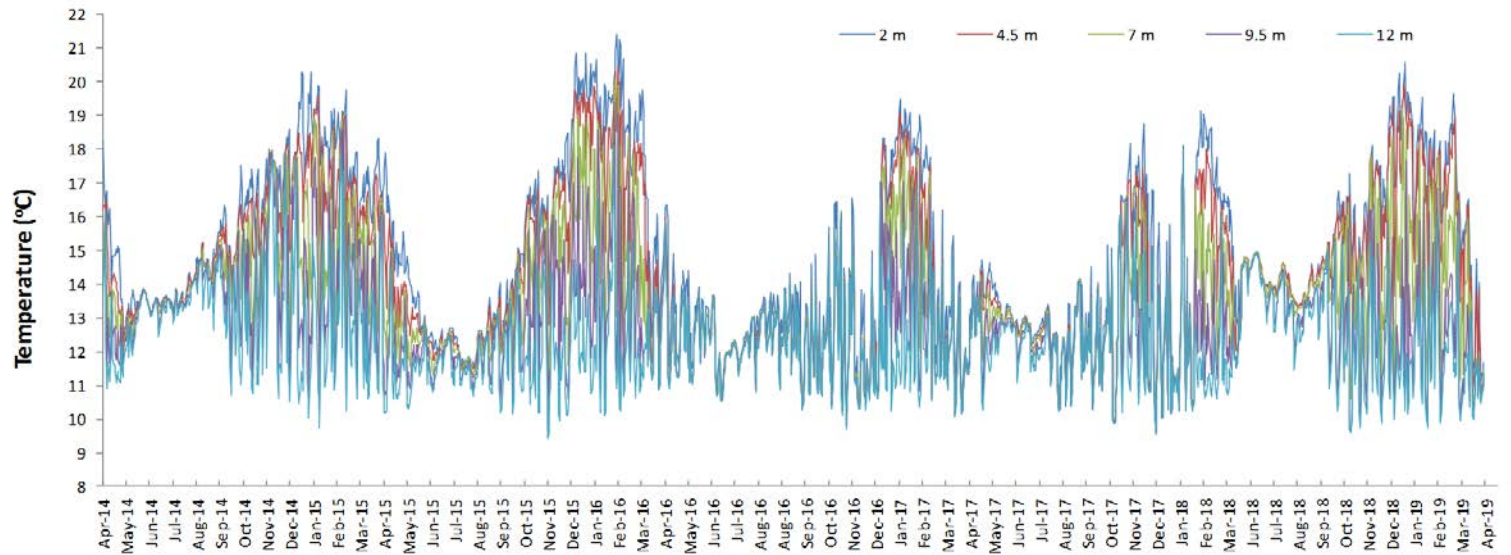
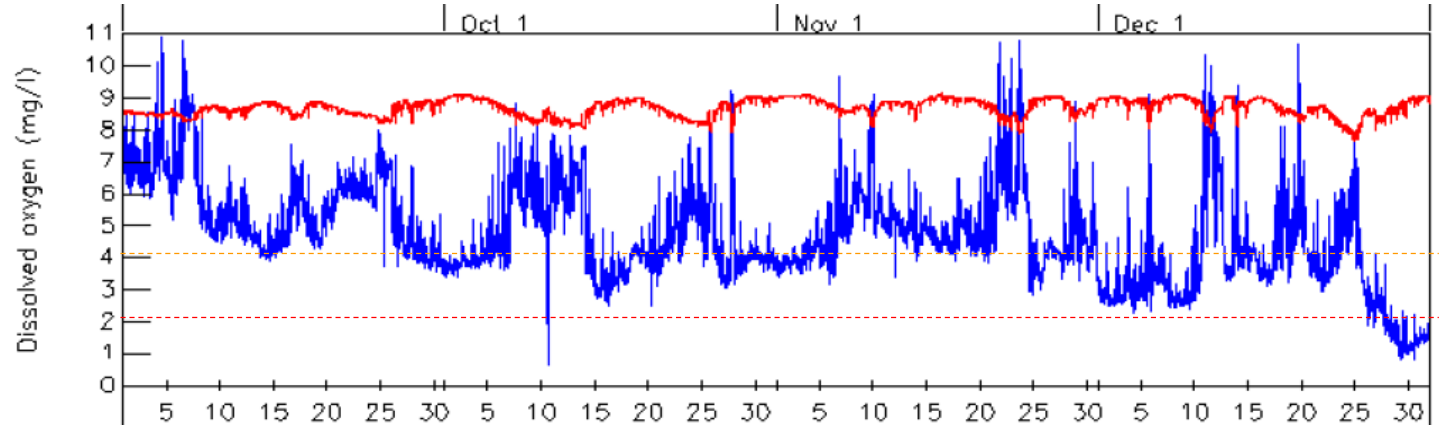
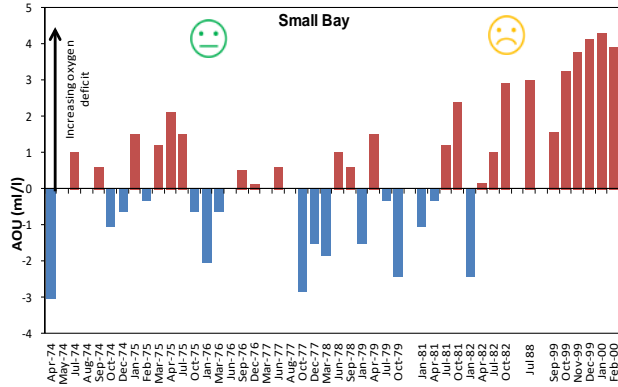
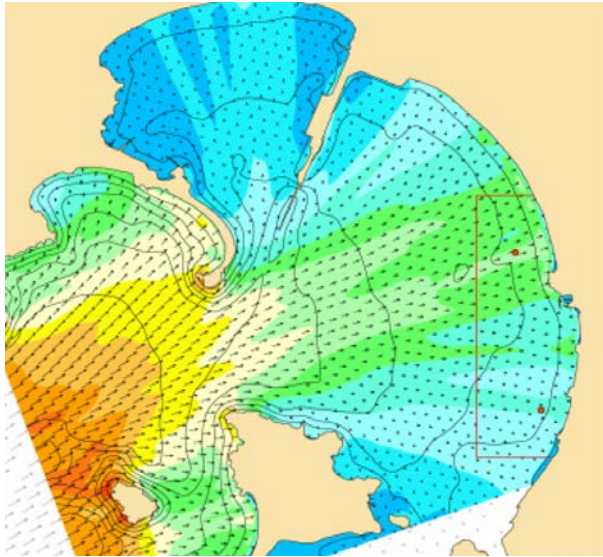


# DAFF ADZ Environmental Monitoring Programme

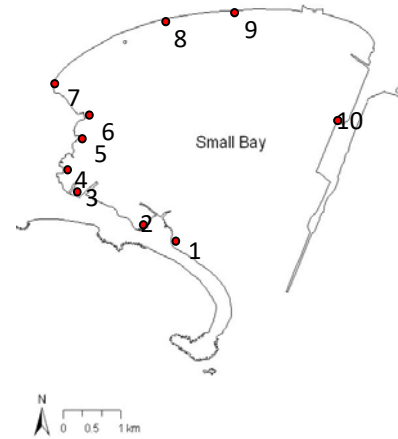
- Sediment
  - total sulphides and/or redox,
  - visual and odour characteristics,
  - grain size composition, porosity,
  - TOC and TON,
  - trace metals: Al, Cu & Zn
- Benthic macrofauna
  - Species composition, abundance, biomass
- Water quality
  - near-bottom oxygen concentration
  - chlorophyll concentration (fluorometer and discrete samples)
- Sampling “*should be aligned*” with SOB monitoring protocols
- Gaps and omissions:
  - impacts on marine megafauna (due to entanglement, interaction with farm infrastructure),
  - transmission of diseases to wild population,
  - genetic interaction with wild populations by shellfish and finfish; and
  - pollution by therapeutants.



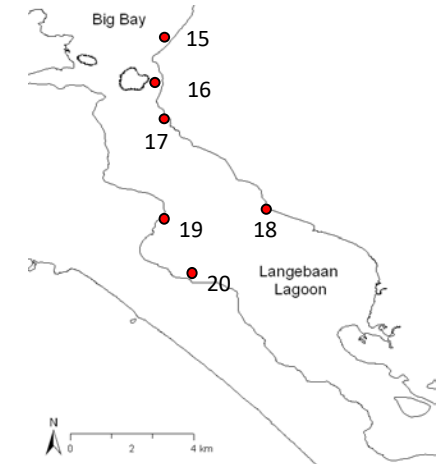
# Water Quality



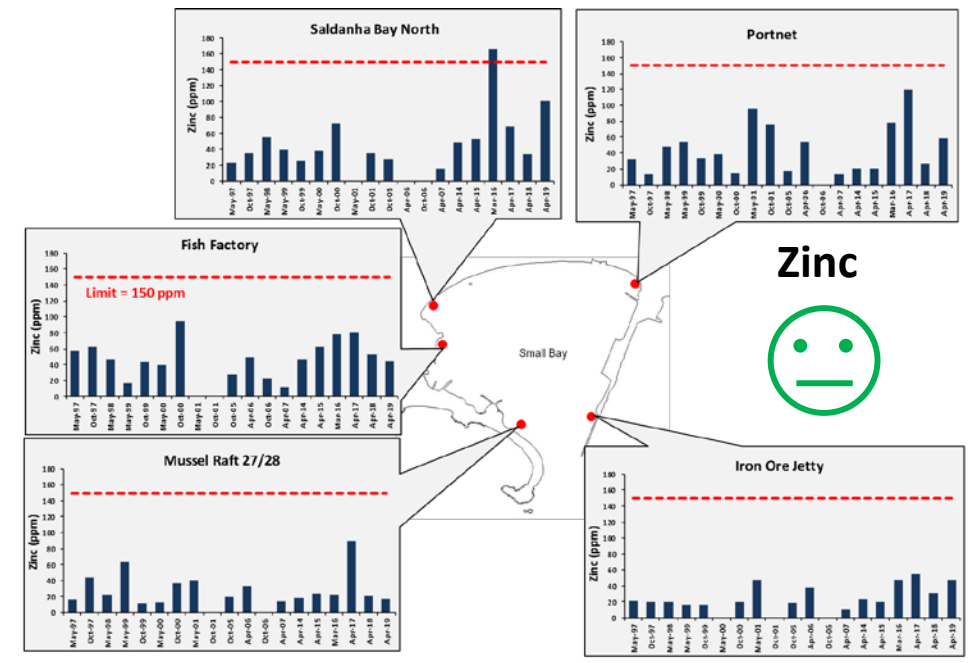
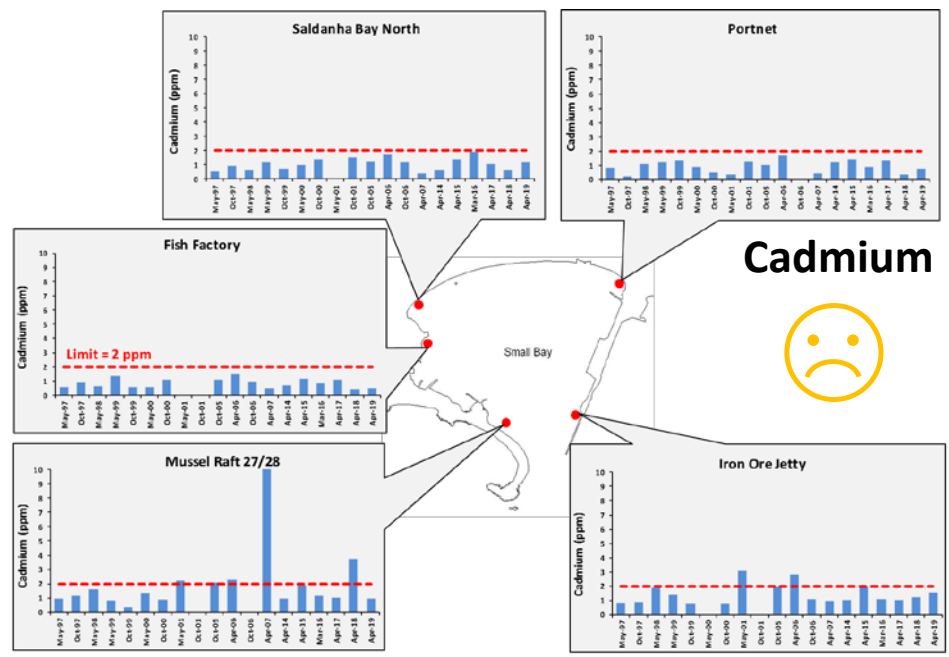
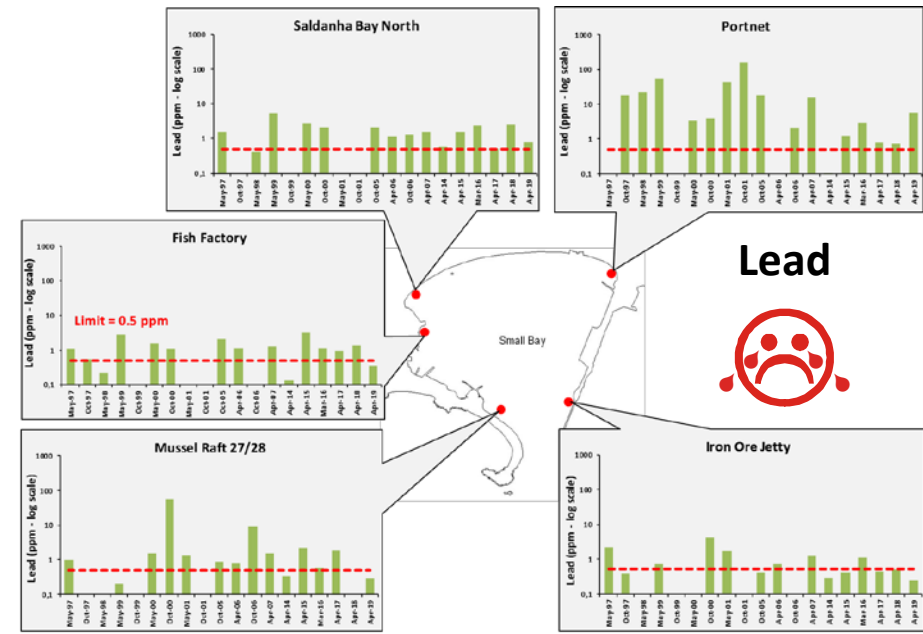
# Microbial indicators



