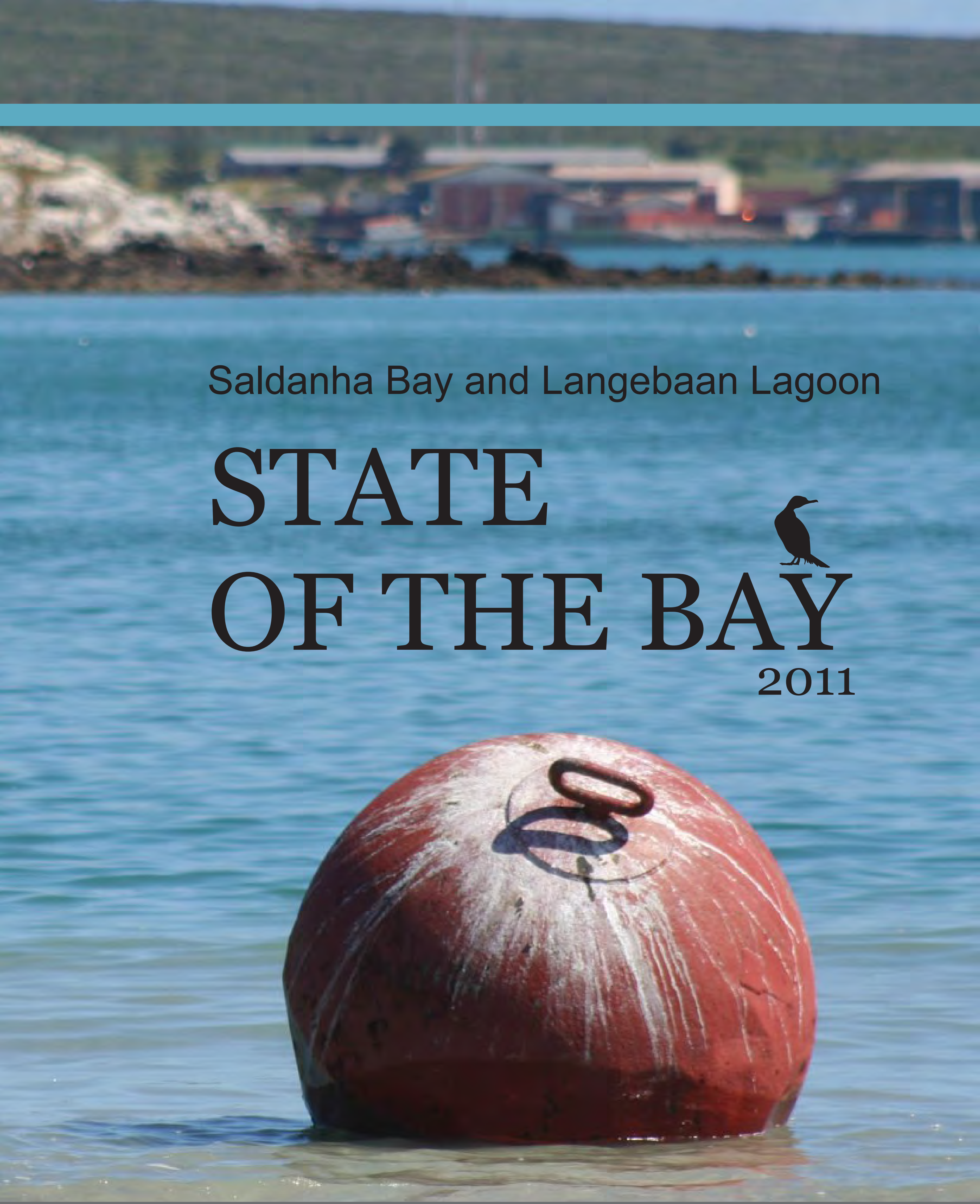
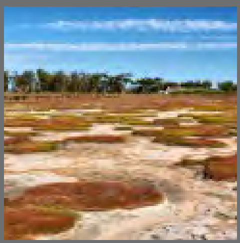


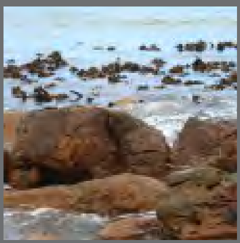
Saldanha Bay and Langebaan Lagoon

STATE OF THE BAY

2011





Foreword

REPORT BY:
Anchor Environmental Consultants

ANCHOR
environmental

FOR:

Saldanha Bay Water Quality Trust

DATA AND INFORMATION:
Anchor, DEAT, CSIR, ADV,
D. Lowenthal, SBWQT, DAFF

Saldanha Bay and Langebaan Lagoon

STATE OF THE BAY

2011

The residents living in and around Saldanha Bay and the Langebaan Lagoon are truly blessed to have such a unique ecological wonder on their doorstep. It has taken centuries of natural processes to provide us with this gift. The advent of man and his need to develop, almost at all costs, has the potential to destroy this gift within tens of years. The question is - how do we balance the need to conserve our natural heritage with the requirement to develop and prosper economically?

There is no simple answer to this very basic question. The conservationists have shouted their 'green' messages from the tree tops whilst the industrialists have simply argued the need to 'provide jobs'. Never the twain shall meet! We will all have to change our attitudes and work together to find the balance. This is a team effort. The government has taken the first step in providing guidance with the proclamation of the National Environmental Management: Integrated Coastal Management Act (Act No. 24 o 2008). This Act is still in the process of being implemented and has a way to go before having the required impact to provide the answer to our question.

Saldanha Bay has been identified as an economic development node by national government and the establishment of an Industrial Development Zone is well under way. To date, most environmental impact studies have been localised and the entire Saldanha Bay and Langebaan Lagoon ecological system has not been taken into account. This problem is presently being addressed by the Environmental Management Framework for the region which is underway. This, with the Integrated Coastal Management Act, will form the cornerstone as to how development will deploy in future.

None of the above can take place without scientifically based information on the 'State of the Bay'. The Saldanha Bay Water Quality Trust have been the pioneers in this regard and for the last 10 years have conducted a series of all encompassing scientific tests with minimal resources. This report is once again a perfect example of the wonderful job they perform. This report comes at a critical time in answering our question of balancing conservation and development.

Let us all, National, Provincial and local government with the private sector and non governmental organisations, take hands and make a difference in conserving our Saldanha Bay and Langebaan Lagoon for future generations whist developing responsibly.

André Kruger
Councillor Langebaan and Speaker West Coast District Municipality

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View of Small Bay from Saldanha Bay Yacht Club

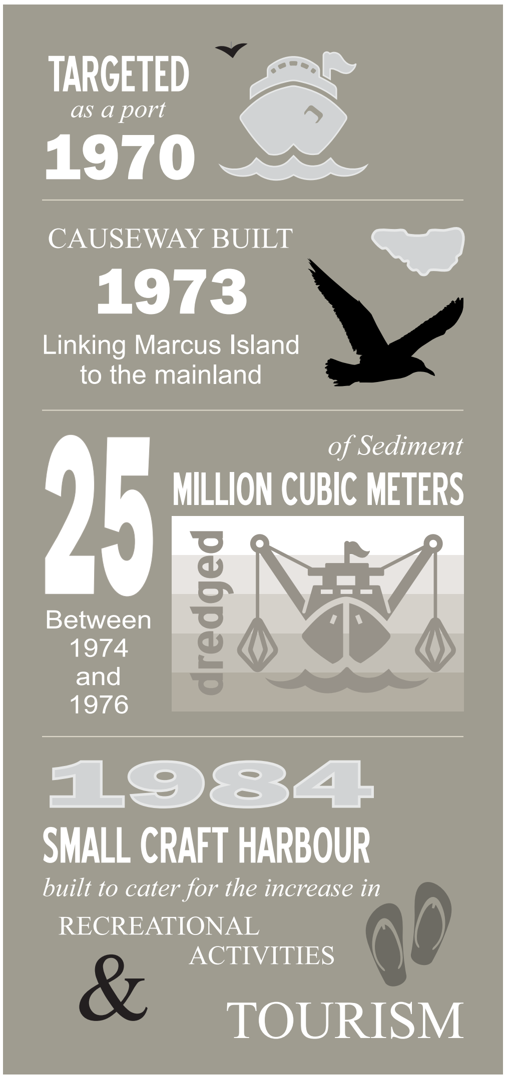
Introduction

Saldanha Bay is situated on the west coast of South Africa, approximately 100 km north of Cape Town. It is directly linked to the shallow, tidal Langebaan Lagoon. The area is exceptionally beautiful, and ranks among the country's biodiversity 'hot spots'. Langebaan Lagoon, the islands in the bay (Schaapen and Marcus) and just outside (Malgas, Jutten and Vondeling) were declared a Ramsar Site in 1988, and are proclaimed marine protected areas. Langebaan Lagoon and much of the surrounding land falls within the West Coast National Park.

However, there has been considerable development in the area that poses a threat to the health and biodiversity of the bay (herein meaning Saldanha Bay, Langebaan Lagoon and the islands). Saldanha Bay is the only natural harbour of significance on the west coast of South Africa, and was targeted for development as a major port in the early 1970s. The first major development was a causeway built in 1973 that linked Marcus Island to the mainland, providing shelter for visiting ore carriers. The Iron-Ore Terminal was built soon after, essentially dividing Saldanha Bay into two sections: a smaller area bounded by the causeway, the northern shore and the Iron-Ore Terminal ('Small Bay'); and a larger, more exposed adjacent area ('Big Bay'), which is connected to Langebaan Lagoon.

Between 1974 and 1976, approximately 25 million cubic meters of sediment was dredged from the bay to facilitate the entry of large ore carriers. A Multi-Purpose Terminal was added to the jetty in 1980, and the Small Craft Harbour was built in 1984 to cater for the increase in recreational activities and tourism. Dredging is periodically required for expansion and maintenance of these and other port facilities in the bay.

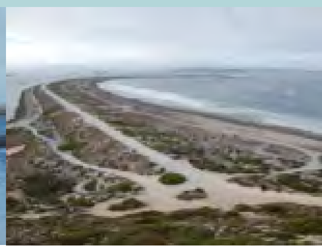
In addition, mariculture operations, fish processing factories and sewage treatment works in Saldanha Bay and Langebaan introduce organic material, nutrients and other contaminants into the bay. Collectively, these developments and activities have had significant impacts on the sensitive environments of the bay.



The Saldanha Bay Water Quality Trust (SBWQT), a voluntary organization representing various organs of State, local industry and other relevant stakeholders and interest groups, was established in 1996 to promote an integrated approach to the management, conservation and development of the Saldanha Bay and Langebaan Lagoon environment.

The SBWQT has played an important role in guiding and influencing management of the bay and in commissioning scientific research to inform decision making and management. While birds have been monitored for a number of years by the University of Cape Town and Department of Environmental Affairs, the SBWQT introduced the monitoring of a number of additional ecosystem indicators in 1999, including water quality (faecal coliforms, temperature, oxygen and pH), sediment quality (trace metals, hydrocarbons, particulate organic carbon and nitrogen) and benthic macrofauna. The range of parameters monitored increased in 2005 to include surf zone fish and rocky intertidal macrofauna.

The SBWQT commissioned the first technical report on the State of the Bay in 2006. Since then, technical reports have been produced annually from 2008. Summary reports such as this one, first produced in 2006, are to be produced at five year intervals.


Map of Saldanha Bay and Langebaan Lagoon

Saldanha Bay Yacht Basin in Small Bay

Monitoring environmental health

Why and how?