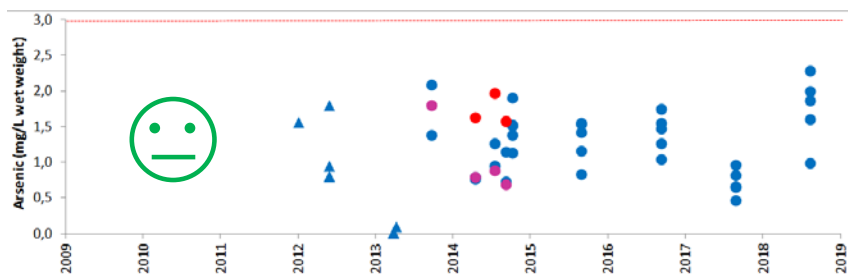
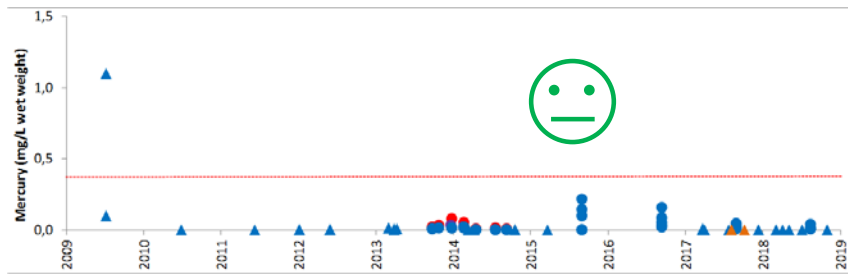
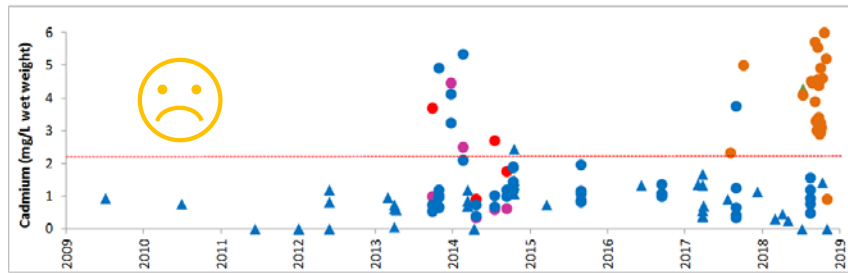
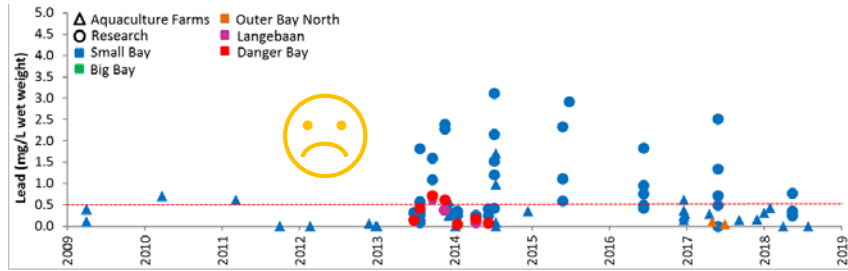
Site	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
<b>Small Bay</b>																					
1. Beach at Mussel Rafts	Fair	Fair	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.
2. Small Craft Harbour	Ex.	Fair	Good	Ex.	Ex.	Ex.	Good	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Good	Ex.	Ex.	Ex.	Ex.	Ex.	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	Ex.	Ex.
4. Saldanha Yacht Club	Poor	Poor	Poor	Fair	Poor	Poor	Poor	Ex.	Ex.	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.	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.	Ex.	ND
7. Hoedjies Bay Hotel - Beach	Fair	Fair	Poor	Fair	Good	Poor	Poor	Good	Fair	Ex.	Fair	Fair	Poor	Poor	Fair	Good	Fair	Good	Fair	Poor	Poor
8. Beach at Caravan Park	Fair	Fair	Fair	Poor	Ex.	Fair	Poor	Ex.	Good	Poor	Fair	Fair	Fair	Poor	Good	Fair	Ex.	Fair	Fair	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	Fair	Fair
10. General Cargo Quay - TNPA	Ex.	Fair	Ex.	Ex.	Ex.	Ex.	Good	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.
<b>Big Bay</b>																					
11. Seafarm - TNPA	Ex.	Fair	Ex.	Ex.	ND	ND	Ex.	Ex.	Ex.	ND	Ex.	ND	ND	Ex.	Ex.	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.	Ex.	Ex.
13. Mykonos - Harbour	Fair	Fair	Ex.	Ex.	Fair	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Fair	Ex.	Ex.	Good	Fair	Ex.	Ex.	Ex.	Ex.
14. Leentjiesklip	ND	ND	Good	Fair	Good	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Fair	Ex.	Good	Ex.	Ex.	Ex.	ND	Ex.
<b>Langebaan Lagoon</b>																					
15. Langebaan North - Leentjiesklip	Ex.	Fair	Good	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Poor	Good	Ex.	Good	Good	Ex.	Ex.
16. Langebaan - Main Beach	ND	ND	Fair	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Good	Ex.	Ex.	Ex.	Ex.	Fair	Ex.	Ex.	ND	Ex.
17. Langebaan Yacht Club	ND	ND	ND	ND	ND	Poor	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Good	Ex.	Ex.	Fair	Good	ND	Ex.
18. Tooth Rock	ND	ND	ND	ND	ND	Fair	Ex.	Ex.	Ex.	Ex.	Ex.	Fair	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	ND	Ex.
19. Kraalbaai North	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	ND	Fair
20. Kraalbaai South	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Ex.	Ex.	Ex.	Ex.	Ex.	Ex.	ND	Ex.



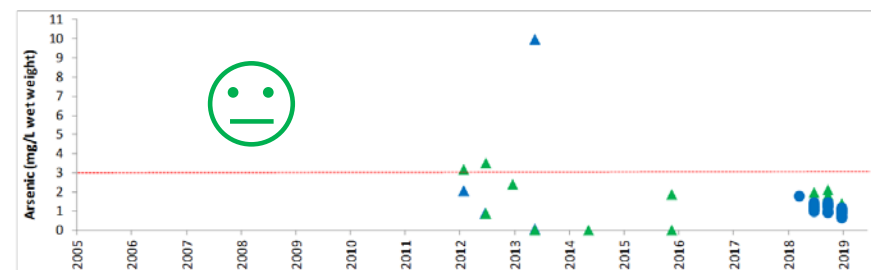
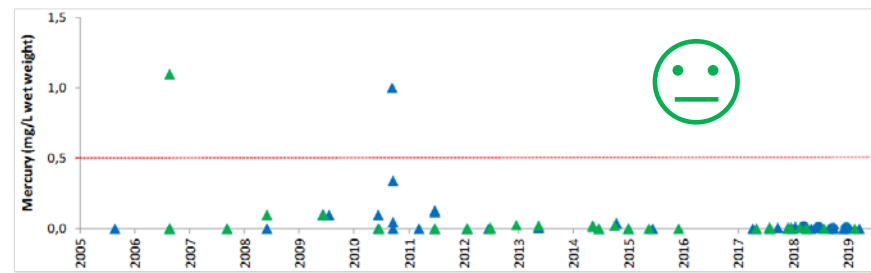
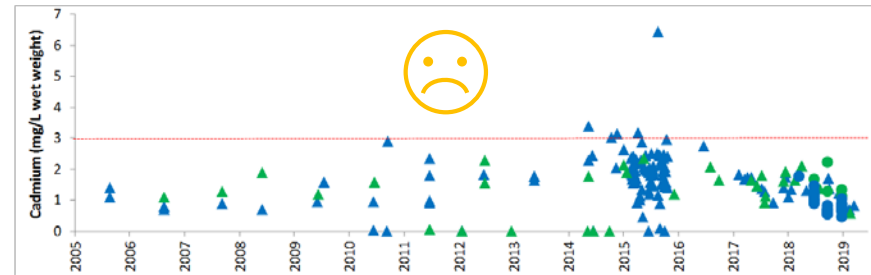
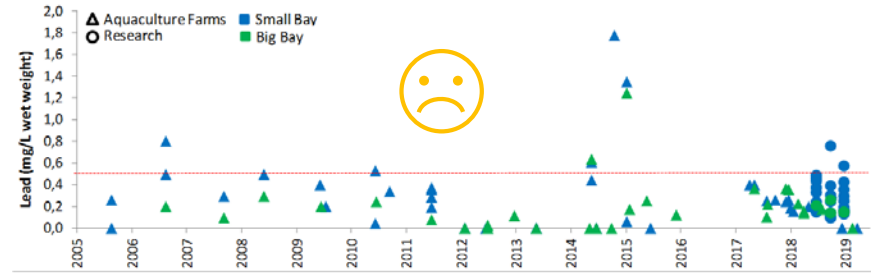
# Trace metals in mussels harvested from the shoreline...