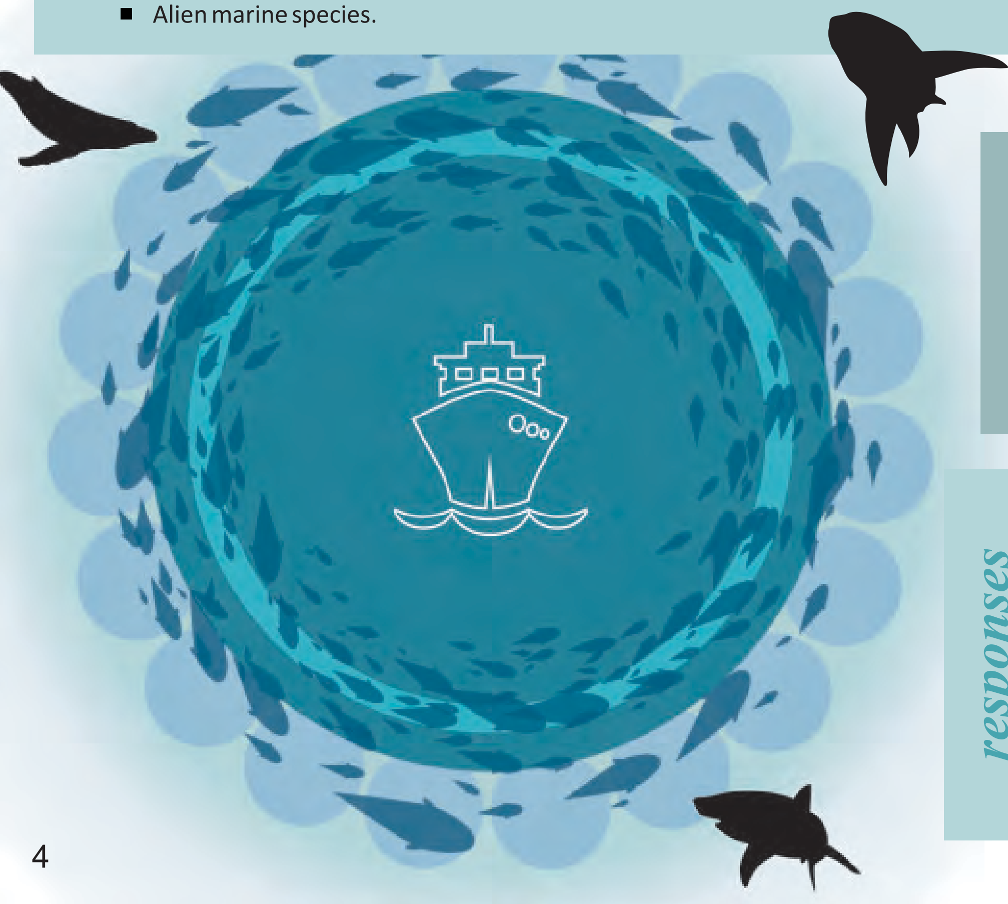

Fishing boats moored alongside the jetty at Small Bay

Human activities in the bay cause disturbances in the form of habitat degradation and loss, water pollution, overexploitation of natural resources and introduction of alien invasive species into the area. These impacts act synergistically on the environment, affecting its biological diversity, functioning, productivity, attractiveness and value. To understand the impact that human activities are having on the environment it is necessary to monitor both the extent of the development and activities (including associated emissions or discharges) that drive these changes, and the response that these invoke in the environment.

The State of the Bay monitoring and reporting programme seeks to address both of these aspects and is divided into two components. The first part covers activities and discharges affecting the environment and includes the following subcomponents:

drivers

- Urban and industrial development;
- Port development;
- Shipping, ballast water discharges, and oil spills;
- Effluent from waste water (sewage) treatment works, fish processing plants and desalination plants;
- Storm water
- Mariculture; and
- Alien marine species.



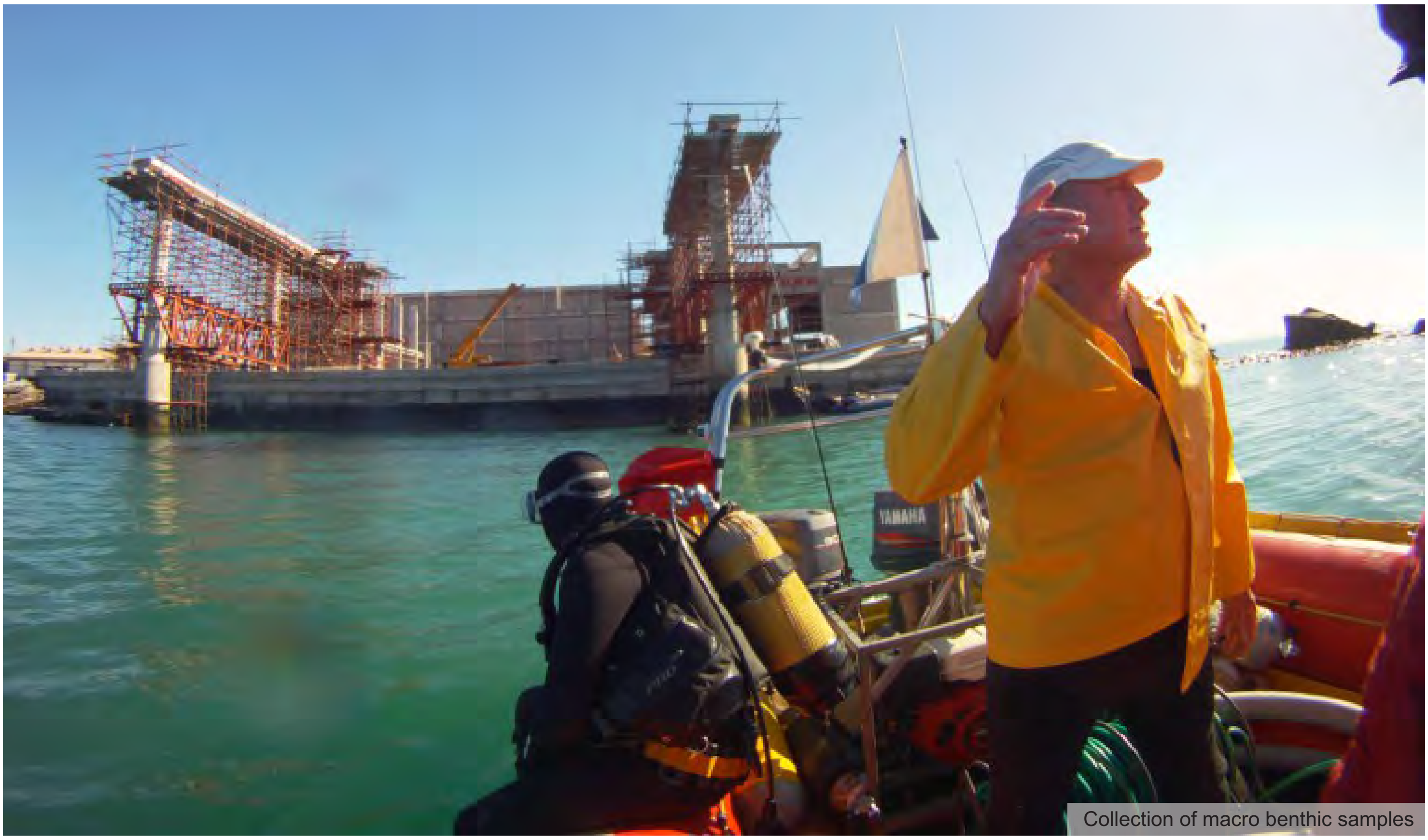
The second part covers the environmental responses and looks at changes in the following ecosystem components in Saldanha Bay and Langebaan Lagoon:

responses

- Water quality;
- Sediment quality;
- Aquatic macrophytes;
- Soft bottom benthic macrofauna;
- Rocky intertidal macrofauna;
- Fish; and
- Birds.

A rating system was devised for the State of the Bay monitoring and reporting programme in which each of the environmental components was assessed on a scale from 'Good' to 'Very Poor', based on measured trends and the expected levels under a relatively un-impacted, natural (or near-natural) condition. These are measures of 'ecosystem health'. The health categories are presented in the table below along with information on the ecological and management perspective of each.

Health category	Ecological perspective	Management perspective
Good	No or negligible modification from the natural state.	Relatively little human-related impact
Fair	Some alteration to the physical environment. Small to moderate loss of biodiversity and ecosystem integrity.	Some human-related disturbance, but ecosystems still functioning well.
Poor	Significant change evident in the physical environment and associated biological communities.	Moderate human-related disturbance with good ability to recover.
Very Poor	Extensive changes evident in the physical environment and associated biological communities.	High levels of human-related disturbance. A significant threat to human health may also be present.



Collection of macro benthic samples

Urban and industrial development

The large sheltered bay, fish resources and beauty of Saldanha Bay and Langebaan Lagoon have made it an attractive place for the development of human settlements, a fishing industry and an industrial port. Initially, development was held back by the shortage of fresh water in this area, but this was only temporary. European settlers first colonised the area shortly after they established a permanent settlement at the Cape in 1652. A fish trading post was established at Oostewal, Langebaan Lagoon, in the early 1700s. Much later, the first fish processing factory was established in Saldanha in 1903 and a whaling station at Donkergat in 1909.

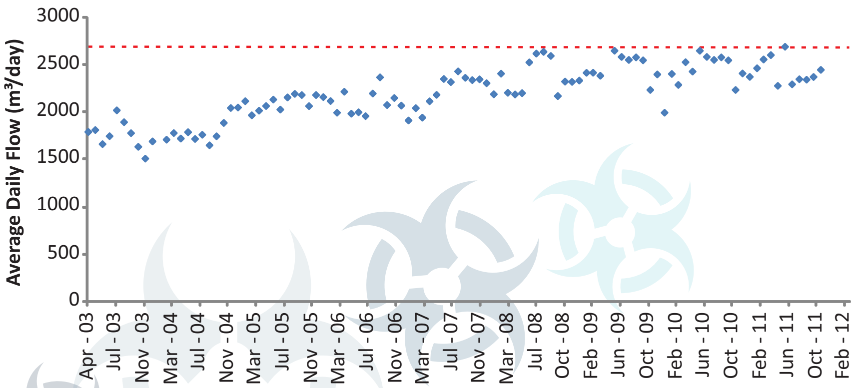
Port development began in earnest in the 1970s, with the construction of the Iron-Ore Terminal and a causeway linking Marcus Island to the mainland in 1973.

Saldanha Iron-Ore Terminal

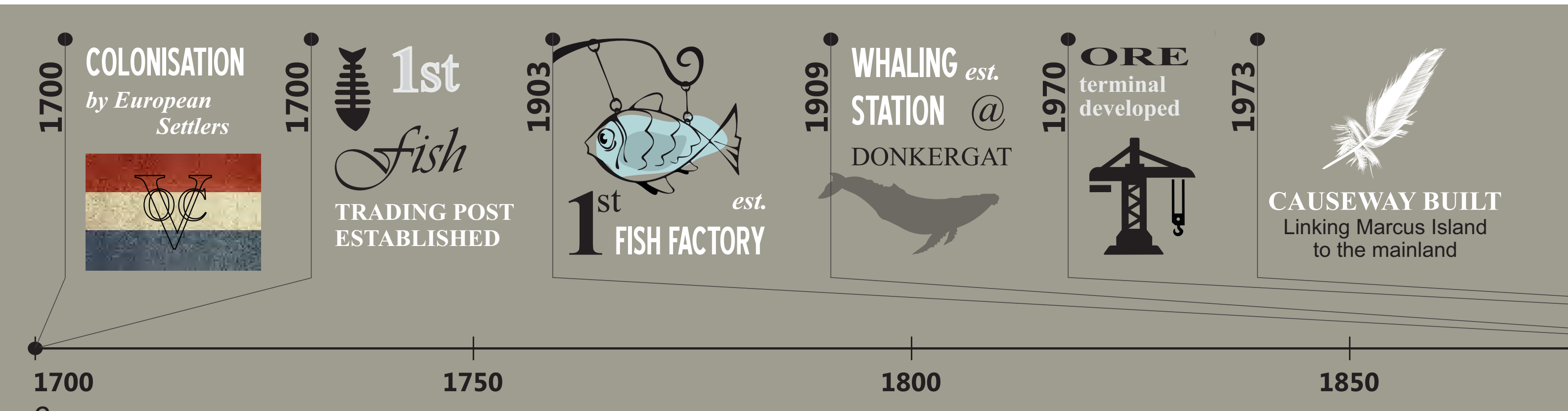
The construction of the Iron-Ore Terminal had a profound impact on water movement patterns in the bay, dramatically reducing wave energy and circulation in Small Bay. Port facilities in Saldanha Bay now include the main Transnet Ore Terminal with berths for three ore carriers, an oil jetty, a Multi-Purpose Terminal, and a general maintenance quay, a fishing harbour which is administered by the Department of Environmental Affairs, a Small Craft Harbour which is used by fishing vessels and tugs, two yacht marinas (Saldanha and Mykonos), a Naval boat yard at Salamander Bay and numerous slipways for launching and retrieval of smaller craft.


Saldanha Bay Commercial Dive School jetty


Transnet tugs moored at the Multi-Purpose Terminal



Trend in the volume of effluent released from the Saldanha WWTW, 2003-2011, and authorised total volume per year expressed as a daily limit (red line).



the health of the bay

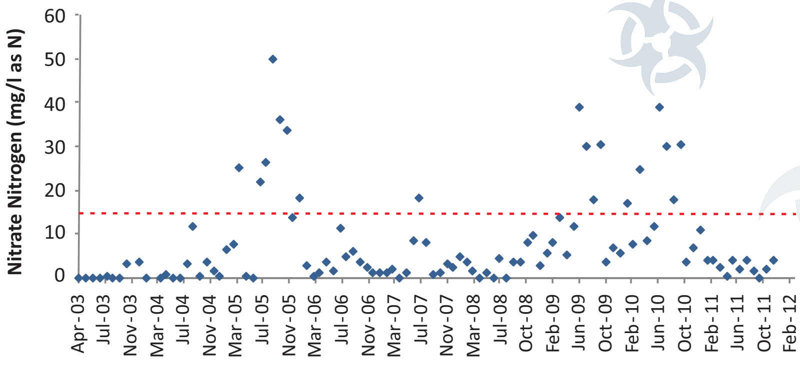
Development of the port and fishing industry served to attract other industry to the area, such as Arcelor Mittal, and also resulted in a rapid expansion in urban development in Saldanha and Langebaan. Urban and industrial developments encroaching into coastal areas have caused the loss of coastal habitats and affect natural coastal processes, such as sand movement.

The area's expanding population generates increasing volumes of sewage, much of which finds its way into the bay, either in partially-treated form from the waste water treatment works in Saldanha and Langebaan, or as untreated sewage from malfunctioning sewage pump stations (of which there are nine near the coast in Saldanha Bay and eighteen in Langebaan) and seepage or overflow from septic or conservancy tanks. In the past, all the effluent from Langebaan was used to water the local golf course, but volumes now exceed those required for irrigation. Growing urban populations in Saldanha and Langebaan will soon completely overwhelm the already over-pressured wastewater treatment facilities unless significant further investment is made in this area.

Sewage contains high concentrations of nutrients such as nitrates and phosphates (ingredients in fertilizers) that affect the balance of natural systems, as well as pathogens or disease-causing organism that pose a risk to human health. Nutrients stimulate the growth of phytoplankton and algae, which together with the decomposition of the organic material in the waste water, can deplete oxygen in the bay, threatening other marine species. While there are guidelines in place that specify maximum concentrations of contaminants in waste water discharges, these guideline levels are often exceeded when the waste water treatment plants are operating beyond their design limits or due to equipment failure.

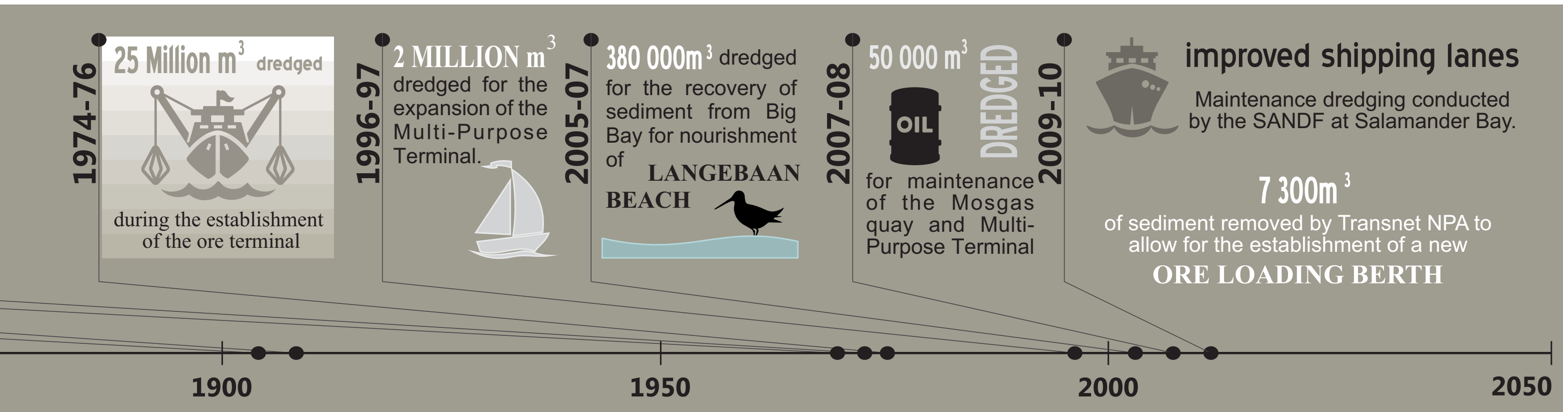
Saldanha Steel

Storm water runoff is also a major threat to the health of the bay. Storm water is generated when rain falls on hardened surfaces such driveways, streets and pavements in urban and industrial areas where it is prevented from soaking into the ground. Storm water running over these surfaces accumulates debris, bacteria, chemical contaminants such as trace metals and hydrocarbons and toxic substances such as insecticides, pesticides and solvents. These are then washed down into the bay where they accumulate in sediments and in the tissues of aquatic organisms.



Variation in Nitrate levels in effluent released from the Saldanha WWTW. Allowable limits as specified in terms of a general authorisation under the National Water Act 1998 are represented by the red line.

Industrial effluent discharged into the bay includes that from a number of fish processing plants and will soon include brine effluent from a desalination plant constructed by Transnet in 2012. Discharges from fish processing, particularly of sardine and anchovy, have caused significant problems in the past, but have improved dramatically in recent years with the ban on 'wet offloading', which entailed discharging substantial amounts of organic matter into the bay, as well as the reduction in volumes of fish processed in these factories.



Activities and discharges affecting

Port operations

Dredging

Dredging, required for the establishment and maintenance of port facilities in Saldanha Bay, has had a devastating impact on the ecology of the bay. Impacts of dredging range from direct destruction of habitat, flora and fauna, to changes in habitat (e.g. sediment structure, bathymetry, and wave climates) and water quality (e.g. increased suspended sediment load, re-suspension and redistribution of trace metals and other contaminants and hypoxia). Four major dredging events have been undertaken as part of the establishment and expansion of the Iron-Ore Terminal:

- 1974-1976 : 25 million m³ of sediment was dredged during the establishment of the ore terminal;
- 1996-1997 : 2 million m³ of sediment was removed for the expansion of the Multi-Purpose Terminal;
- 2007-2008 : 50 000 m³ of sediment was removed for maintenance of the Mossgas quay and Multi-Purpose Terminal; and
- 2009-2010 : 7300 m³ of sediment was removed to allow for the establishment of a new ore-loading berth.

Other dredging operations in the bay include the recovery of 380 000 m³ of sediment from Big Bay between 2005 and 2007 for the nourishment of Langebaan Beach, and maintenance dredging conducted by the South African National Defence Force (SANDF) at the Salamander Bay boatyard in 2009-2010.

Iron ore stockpiles

Cargo handling

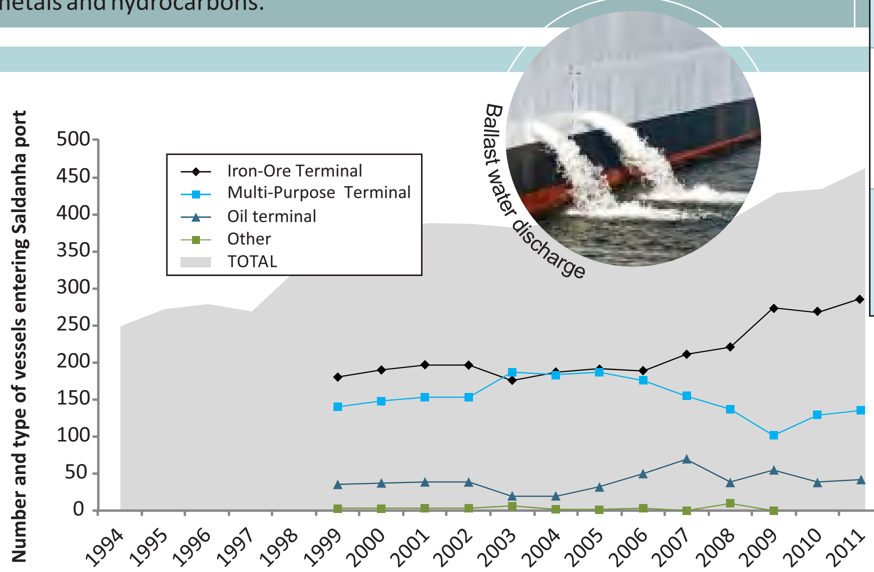
The Port of Saldanha is the only dedicated iron ore export facility in the country and nearly 60 000 tonnes are exported per annum. Most of the ore exported from the port is delivered along a dedicated ore railway from mines near Sishen in the Northern Cape. The transfer of ore from the railway carriages to storage facilities in the port and from these storage facilities onto the vessels, invariably results in some ore being spilled, either directly into the sea or onto the ground, where it can be flushed into the sea. Ore dust, generated during the ore handling process, also represents an important mechanism through which ore can find its way into the marine environment. Iron ore is not considered toxic, but it can promote growth of phytoplankton and can physically smother benthic organisms where it accumulates. The port also serves as an oil transfer terminal and handles exports of lead, zinc and copper concentrates. Lead, zinc and copper are all highly toxic to marine organisms when they are elevated above their normally very low concentrations.

Imports to the port are small by comparison, totalling almost 5 000 tonnes in 2011, and include anthracite, coking coal and steel pellets, the handling of which are not of particular concern to the immediate environment.