# Farmed mussels...



# Farmed oysters...



Lead

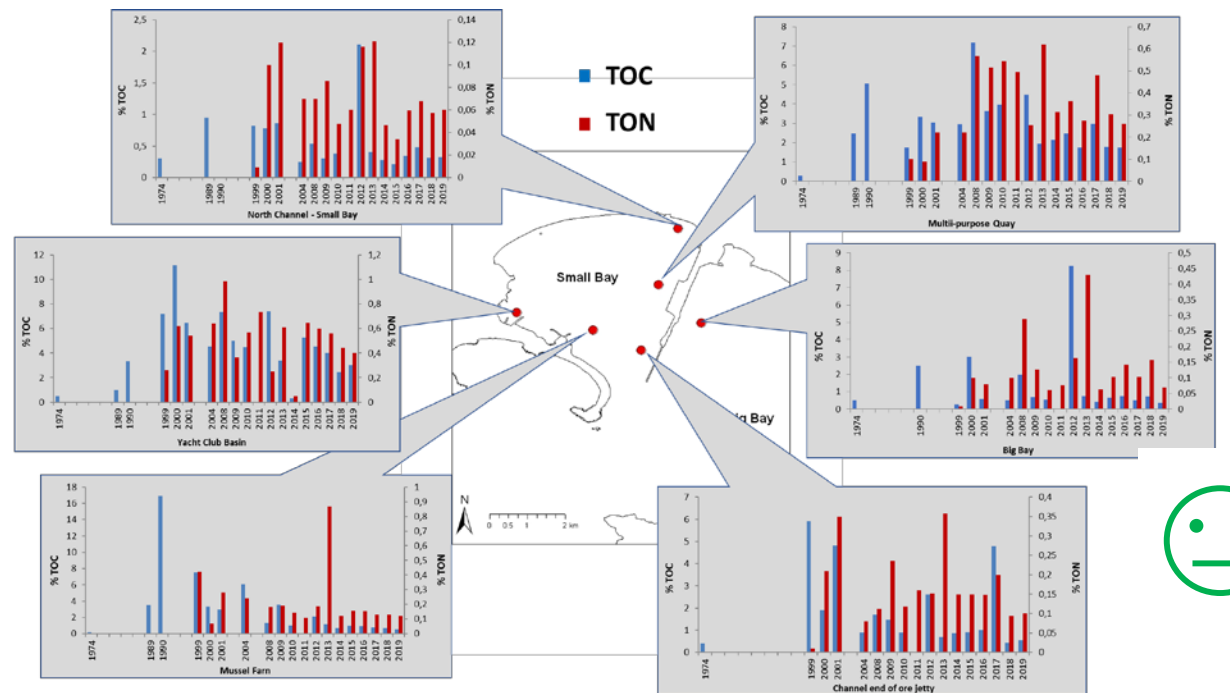
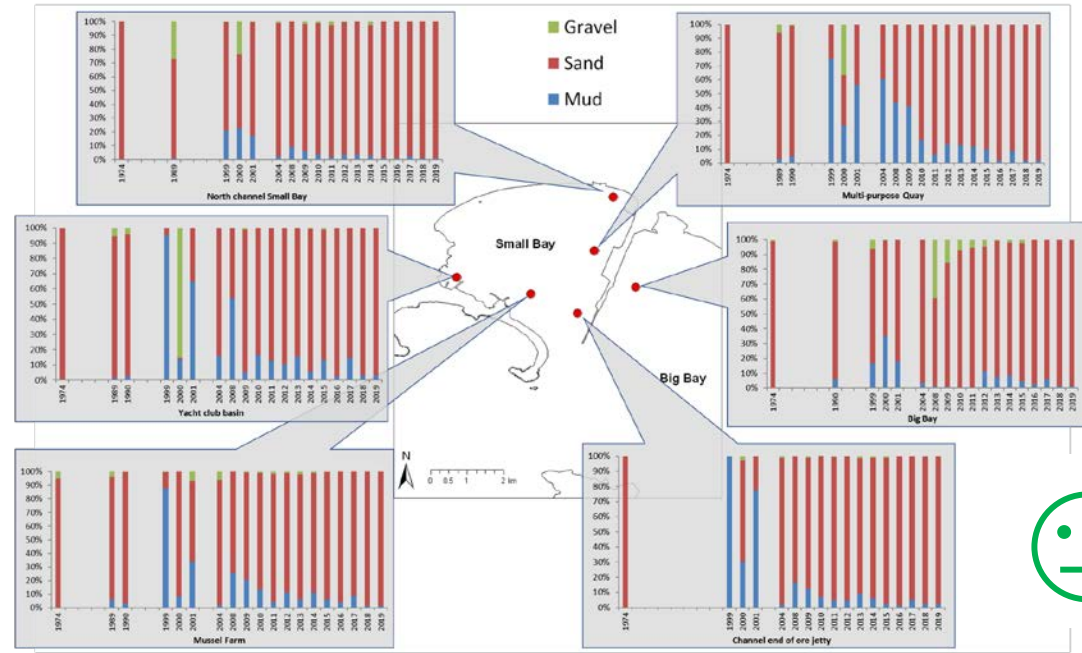
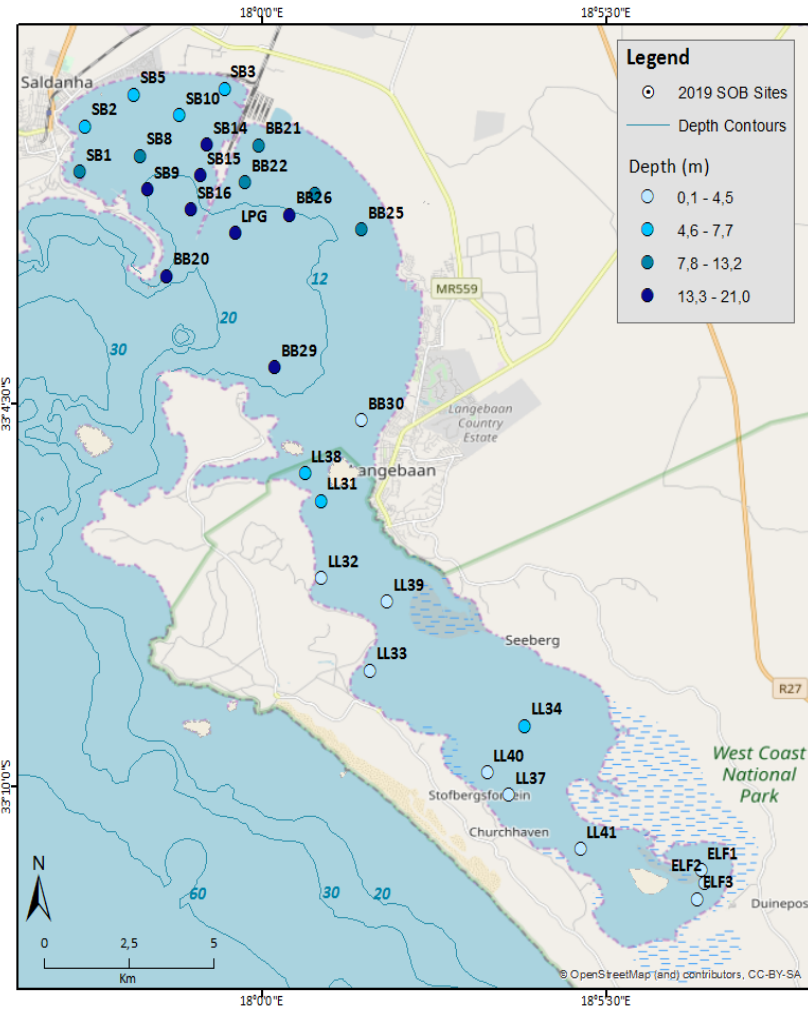
Cadmium

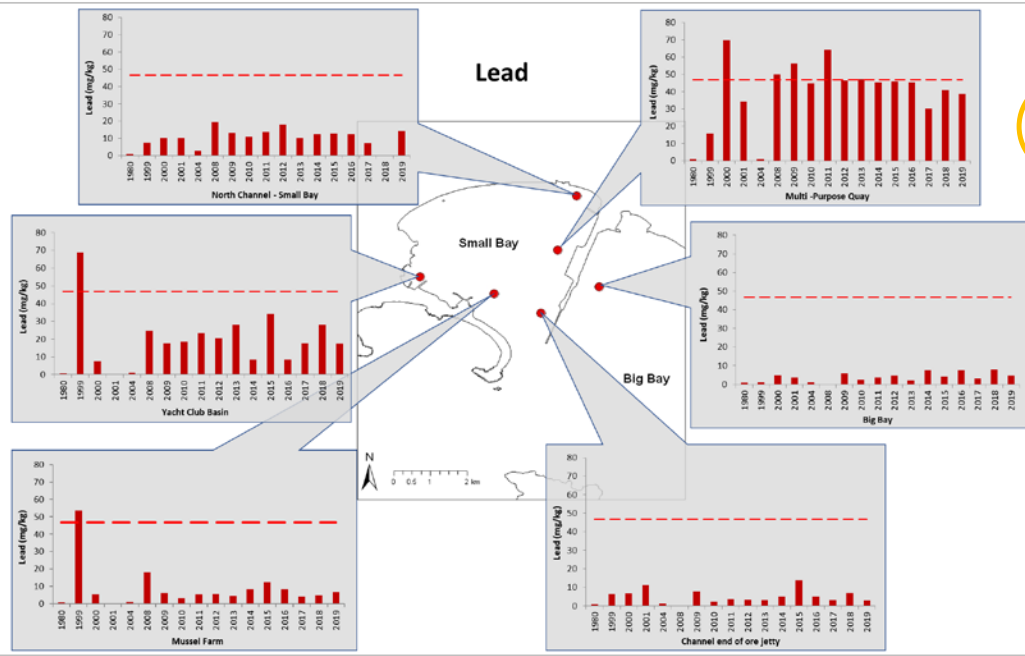
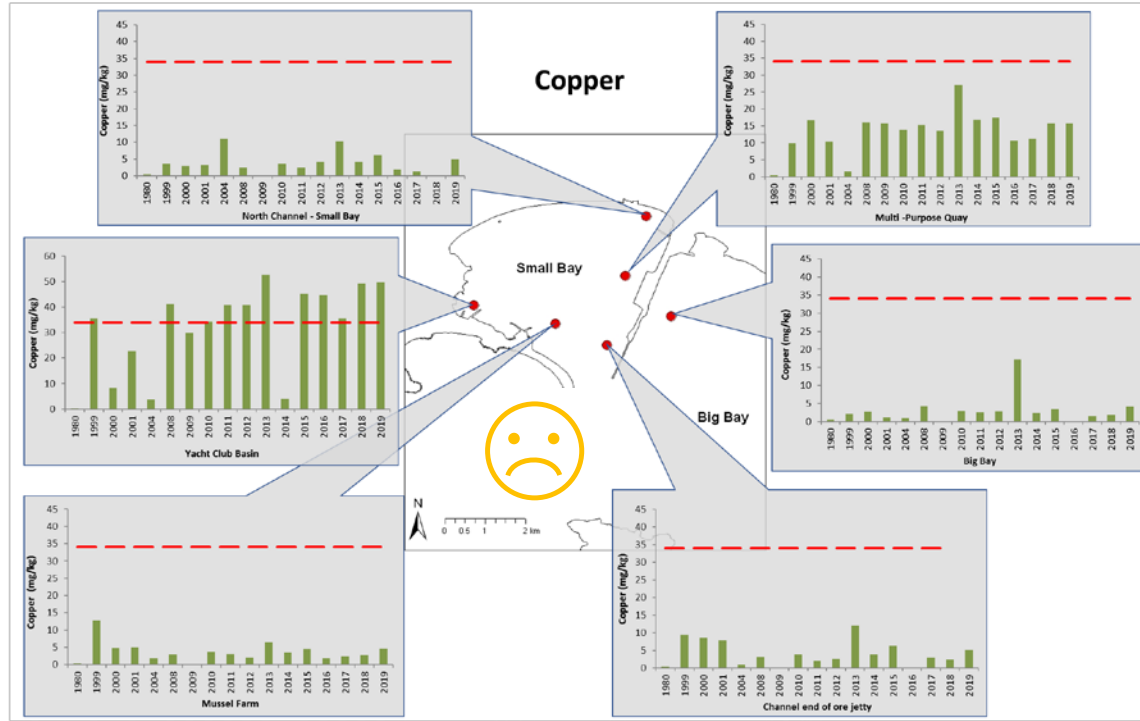
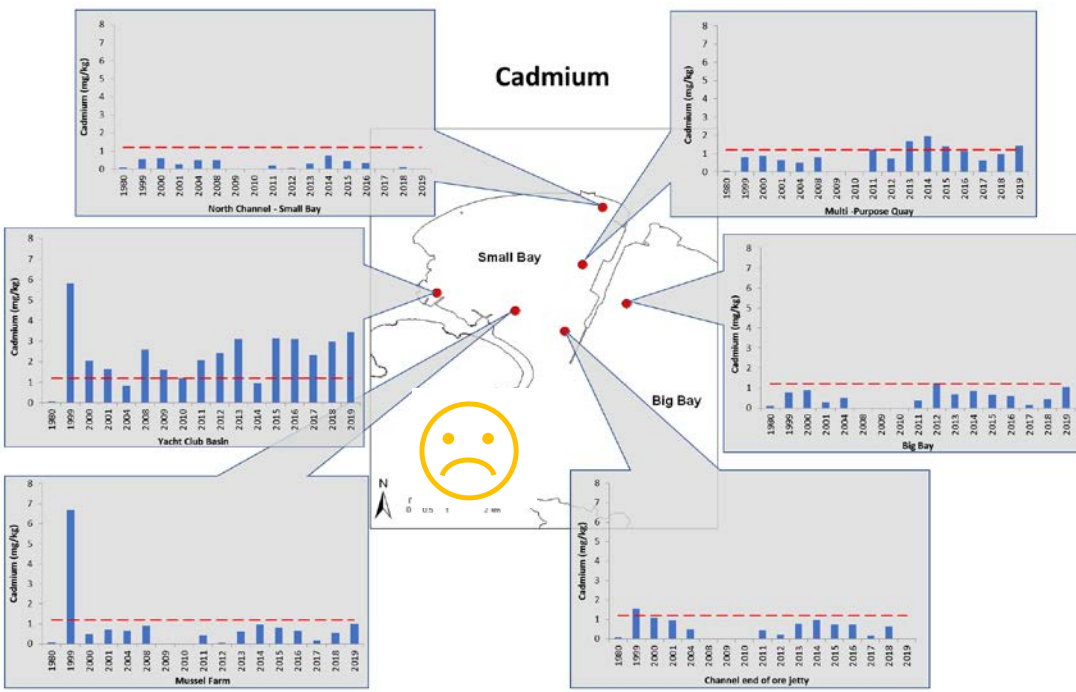
Mercury