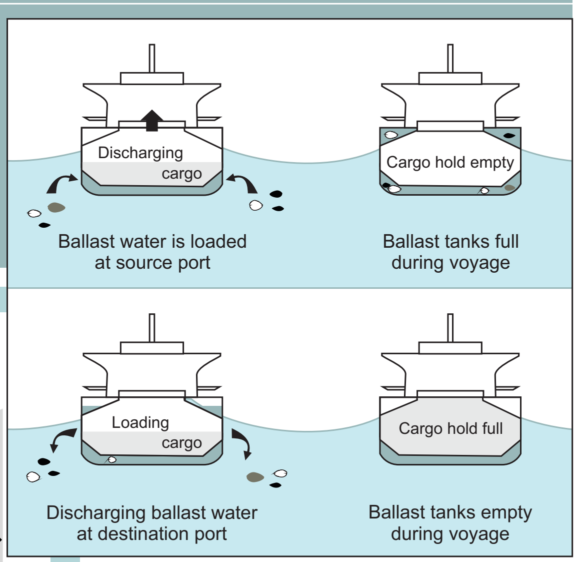
Vessel activities

The diversity of port facilities in Saldanha Bay allows for a great deal of vessel traffic which poses a significant hazard for marine life due to disturbance from the vessels themselves and accidental and deliberate discharges of ballast water from these vessels into the bay. Ballast water accounts for most of the effluent discharged from vessels into the bay. Ballast is essential for the efficient handling and stability of ships during ocean crossings and when entering a port. Water is pumped into ballast tanks when cargo is offloaded and is discharged when cargo is loaded, along with the eggs, larvae and adults of marine species picked up in the ports or seas from which it was drawn. Despite international protocols encouraging practices such as open-ocean ballast water exchange, it is estimated that at least 85 alien marine species have been introduced to South Africa, 62 of which are thought to occur in Saldanha Bay and Langebaan Lagoon.

The Increase in the volumes of ballast water discharged into the bay has been dramatic in recent years, having more than doubled since 2004. In addition, since ballast water is generally taken up in ports, discharges into the bay can contain high concentrations of contaminants such as trace metals and hydrocarbons.



Volumes of ballast water discharged by different types of vessels entering Saldanha port between 1994 and 2011



Ballast water transfer operations

Oil spills are an ever present threat associated with shipping traffic but fortunately few such events have been recorded in Saldanha Bay to date. Discharges of sewage and bilge water from vessels, ranging from small yachts and power boats to large ships, also contribute to pollution in the bay.

Mariculture

Being one of few natural sheltered embayments in South Africa, Saldanha Bay is a major area for mariculture. Saldanha Bay was zoned to cater for mariculture operations in 1997 and approximately 1 000 ha were demarcated for this purpose. To date, a total of 145 ha has been allocated to seven mariculture operators for cultivation of mussels and oysters. In addition, an application has recently been lodged to establish a salmon farm in the bay.

Loading oyster baskets

Mariculture production in Saldanha Bay has been fairly steady over the last 10 years, increasing from about 500 tonnes per annum in 2000 to about 700 tonnes in 2011. Studies conducted in the bay and elsewhere have shown that mussel culture can lead to organic enrichment and anoxia in sediments under the mussel rafts, as a result of accumulation of faeces. This can impact on the benthic organisms in these areas.

Alien marine species

An estimated 85 marine species have been introduced to South African waters from elsewhere in the world, mainly as a result of shipping activity and mariculture. At least 62 of these are thought to occur in Saldanha Bay and Langebaan Lagoon. Some — including the Mediterranean mussel *Mytilus galloprovincialis*, the European green crab *Carcinus maenas*, and the recently detected barnacle *Balanus glandula* — are considered invasive, which means they have spread since being introduced and are most likely causing significant ecological impacts. A further 25 species in Saldanha Bay are currently regarded as cryptogenic: their origin is unknown, but it is highly likely that they were introduced.

Many introduced species struggle to adapt to South Africa's exposed coastline, and remain confined to the sheltered bays and harbours they arrive in. Saldanha Bay, being particularly protected from rough seas, provides a good deal of suitable habitat for a large number of the exotic species recorded in this country. The following section presents information on a few key introduced species in Saldanha Bay. Future surveys will monitor the abundance and distribution of all known invasive species, as well as determine if new ones have arrived.

The Mediterranean mussel

The first record of the Mediterranean mussel *Mytilus galloprovincialis* on South African shores was made in Saldanha Bay in 1979. The species has subsequently become the most widely distributed marine invasive in the country, with a range extending from the Namibian border on the west coast to East London in the east. It is commercially cultured at a number of sites in Saldanha Bay and elsewhere, and is widely exploited by recreational and subsistence fishers.

In South Africa, the Mediterranean mussel forms dense beds on exposed rocky shores, outcompeting the indigenous mussel and limpet species for space. At the same time, these beds provide extensive new habitat for a range of small invertebrates that shelter between the shells. The invasion has thus greatly increased the intertidal biomass of rocky shores, despite excluding a number of larger shellfish species.

Historically, the Mediterranean mussel has not been found much in sandy habitats in this country, which remain dominated by the indigenous black mussel *Choromytilus meridionalis*. However in the mid-1990s Mytilus began establishing dense beds on sandy banks in the middle of Langebaan Lagoon. This anomalous population peaked in 1998, at which point SANParks initiated a programme to dredge the mussels from the Lagoon. Midway through this process the mussels began to die off naturally and had completely died off by 2001.

The Acorn barnacle

The Acorn barnacle *Balanus glandula*, which is native to the Pacific coast of North America, has only recently been identified in South Africa. It is likely, however, that this species has been in the country since at least the early 1990s. It is now the most abundant intertidal barnacle along the southern west coast and in Saldanha Bay.

The Acorn barnacle was first confidently identified in the State of the Bay surveys in 2008. It is likely, however, that it was present in earlier surveys, but confused with an indigenous barnacle species *Chthamalus dentatus*.

The Pacific South American mussel

A second introduced mussel species, the Pacific South American mussel *Semimytilus algosus*, has recently been discovered in South Africa. It reportedly occurs in huge densities of thousands of individuals per square metre low on the shore, along most of the west coast. The species appears to show a strong preference for wave exposed shores, and thus does not reach such high densities in Saldanha Bay. It has, however, been observed on ropes in the mussel farms, where it could become a fouling nuisance. This mussel species does not reach as large a size as the local mussel species (maximum size is 50 mm), and has an elongated shell, which is relatively flat and smooth. Its shell is tinged with green.

The European shore crab

The European shore crab *Carcinus maenas* is a native European crab species that has been introduced to many other areas in the world. It is typically is restricted to sheltered, coastal sites and appears to have been unable to establish on the open wave-exposed coastline in South Africa. However, it has managed to established dense populations in both Table Bay and Hout Bay Harbours in Cape Town.

No live specimens of this species have been recorded in surveys of Saldanha Bay to date, although a single dead specimen was reported in Small Bay in 2004. This species has reportedly decimated shellfish populations in other areas where it has become established and there is concern that it will do the same in Saldanha Bay if it is ever able to establish a foothold here.

The disc lamp shell

The disc lamp shell *Discinisca tenuis* is a small (20 mm diameter), disc-shaped organism with a semi-transparent, hairy, fringed shell. It was first recorded clinging to farmed oysters in Saldanha Bay in 2008. More recently (2011), it has been reported as living freely outside the oyster culture operation on Schaapen Island. This species is endemic to Namibia and is thought to have been introduced to South Africa with cultured oyster imports. It reaches very high densities in its home range and it is feared that it could become a significant fouling species in Saldanha Bay in the future.


C.L. Griffiths

The shell worm

The shell worm *Boccardia proboscidea* is a small (20 mm long) tube-dwelling worm found in shallow sand-lined burrows on the surfaces of oysters, abalone and other shellfish. It occurs naturally on the Pacific coast of North America and Japan. In South Africa it is known to occur on a number of oyster and abalone farms (including those in Saldanha Bay), and has recently been recorded outside aquaculture facilities in Saldanha Bay.

Vase tunicate

The vase tunicate *Ciona intestinalis* is a tall (15 cm), cylindrical, yellowish, solitary ascidian. It forms large aggregations on submerged structures in harbours and lagoons from Saldanha Bay to Durban. It is an important pest as it quickly coats hard marine surfaces. It is also known to smother and kill farmed mussels, and is thus of economic concern in Saldanha Bay.

Water quality

chlorophyll a
temperature
salinity
nutrients
dissolved oxygen

Marine water quality is influenced by a number of variables, with five of these - temperature, salinity, dissolved oxygen, nutrients and chlorophyll a (an indicator of phytoplankton abundance) — being most commonly measured.

Water quality is also influenced by wave action, current strength and circulation patterns, all of which can be affected by coastal development.

Waves and currents

Large-scale harbour development in the early 1970s had notable impacts on water movement patterns and wave action in Saldanha Bay. The bay was split into two sections by the Iron-Ore Terminal. The Marcus Island causeway created a barrier for incoming swells, decreasing wave exposure and increasing the extent of sheltered and semi-sheltered areas, particularly within Small Bay. In Big Bay, wave exposure decreased in some places and increased in others due to altered circulation patterns.

In the past, current strength and circulation in Saldanha Bay were determined by a combination of tidal movements and wind. Deeper currents, being less influenced by wind than those at the surface, followed more predictable patterns based on tidal ebb and flow and wind-induced upwelling processes. These patterns, as well as those at the surface, have been modified as a consequence of port development.

Residence time of water in Small Bay has increased, which means that there is reduced potential for dilution and flushing of effluent and associated contaminants discharged into this part of the bay. Contaminants persist in the water column for longer periods, using up available oxygen. Some settle out in the sediments and others are taken up by living organisms in the bay.

The most obvious impacts of changes in water circulation patterns and effluent discharges can be seen in the effects on available oxygen in the water column in Small Bay, in trace metals that accumulate in filter-feeding organisms and bacterial concentrations in nearshore waters.