Arsenic



# Sediments

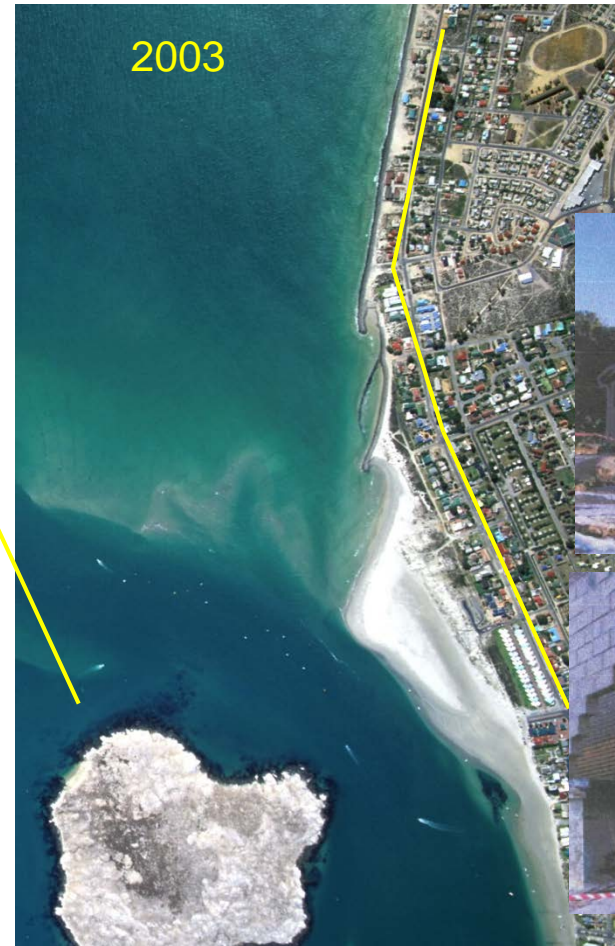




# Langebaan Beach Erosion

1960

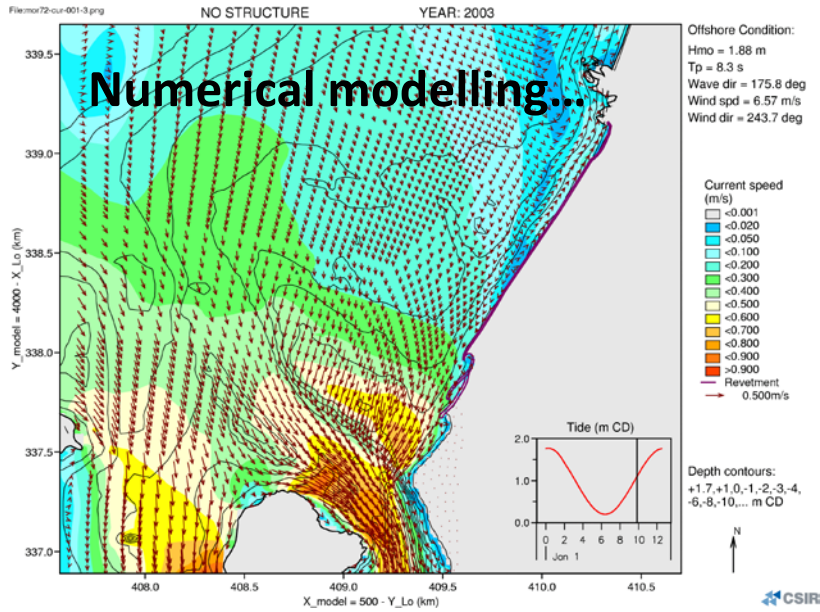
1979



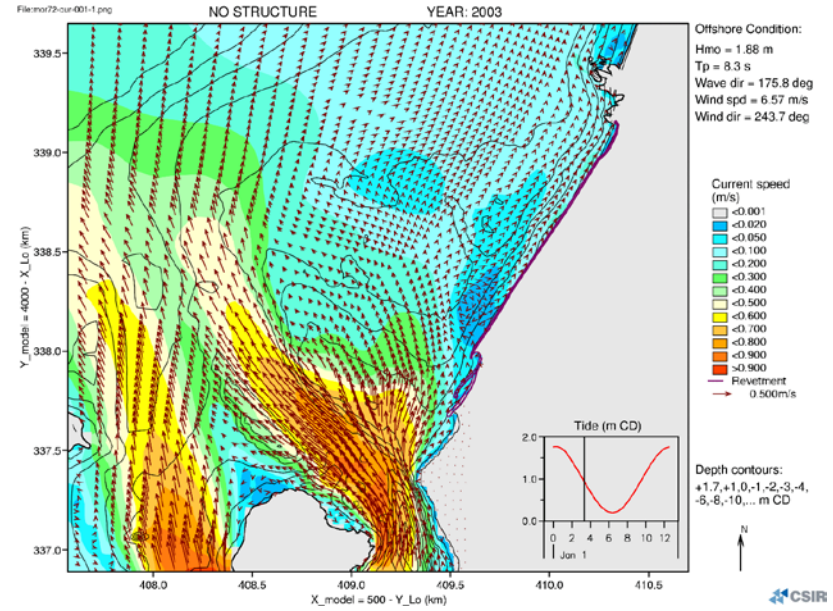
**STORM DAMAGE  
JUNE 1997**



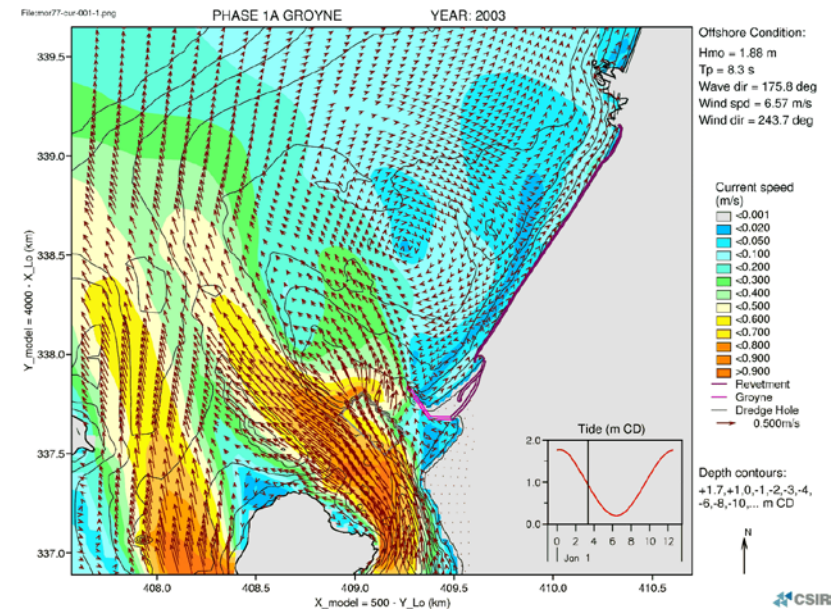
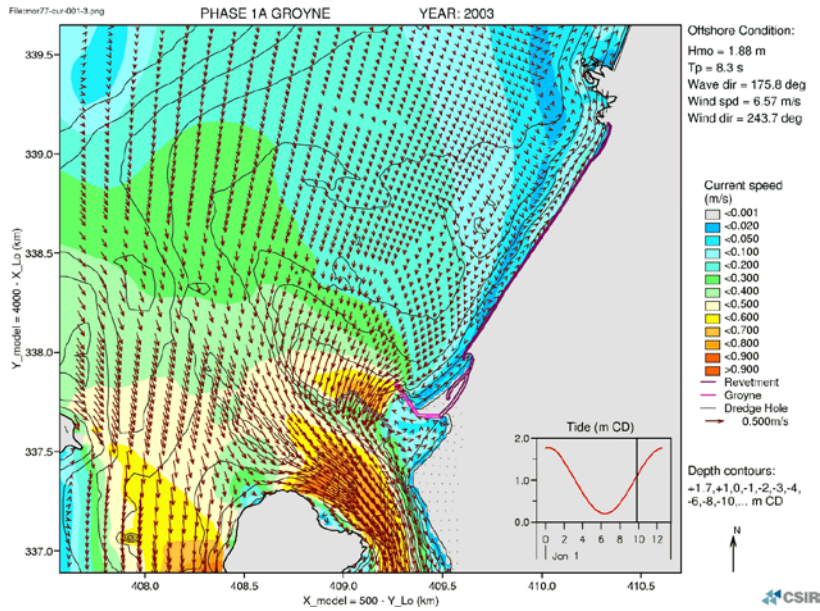
**Temporary erosion control measures 1997-2001**



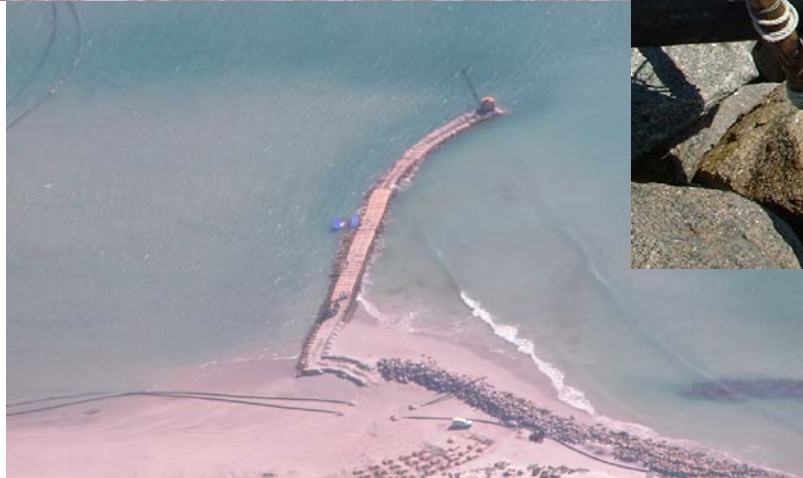
Incoming  
tide...



Outgoing  
tide...



# Groyne construction and beach nourishment: 2004-2008



Groyne 1 Completed  
February 2005

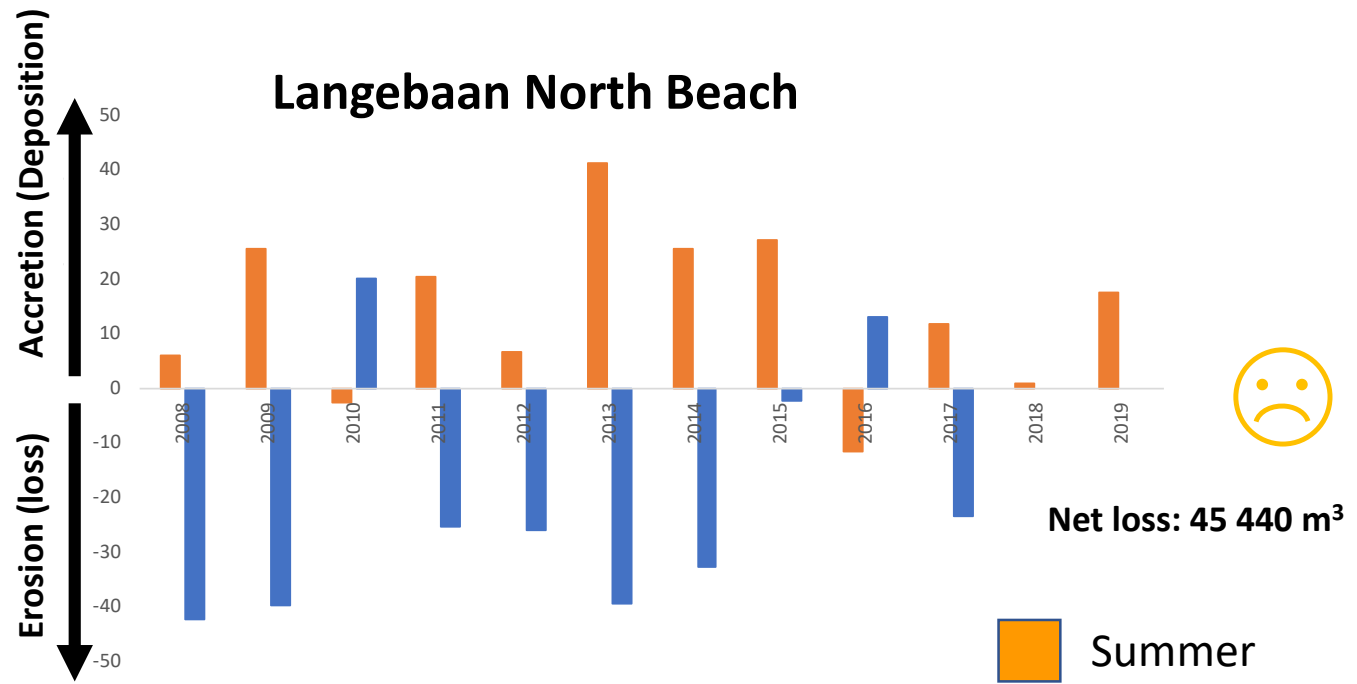
# Langebaan Beach Erosion/Accretion Monitoring Programme

- Started in 1994 by the SBM, ended in 2017
- Restarted by the SBWQFT in 2019
- 24 measured lines
- Surveyed two times a year (after-summer and after-winter) during spring tide
- Measured lines extend from the high-water mark to approximately 2 m below mean sea level (MSL)

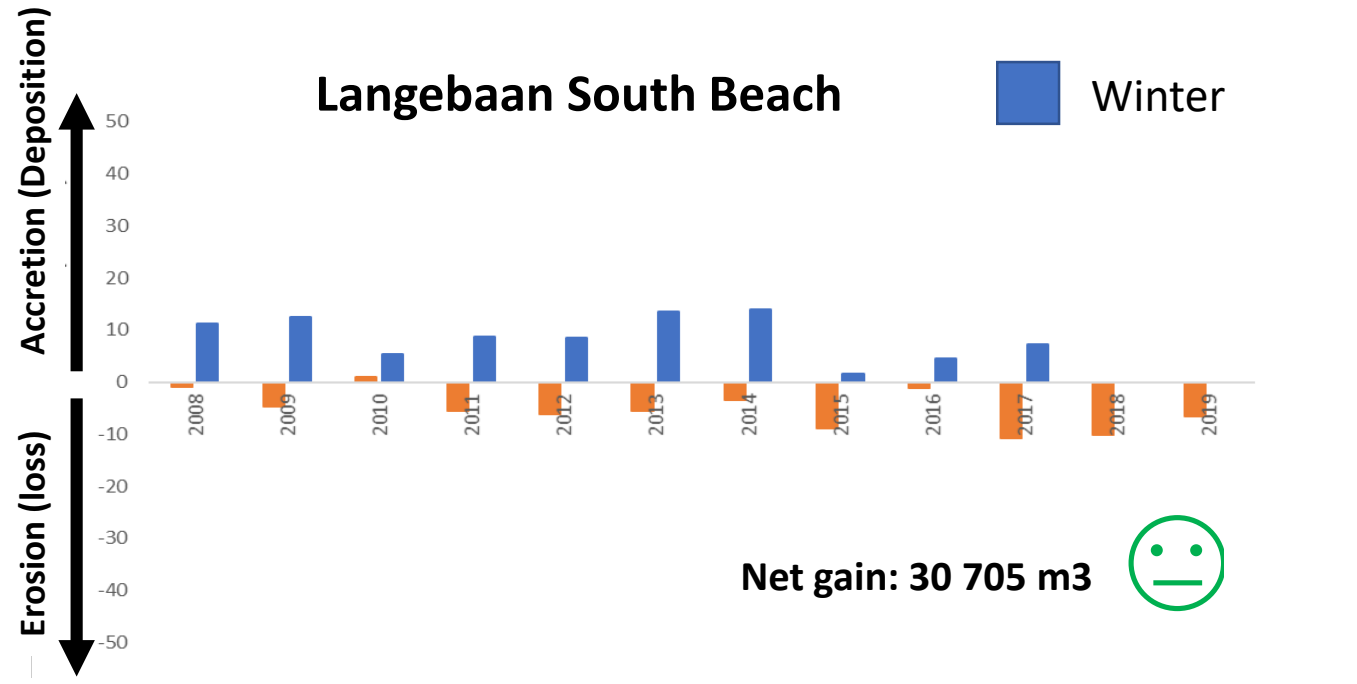


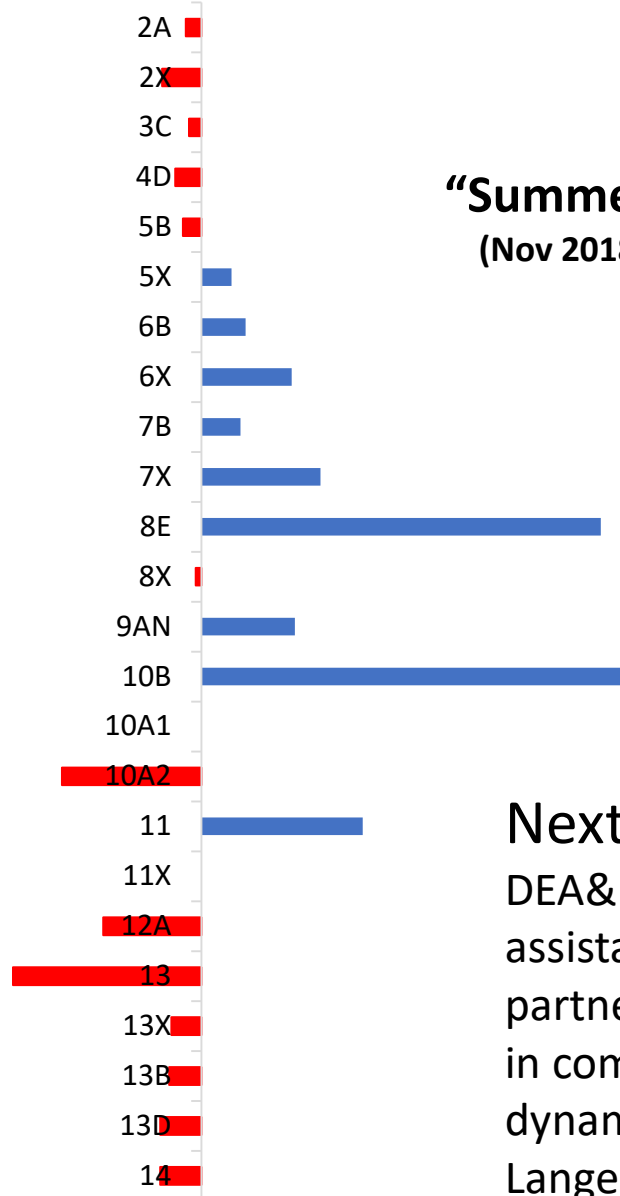
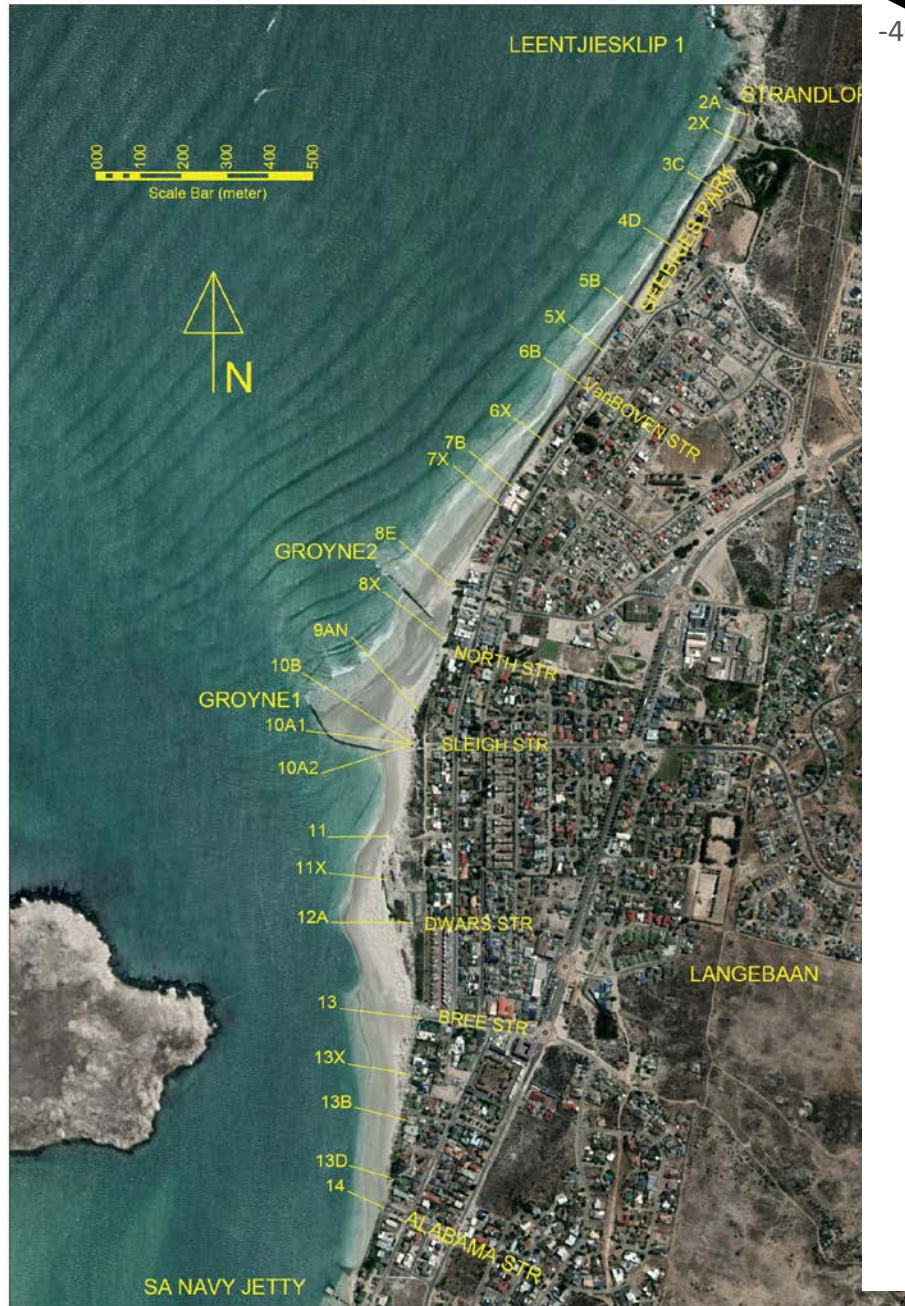


### Langebaan North Beach



### Langebaan South Beach





**“Summer period”**  
(Nov 2018-Apr 2019)

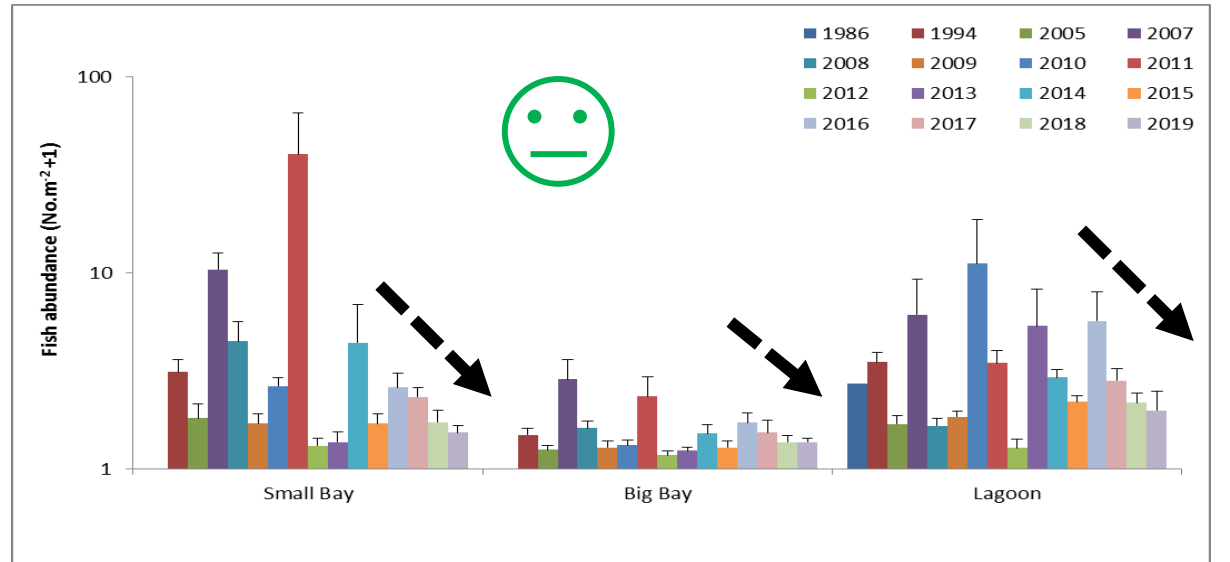
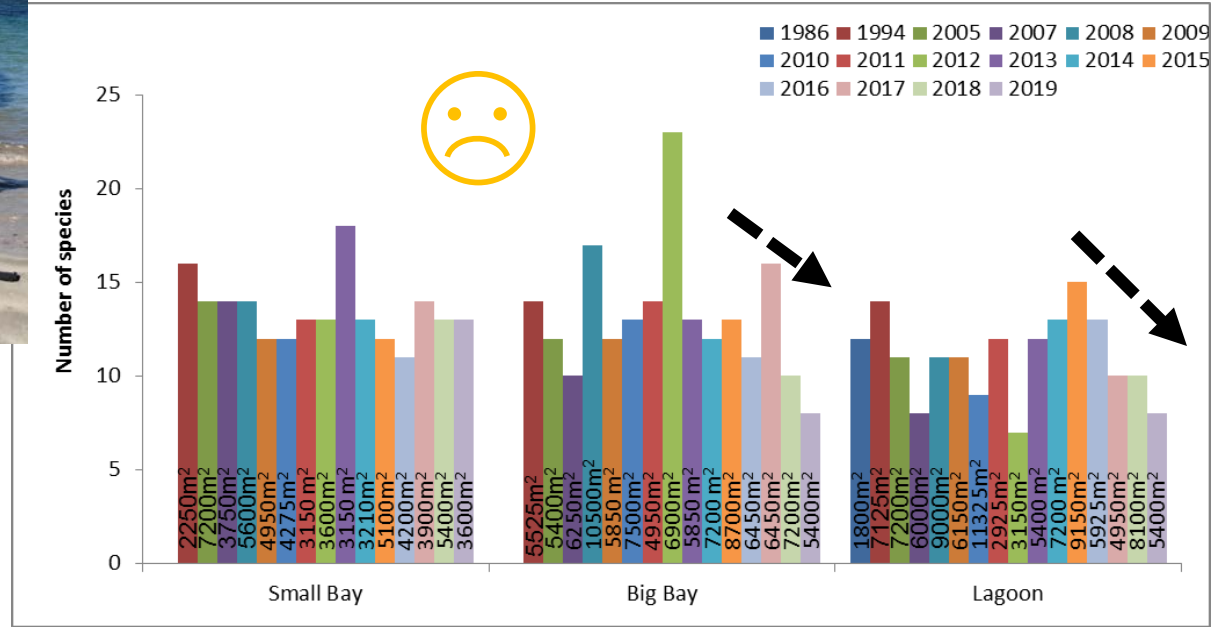
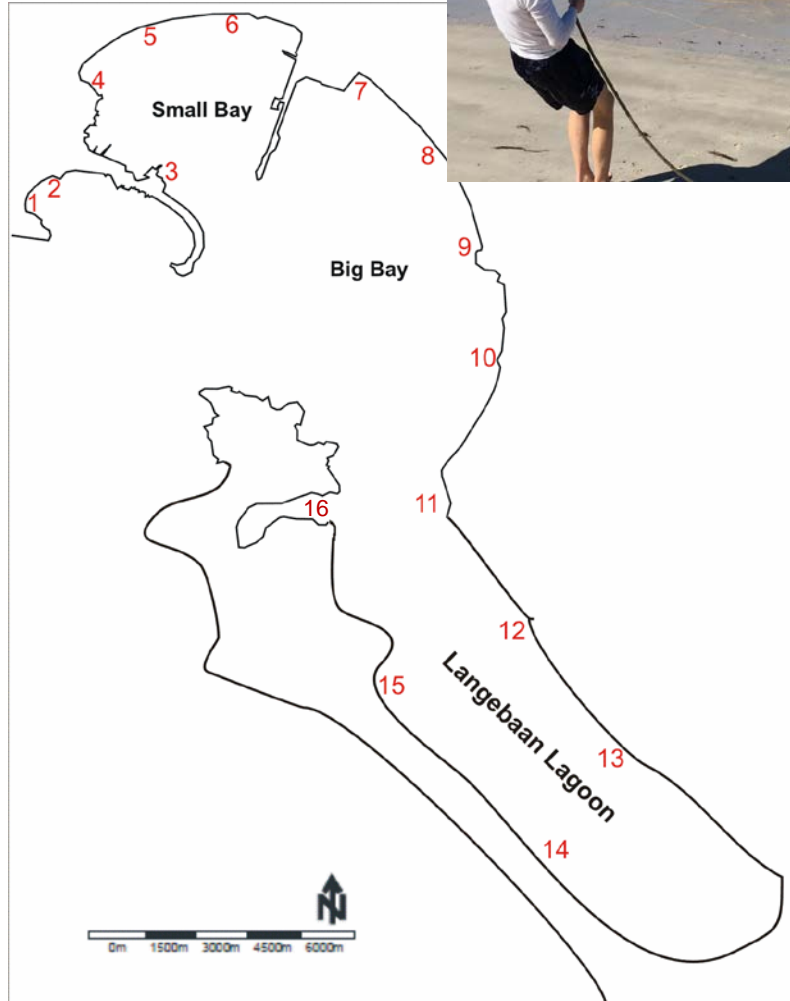
**Next steps...**