Adapted from Shannon and Stander 1977 and Flemming 1977

Adapted from Weeks et al. 1991 and Luger et al. 1999

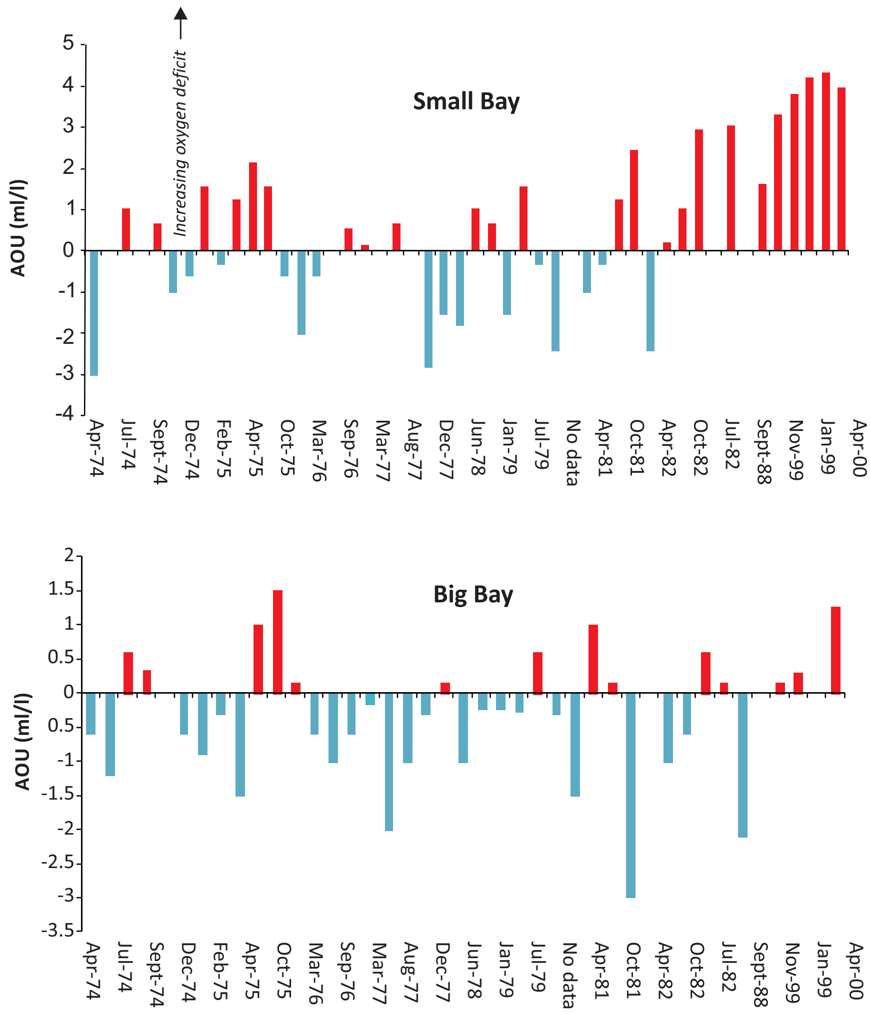
Oxygen

Dissolved oxygen in seawater, which is essential for the survival of most marine life, can be depleted by the decomposition of organic matter. Natural 'black tide' events on the west coast occur when dense algal blooms die en masse and aerobically decay, causing low oxygen conditions (anoxia) and mass mortalities of marine animals like crayfish.

Anthropogenic inputs of organic matter to the sea, for example fish factory waste or sewage, can deplete oxygen in similar ways.

In the graph, dissolved oxygen in Big Bay and Small Bay is represented using the Apparent Oxygen Utilization measure (AOU), defined as the difference between the maximum oxygen concentration for a given water temperature and the actual concentration recorded. Larger values, highlighted in red, indicate situations of oxygen deficit.

More frequent oxygen deficits have been observed in Saldanha Bay in recent years, particularly in Small Bay, which used to experience deficits mainly in winter but now experiences them in summer as well. This suggests that human inputs of organic matter, of which fish processing factories and mussel farms are two main sources, are increasing. It also points to the reduced flushing capacity of the bay following the development of the port facilities.



Oxygen given as AOU (apparent oxygen utilization - ml/l)

Claudio Velasquez Rojas/Homebrew films

Rock Lobster walkout due to low oxygen event

Water quality

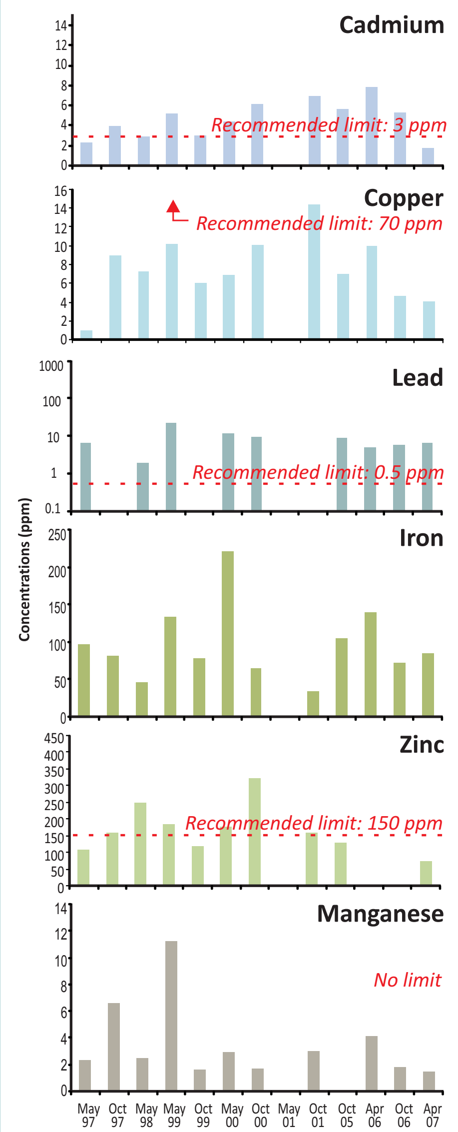
Trace metals

Concentrations of trace metals and other contaminants in water tend to be low and very variable (in response to factors such as season, state of the tide, currents, freshwater runoff and the intermittent flow of industrial effluents) and hence requires highly sophisticated sampling and analytical techniques. However, some of these contaminants, particularly trace metals, accumulate through the food chain in the flesh of living organisms.

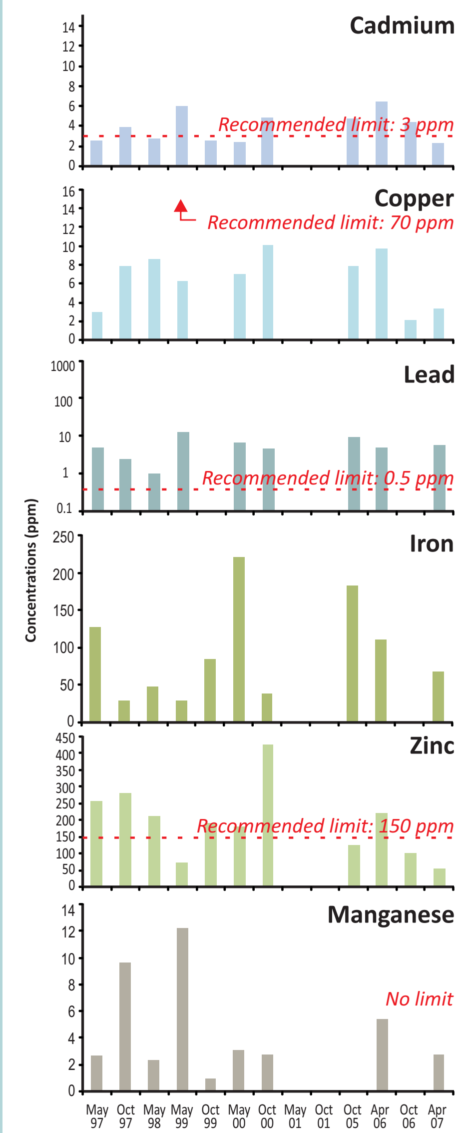
Sessile, filter-feeding organisms like mussels and oysters accumulate trace metals and other contaminants at extremely high levels. This means they can be used to monitor water quality and indicate environmental pollution.

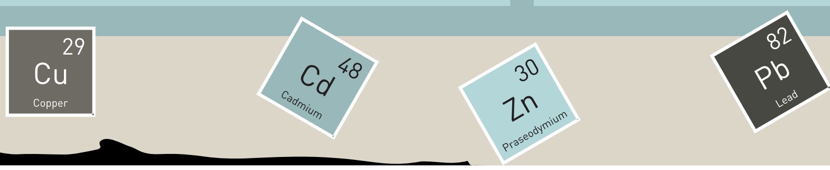
The Mussel Watch Program, run by the Department of Environmental Affairs (DEA), monitors the concentration of a range of trace metals in mussels from sites around Saldanha Bay. Data from 1997—2007 paint a worrying picture: food safety guidelines were frequently exceeded for lead and cadmium, and occasionally for zinc. Copper concentrations however, have remained well below dangerous levels. No clear trends over time are evident for any of these contaminants, although recent (post-2007) are lacking.

1. Saldanha Bay north

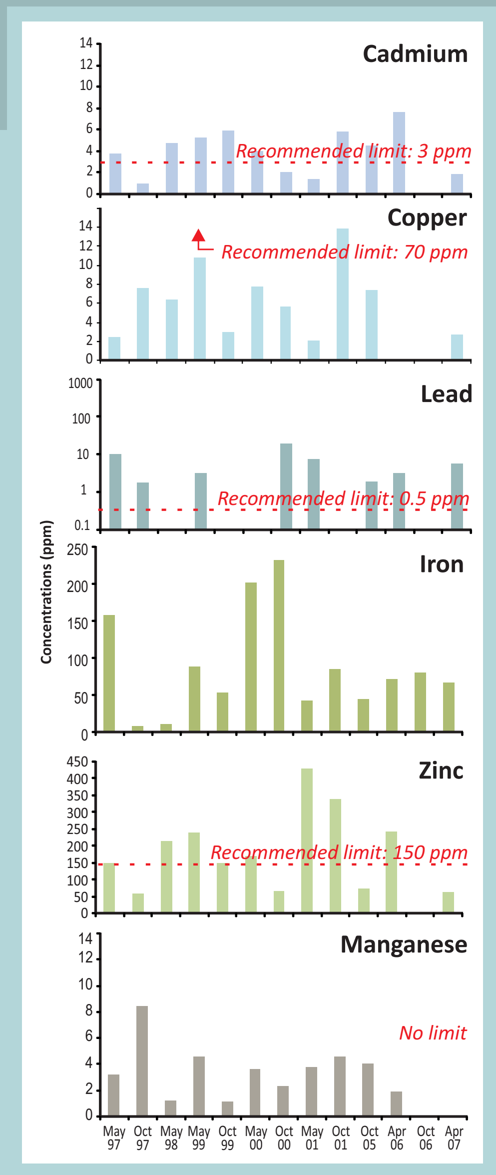


2. Fish factory

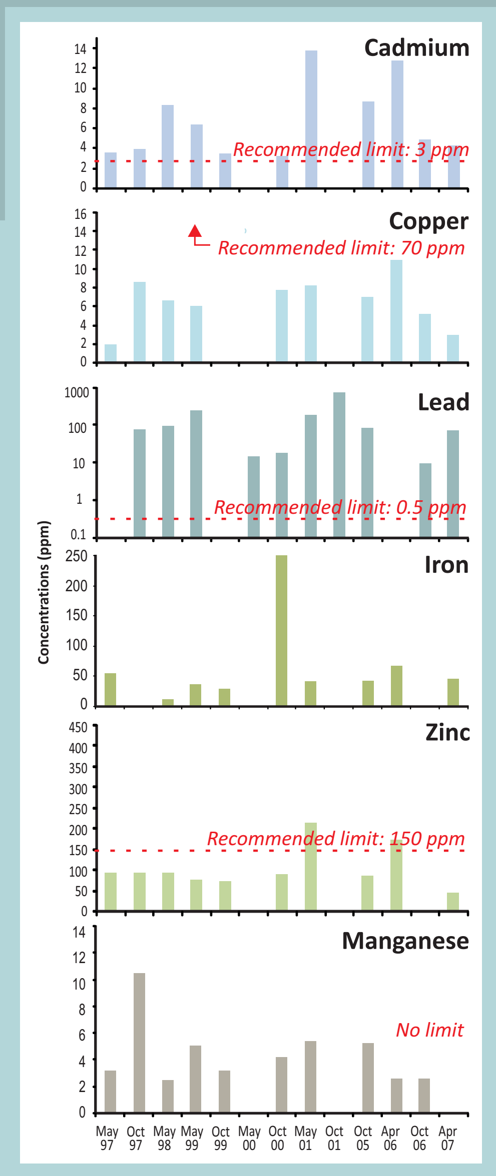




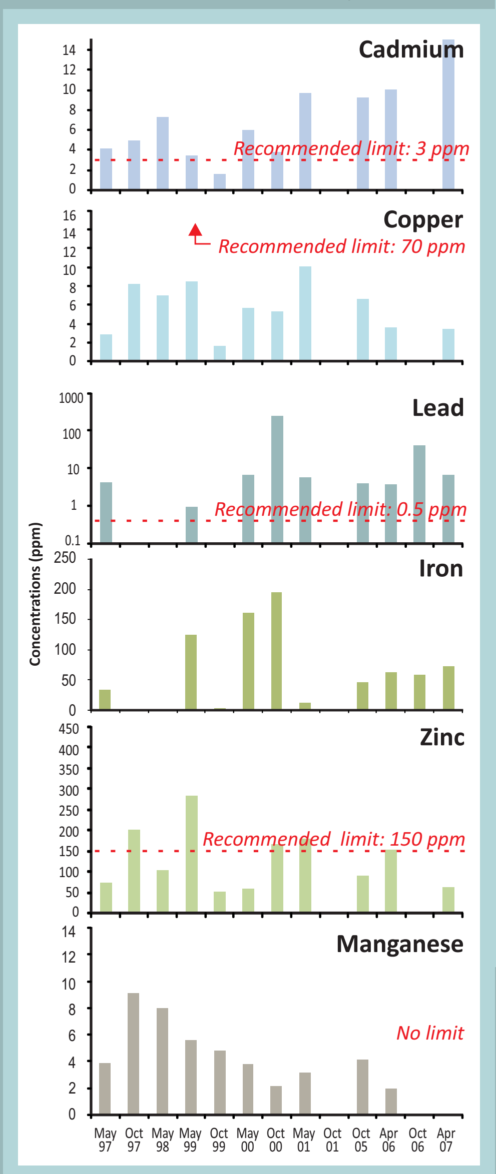
5. Iron ore jetty

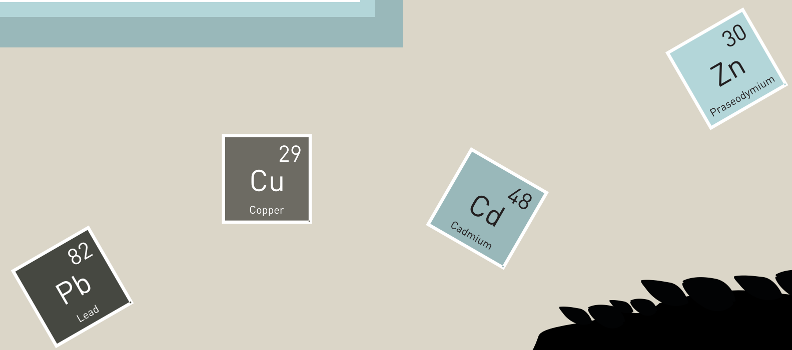


4. Portnet



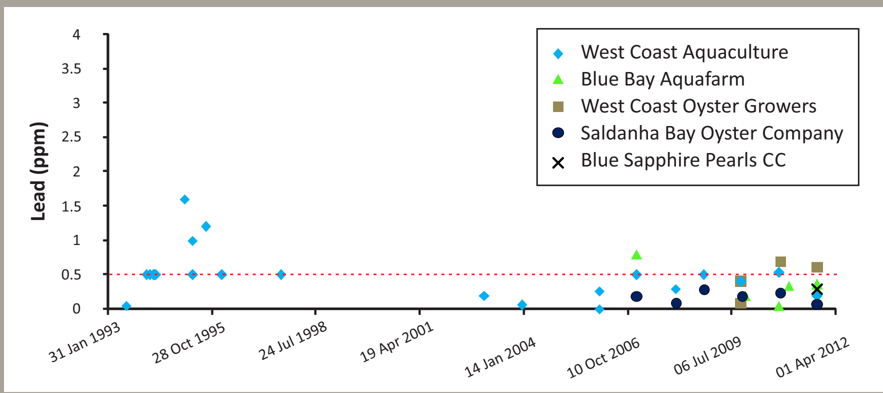
3. Causeway





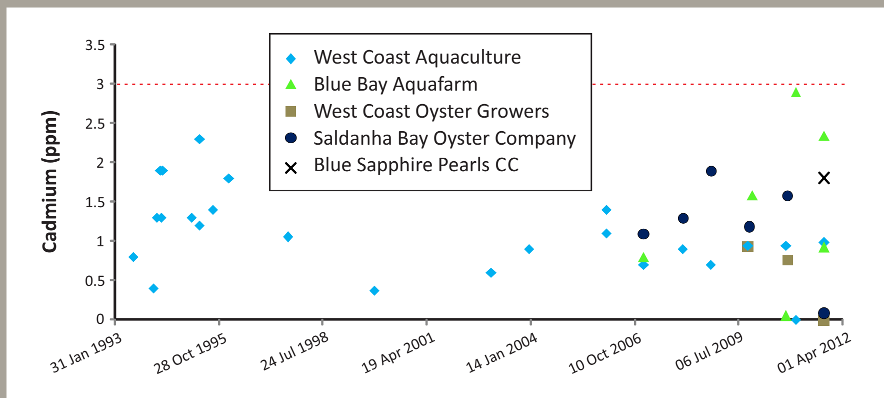
Water quality

Mussels grown on rafts in the bay tend to have lower concentrations of trace metals than those growing closer to the shore. Food safety standards are seldom exceeded in cultured mussels. One possible reason for this difference is that farmed mussels grow faster, leaving less time for contaminants to accumulate in their flesh. Another is that farmed mussels feed on phytoplankton blooms that develop in upwelled water that originates outside the bay. Mussels nearer the shore filter water that has been in the bay for longer, and are thus exposed to water with a higher contaminant load.



Variation in copper concentration in farmed mussels in Saldanha Bay, 1993 - 2011.

Mariculture jetty at Small Bay



Variation in cadmium concentration in farmed mussels in Saldanha Bay, 1993 - 2011.

Mariculture rafts in Small Bay

Bacterial indicators

Faecal pollution from sewage effluents and storm water runoff can introduce disease organisms into coastal waters. These pose a threat to recreational water users and consumers of seafood. Faecal coliform and *E. coli* counts in parts of Saldanha Bay have exceeded safety thresholds for many years, although there have been clear signs of improvement since 1999, when dedicated monitoring was initiated by the SBWQT. Levels in Small Bay have been of particular concern, frequently exceeding safety guidelines for both recreational use and mariculture (which are more stringent). The worst locations are typically the Bok River sewage outlet and Pepper Bay, both in Small Bay. Bacterial counts in Big Bay and Langebaan Lagoon tend to be much lower, but appear to have increased in recent years.

Downwind Dash 2012

Kite surfing at Langebaan Lagoon

Site	1999/2000	Present
1. Beach at mussel rafts	☹ (orange)	😐 (green)
2. Small Craft Harbour	☹ (orange)	☹ (orange)
3. Small quay (Sea Harvest)	☹ (red)	☹ (orange)
4. Saldanha Bay Yacht Club	☹ (red)	😐 (green)
5. Pepper Bay - big quay	☹ (red)	☹ (orange)
6. Pepper Bay - Cape Reef	☹ (red)	☹ (orange)
7. Hoedjies Bay Hotel - beach	☹ (red)	☹ (red)
8. Beach at caravan park	☹ (orange)	☹ (red)
9. Beach at Bok River mouth	☹ (red)	☹ (red)
10. General cargo quay	😐 (green)	☹ (orange)
11. Sea farm	😐 (green)	☹ (orange)
12. Mykonos - Paradise Beach	☺ (blue)	😐 (green)
13. Mykonos - harbour	☹ (orange)	☹ (orange)
14. Lentjiesklip	😐 (green)	😐 (green)
15. Langebaan North - Lentjiesklip	☹ (orange)	😐 (green)
16. Langebaan - main beach	☹ (orange)	😐 (green)
17. Langebaan Yacht Club	☹ (orange)	☹ (orange)
18. Tooth Rock	😐 (green)	☹ (orange)
19. Kraalbaai - North	*no data*	😐 (green)
20. Kraalbaai - South	*no data*	😐 (green)

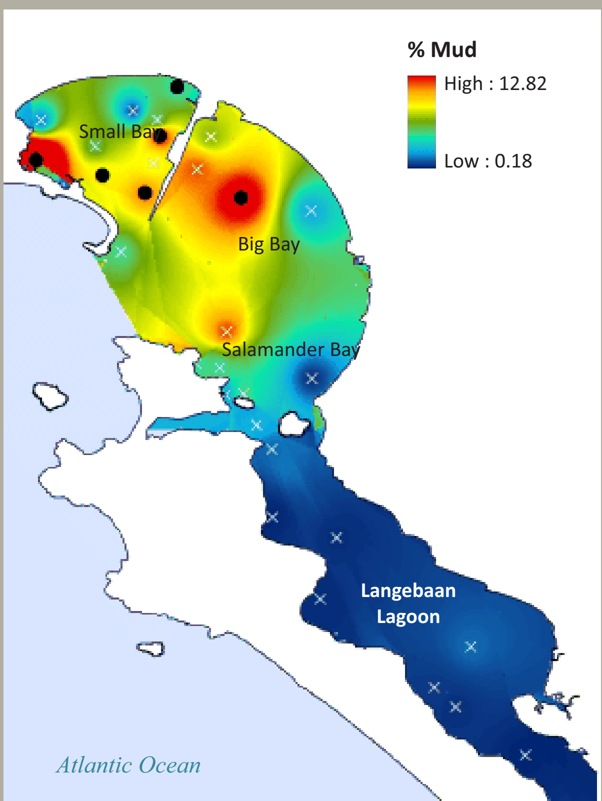
Sediments

The health of sediments in Saldanha Bay has historically been monitored through three closely-related aspects: sediment particle size composition; concentrations of organic matter (particulate organic carbon and nitrogen) and trace metals. The earliest records from Saldanha Bay (pre-1970) indicate that sediments in Saldanha Bay were predominantly sandy (i.e. fairly coarse), with a low concentration of organic matter and trace metals. This changed following construction of the Marcus Island causeway and ore jetty in the 1970s, when fine sediment (mud) started to build up in the more sheltered parts of Small Bay (particularly around the Yacht Club Basin and Small Craft Harbour) and also in the dredged shipping channels around the Iron-Ore Terminal. Elevated inputs of organic material, particularly from the sewage treatment works, fish factories and mussel farms, have further contributed to this problem. Trace metals, which typically associate with finer sediments and organic material, also started building up at this time as a result of discharges of effluents into the bay and port operations (ore loading and vessel maintenance).

The accumulation of fine sediment, trace metals and organic material has led to a depletion of oxygen in the sediments in the bay and to these sediments becoming toxic for marine organisms in some areas. Areas of greatest concern are located either in close proximity to the source of contamination (e.g. adjacent to the Multi-Purpose and Iron-Ore Terminals), or in the more quiescent areas of the bay where fine sediments accumulate (e.g. in the Yacht Club Basin and Small Craft Harbour in Small Bay).

Normally these oxygen-poor and toxin-rich sediments would become buried over time, and hence isolated from the overlying water column. However, periodic dredging in the bay has stirred up much of this material as well as other fine material long buried beneath the bay. Once stirred up, this fine material floats around in the water column with its associated contaminants, before eventually settling in the calmer and deeper parts of the bay, further impacting on water and sediment quality in these areas.