DEA&DP have requested assistance from various IGTT partners (DEAFF, DPW, TNPA, SBM) in commissioning a sediment dynamics study of Saldanha Bay & Langebaan Lagoon

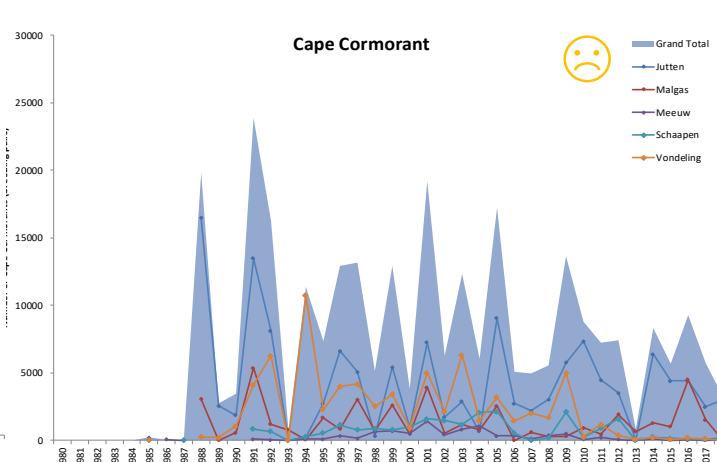
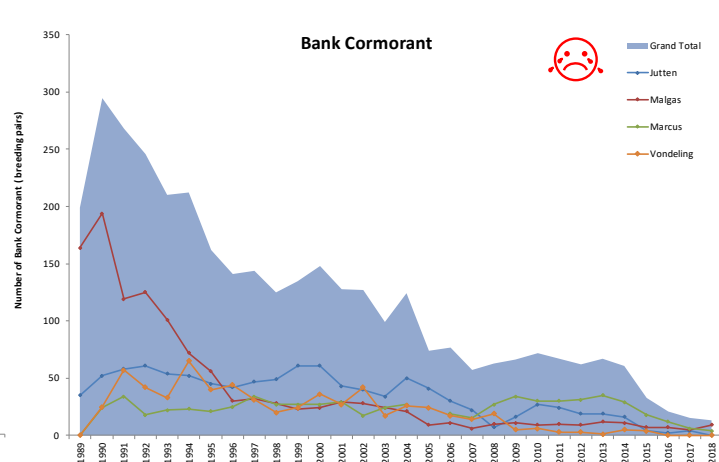
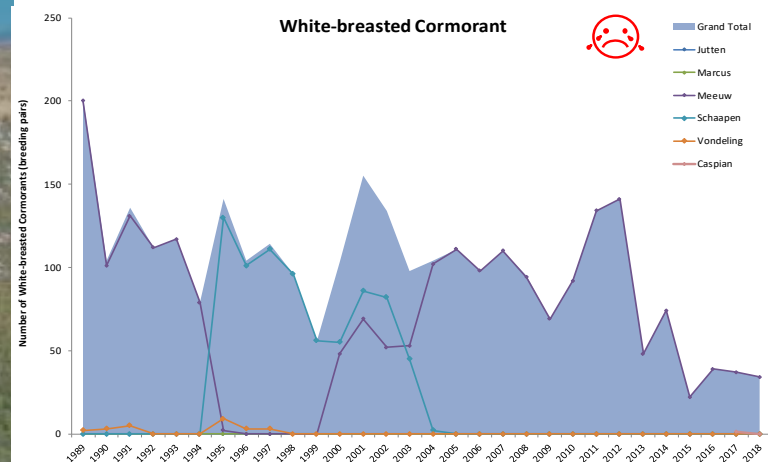
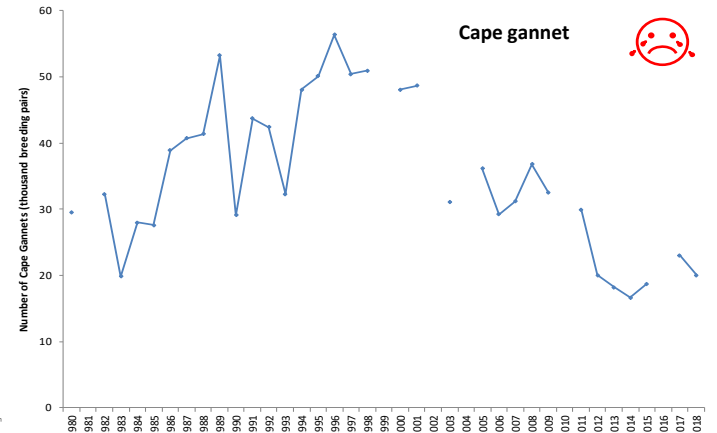
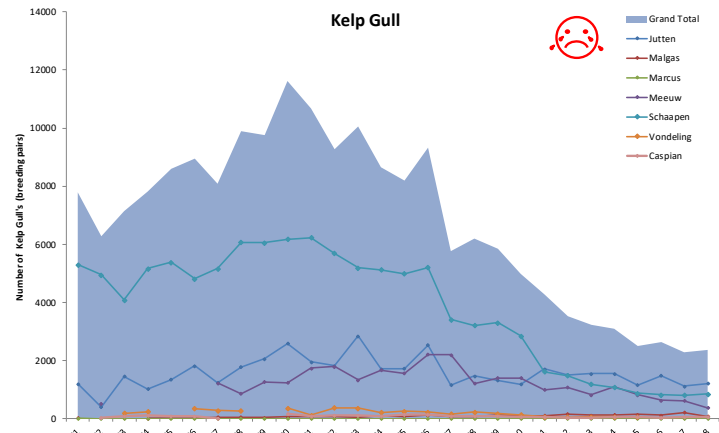
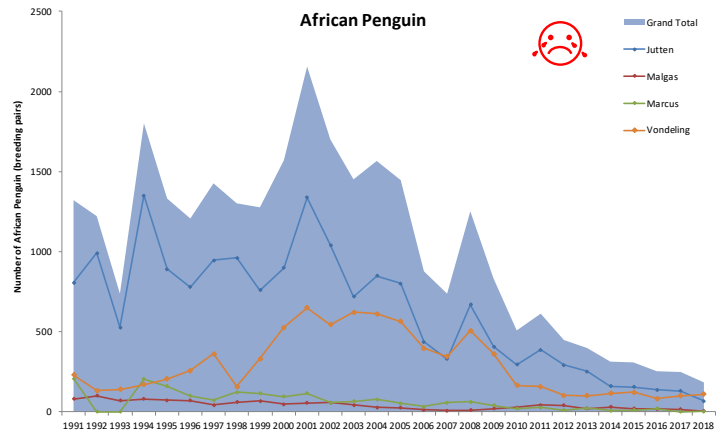