Sediment Particle Size

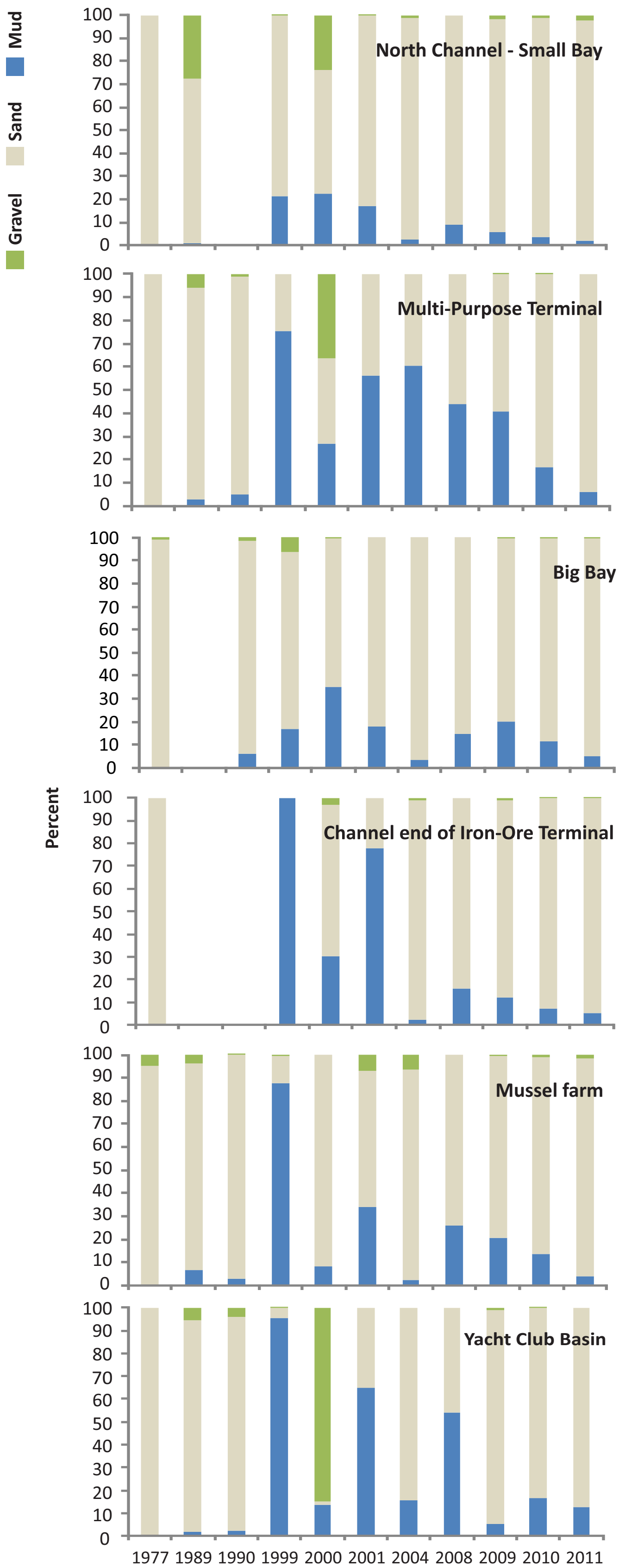


Fine sediment has accumulated in the more quiescent parts of the bay, particularly Small Bay (in and around the Yacht Club Basin and Small Craft Harbour) and in the dredged shipping channels adjacent to the Iron-Ore Terminal.

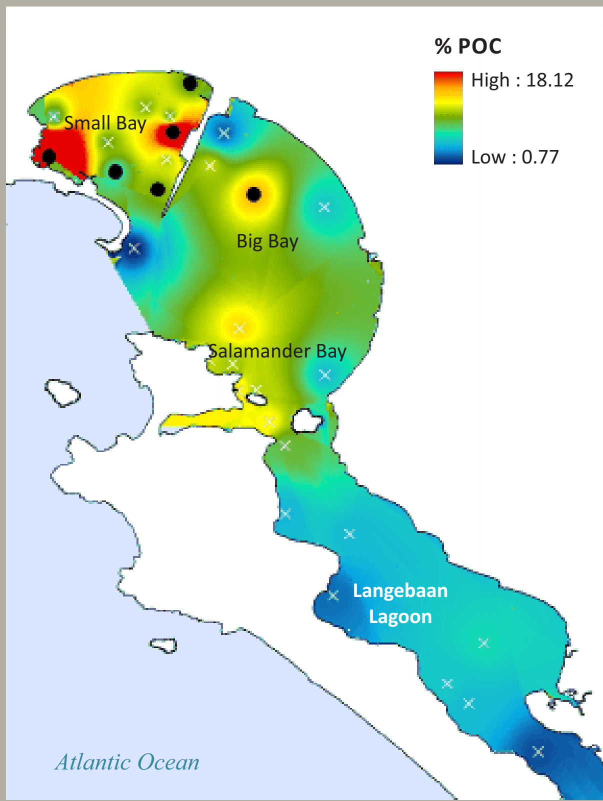
Saldanha Bay Yacht Club

Marcus Island Causeway

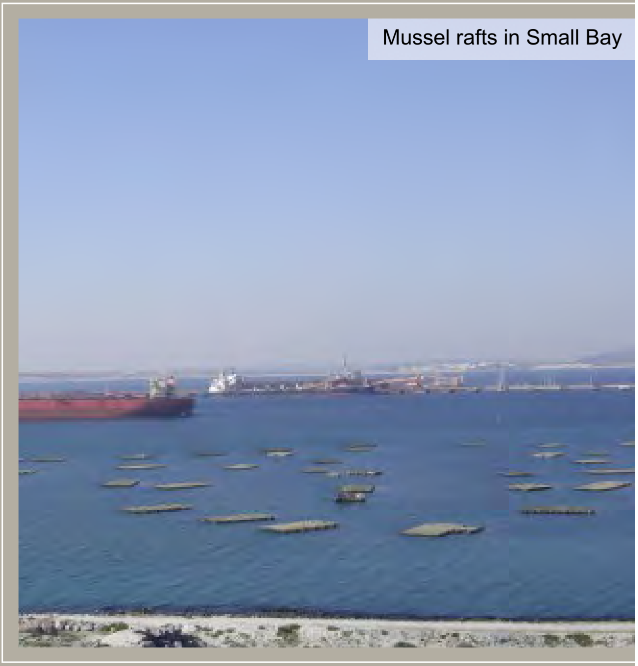
Particulate Organic Carbon (POC)



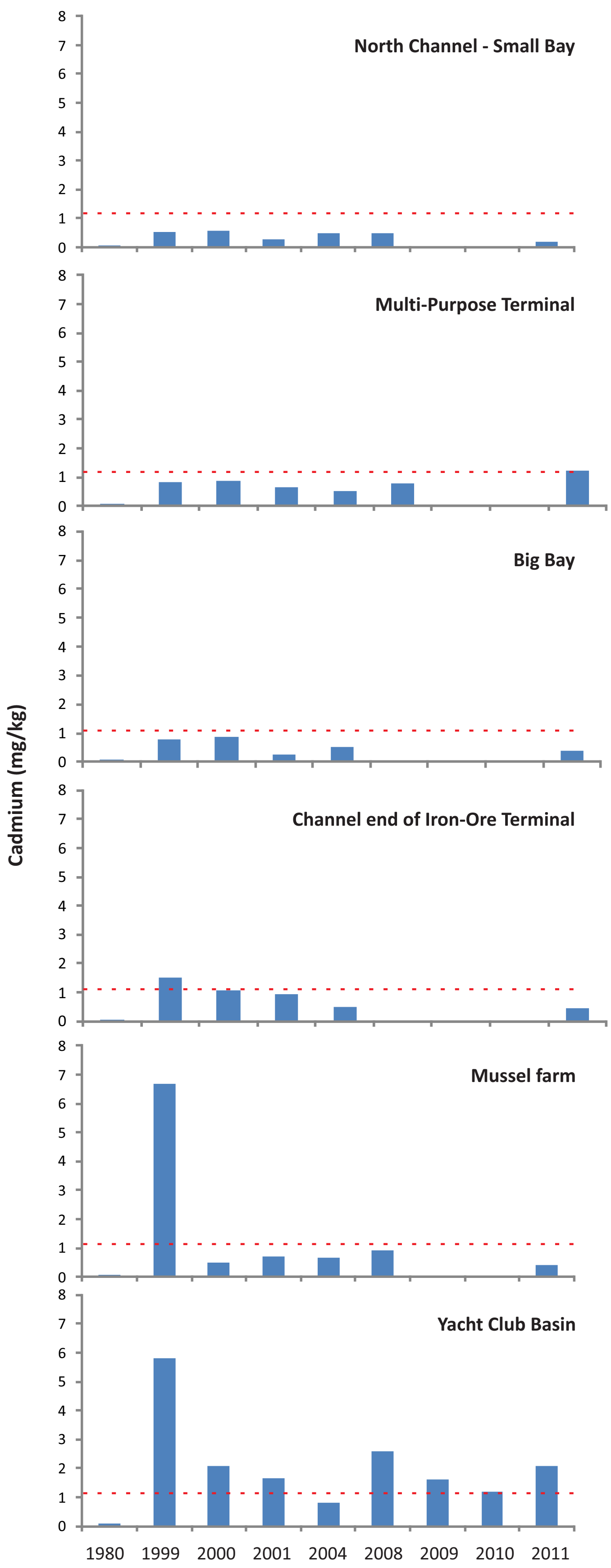
Change in sediment grain size composition at selected sites in the bay over time. The amount of fine sediment (mud=blue shading) was greatly elevated at most sites following the major dredge event in 1996/7 and has spiked again to varying extents at these sites following subsequent, smaller-scale dredge events in 2005-7, 2007-8 and 2009-10.



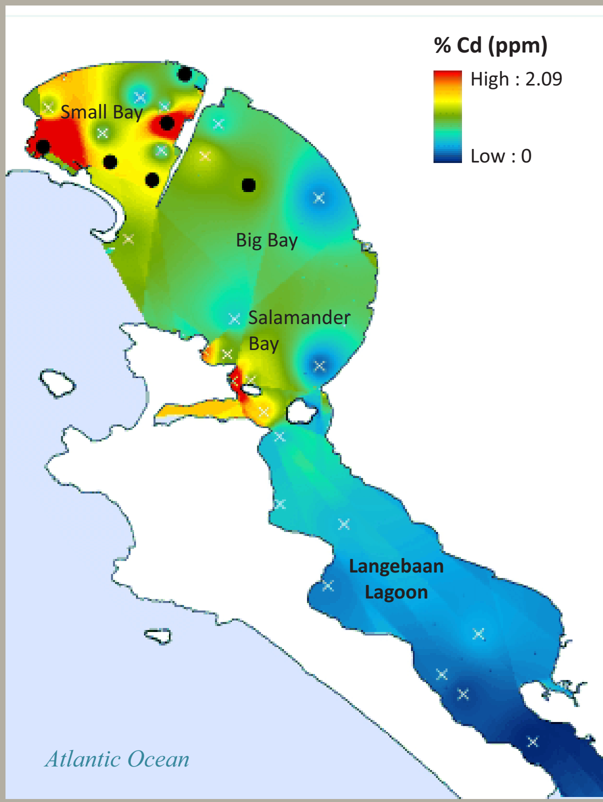
Organic matter tends to accumulate in the same areas as fine sediment. Abundance is particularly high in Small Bay where most of the sources of organic matter are located (waste water discharges, mussels farms) and where water movement has been most severely reduced.