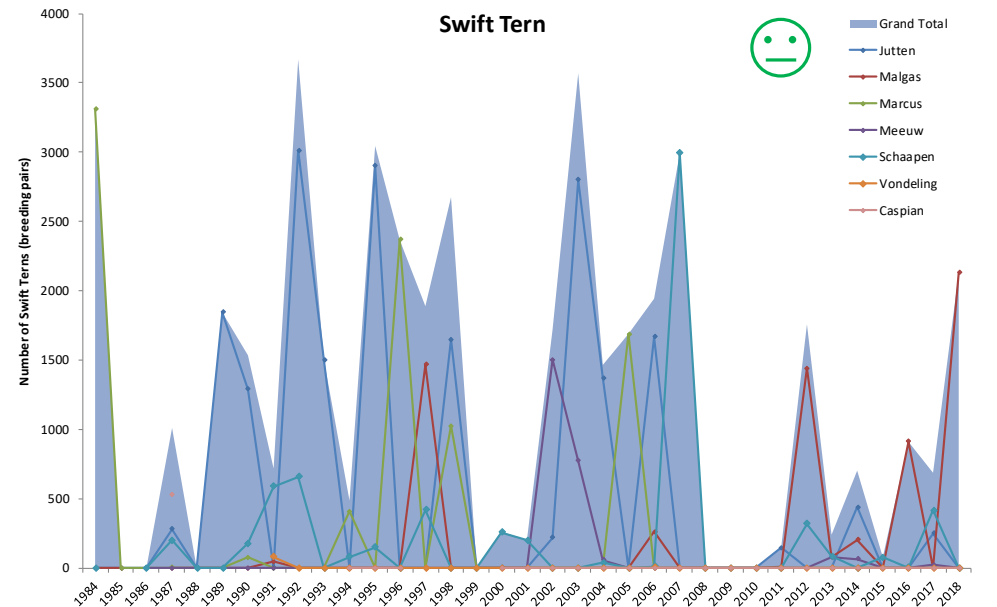
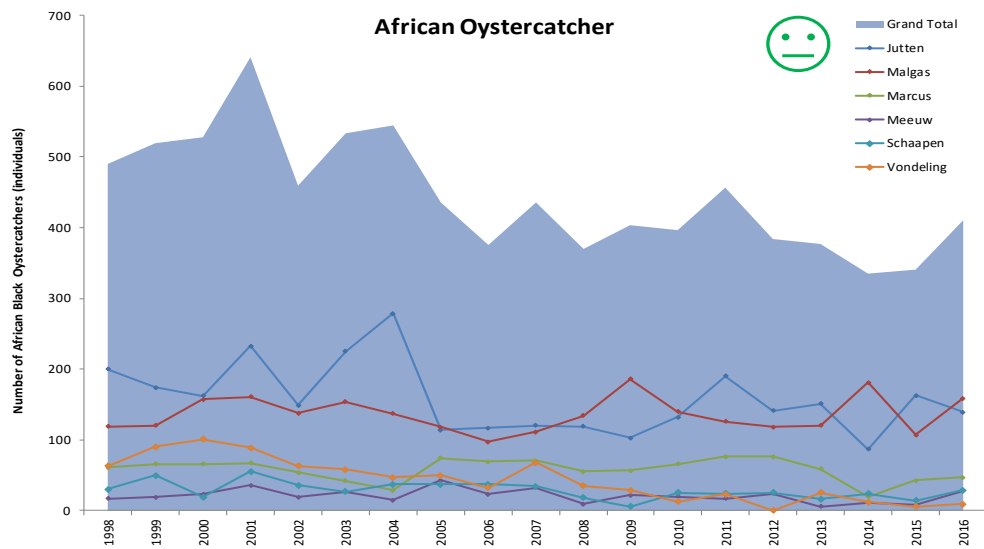
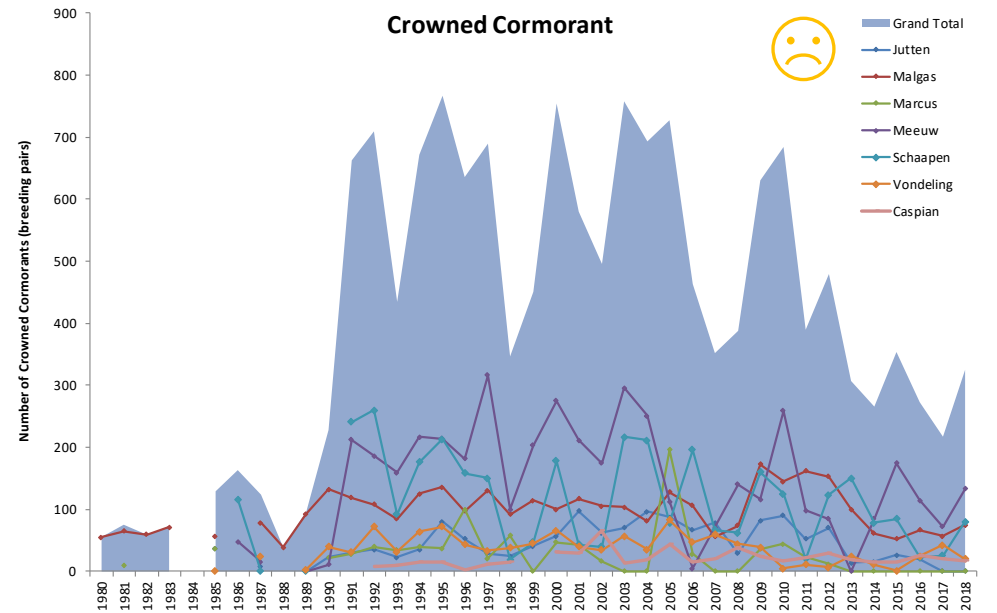
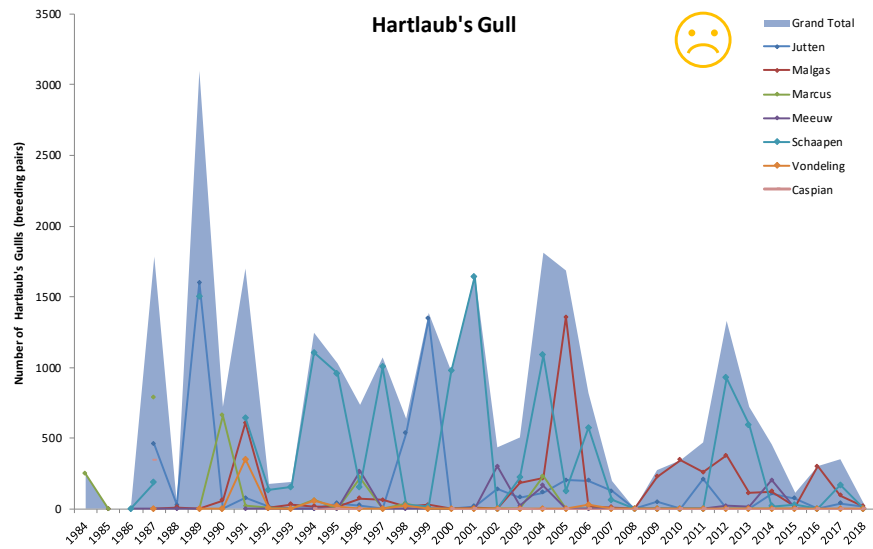


# Fish



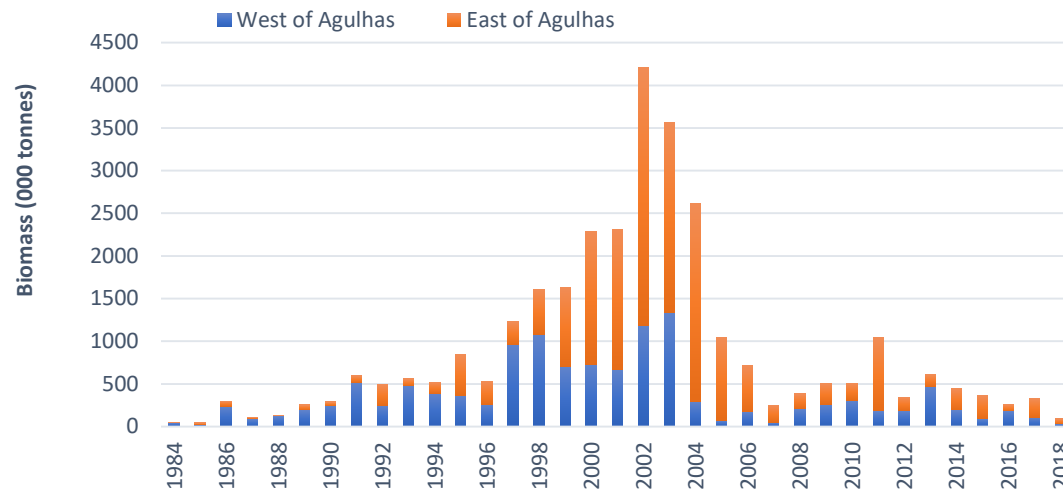
# Island breeding birds



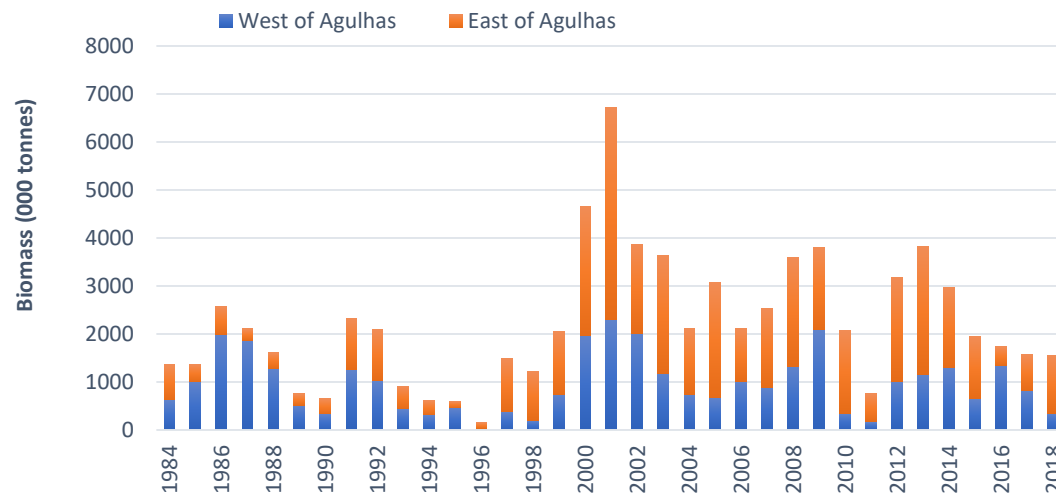


# What is the main reason for these declines?

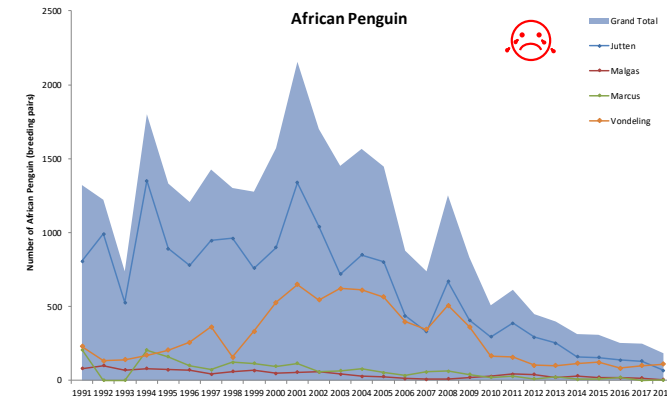
## Sardine



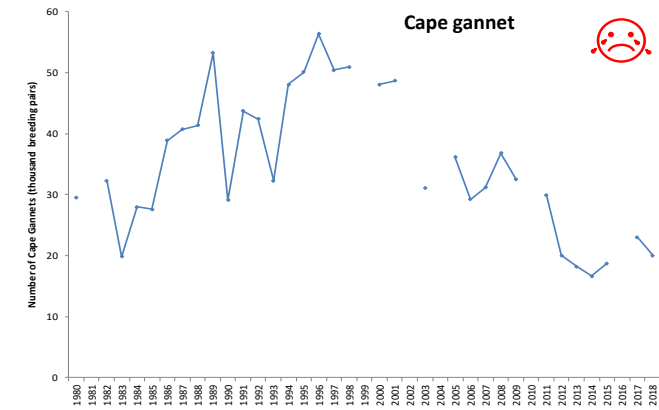
## Anchovy



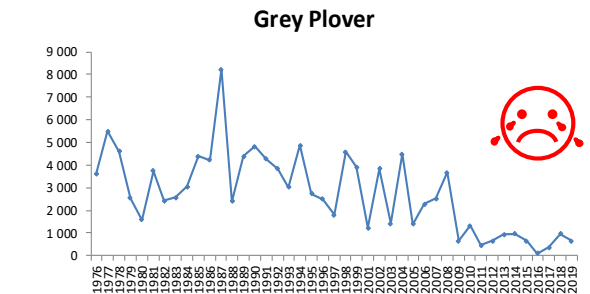
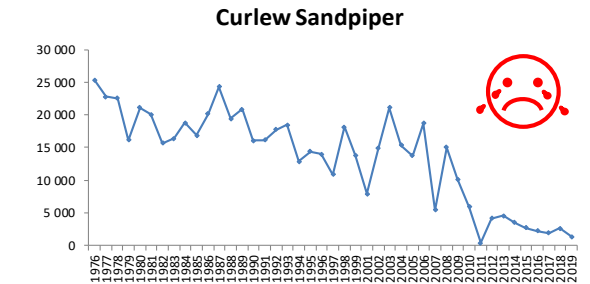
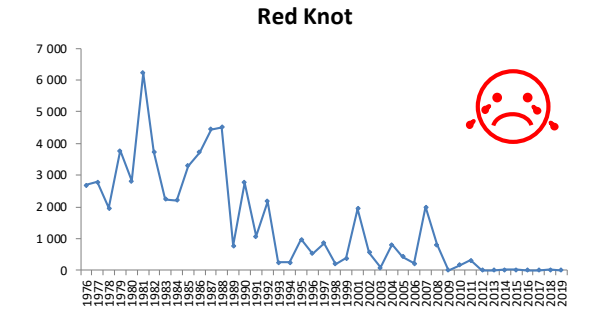
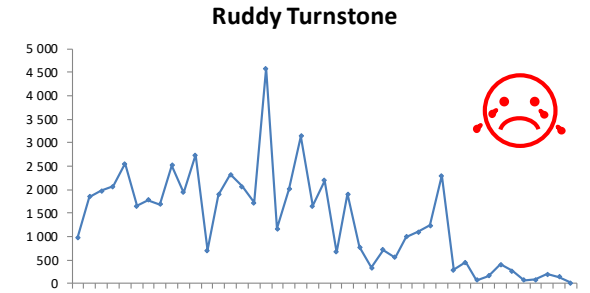
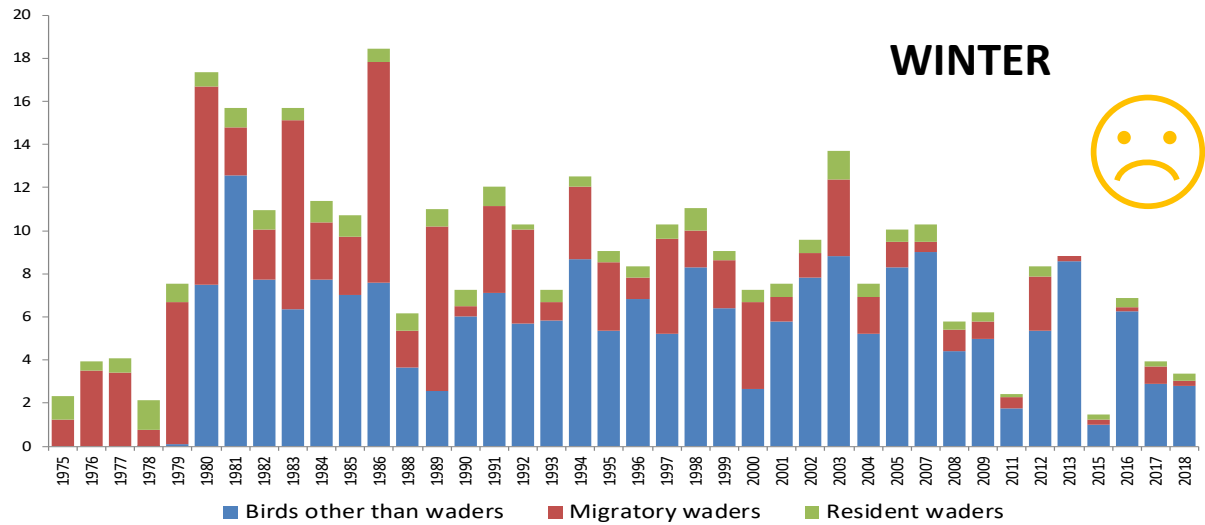
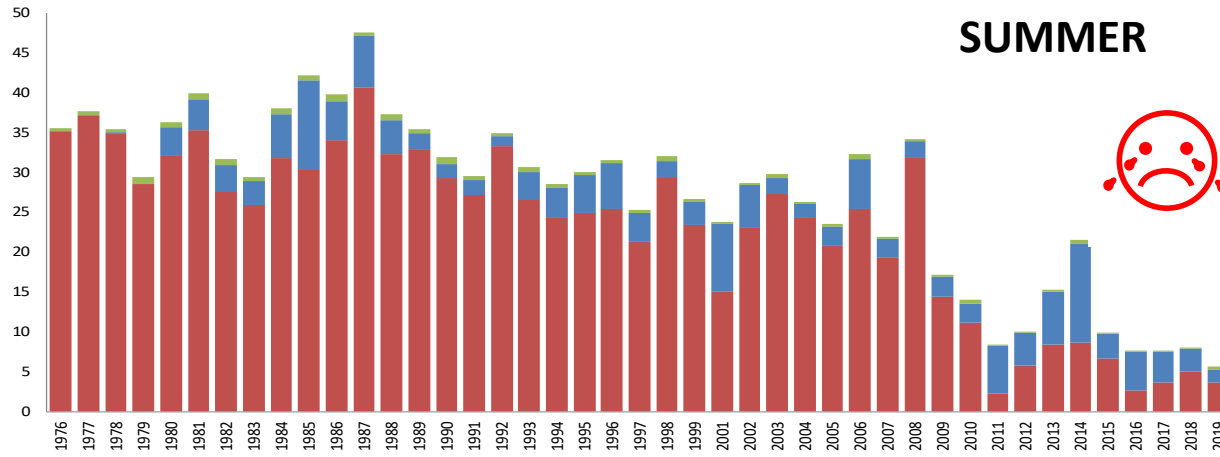
## African Penguin



## Cape gannet

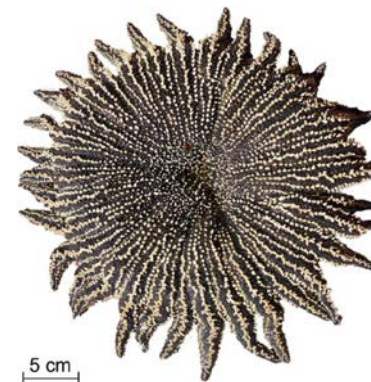


# Langebaan lagoon



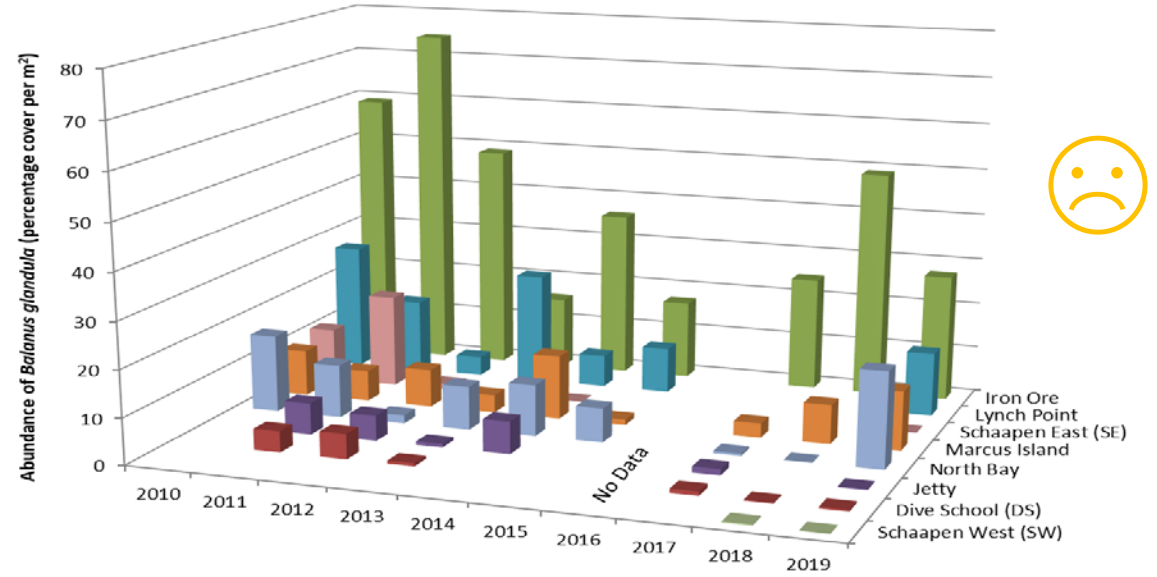
# Alien & invasive species

- 36 alien and 53 invasive marine and estuarine species occurring in South African waters
- 28 alien and 42 invasive species reported from the West Coast of South Africa (mostly from Saldanha Bay)
- Introduction is mostly via shipping and mariculture
- Five new species have been added since 2014:
  - barnacle *Perforatus perforates*,
  - Japanese skeleton shrimp *Caprella mutica*,
  - West African porcelain crab *Porcellana Africana*,
  - South American sunstar *Heliaster helianthus*,
  - Chilean stone crab *Homalaspis plana*
- Also 41 “cryptogenic” species, 20 from the West coast

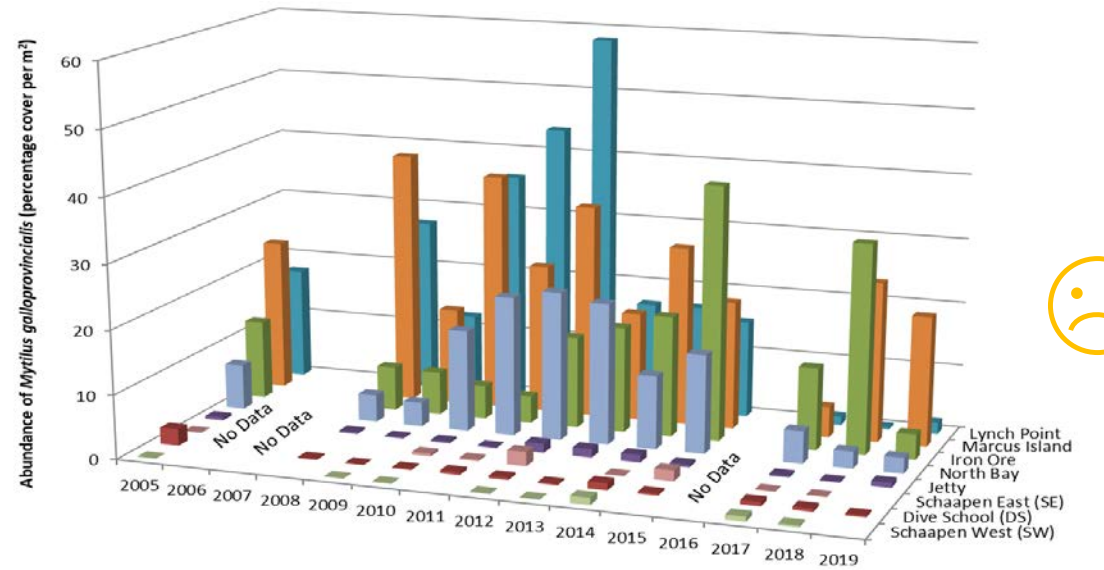




Acorn barnacle *Balanus glandula*



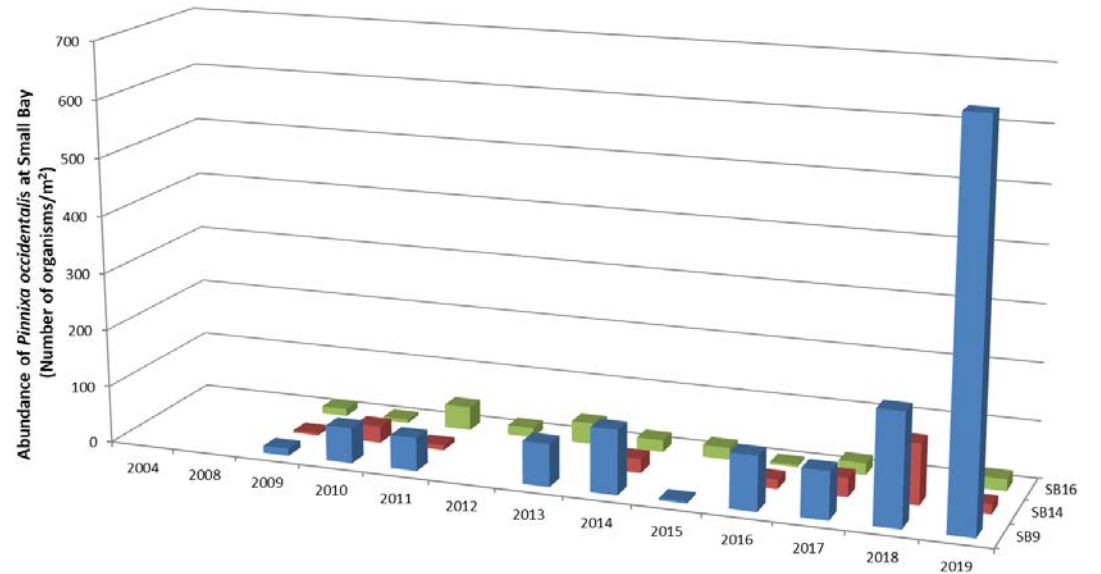
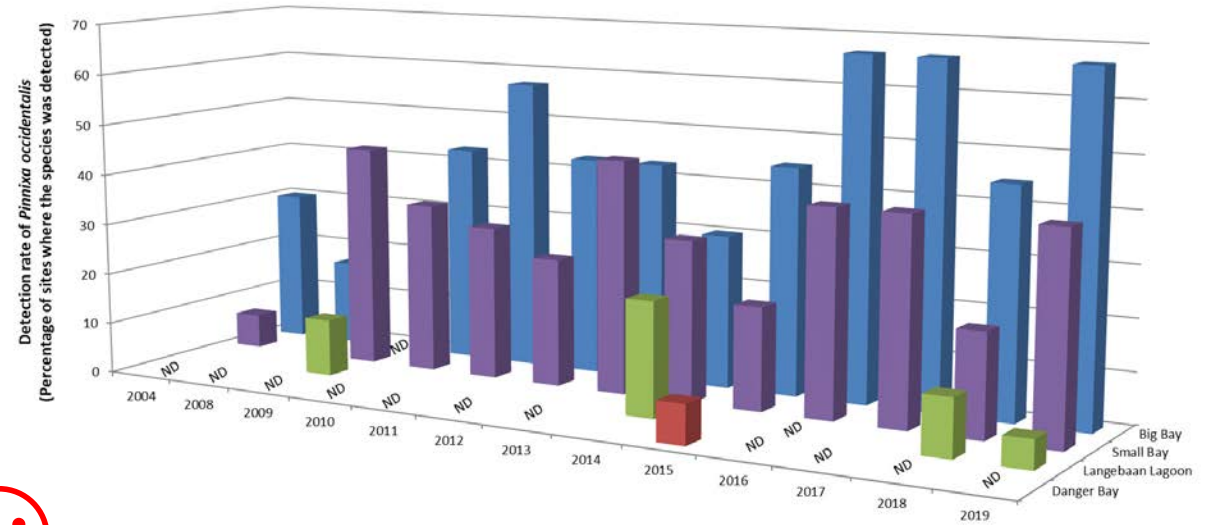
European mussel *Mytilus galloprovincialis*







# Western pea crab *Pinnixa occidentalis*



# 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 decreasing...
  - Birds (both on the islands and in Langebaan Lagoon) continue to decline...
- Marine aliens are increasing...rapidly
- Visitor numbers are declining...?
- Overall: Stable?





Thank You