Cadmium



Variation in cadmium concentration in sediments in Saldanha Bay, 1980 - 2011, in relation to guideline levels.

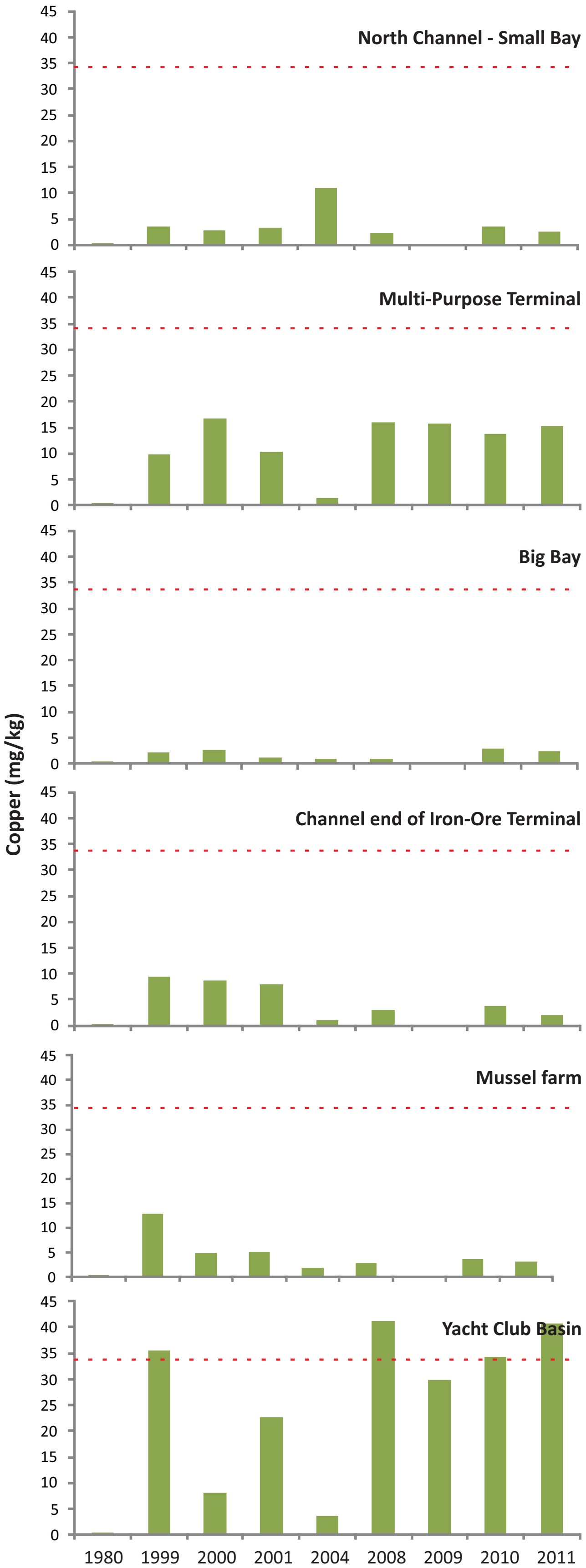


Cadmium (Cd) is widely distributed in the earth's crust at an average concentration of about 0.1 mg kg^{-1}, but natural background levels can be as high as 15 mg kg^{-1}. Anthropogenic sources of cadmium include emissions from industrial combustion process, metallurgical industries, road transport and waste streams. Cadmium often finds its way into the marine environment through stormwater runoff.

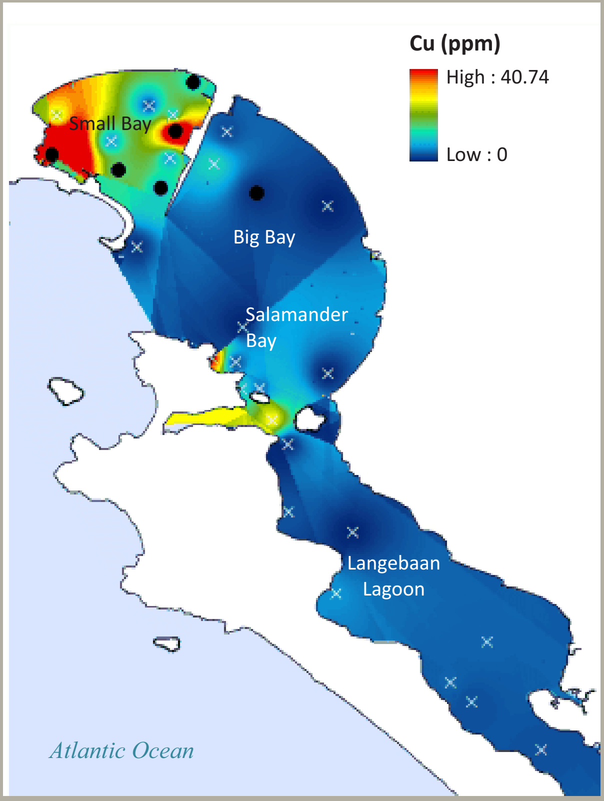
Cadmium is considered toxic to marine organisms at levels above 1.2 mg/kg and shows a strong tendency to bioaccumulate, and is thus a concern for both the marine environment and human consumption of marine organisms. Cadmium levels in sediments in Saldanha Bay are highest in Small Bay (near the Small Craft Harbour and Iron-Ore Terminal) and at the entrance to Langebaan Lagoon (Salamander Bay). The latter is a recent phenomenon believed to be associated with recent dredging activities in this area.

The Iron-Ore Terminal

Copper



Variation in copper concentration in sediments in Saldanha Bay, 1980 - 2011, in relation to guideline levels.



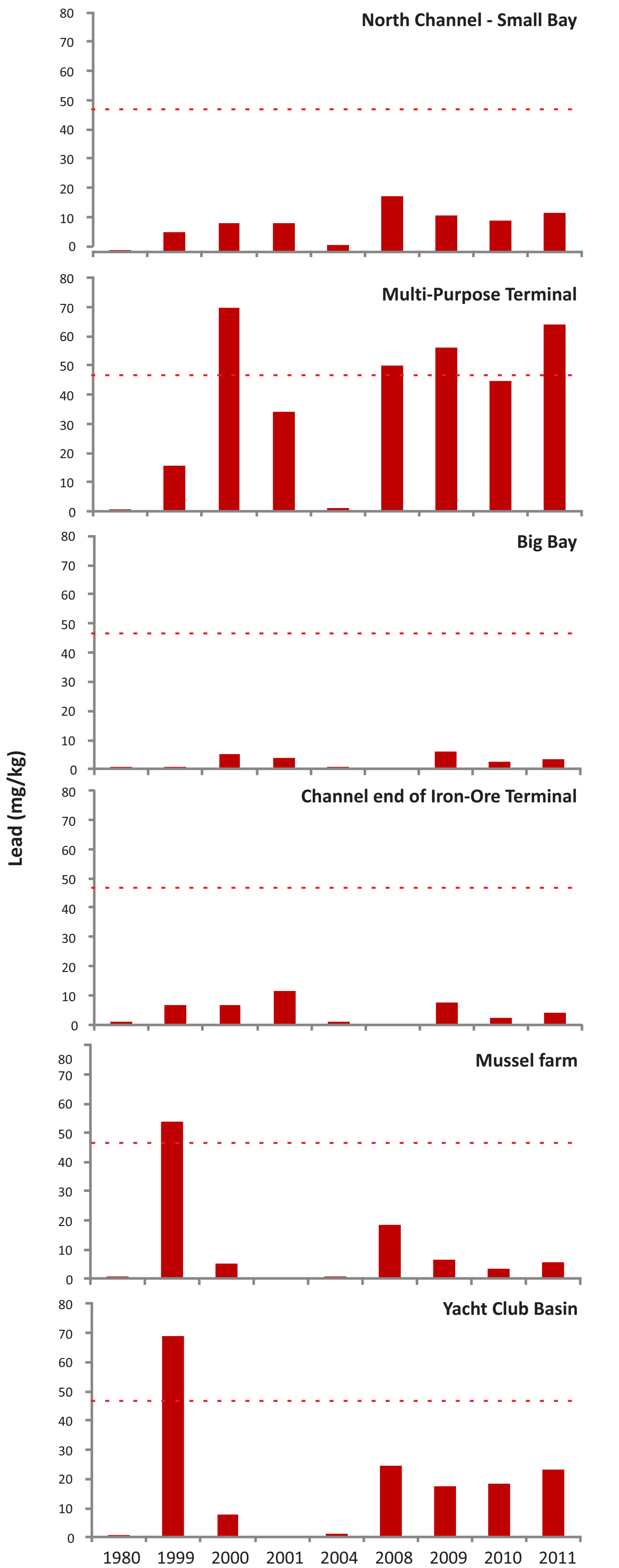
As with many other trace metals, copper (Cu) is an essential micronutrient used by marine organisms for normal physiological process. However, when elevated above normal background concentrations (anywhere above 34 mg/kg) it is considered highly toxic to marine organisms.

Major industrial sources of copper in the marine environment include shipping (where it has been widely used as an anti-fouling agent), mining, smelting, refining and coal-burning industries. Copper makes its way into the sea via sewage, industrial discharges and through atmospheric deposition.

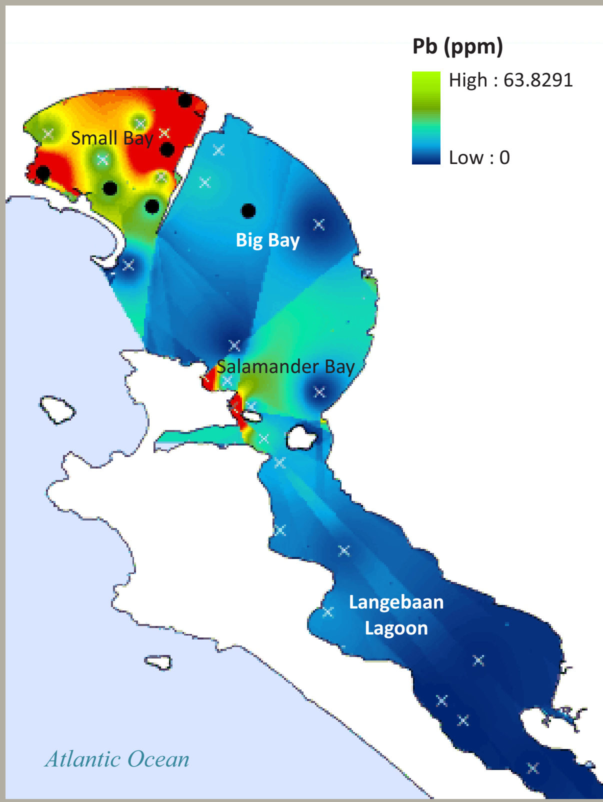
Copper levels in sediments in Saldanha Bay are highest in Small Bay (near the Small Craft Harbour and Iron-Ore Terminal) and at the entrance to Langebaan Lagoon (Salamander Bay).

A mining drill ship

Lead



Variation in lead concentration in sediments in Saldanha Bay, 1980 - 2011, in relation to guideline levels.



There has been a widespread elevation of lead (Pb) in the environment due to mining, smelting and the industrial use of this material. Lead is a persistent compound which is toxic to aquatic organisms and mammals, and thus contamination is of concern for the marine environment and human consumption. Concentrations above 47 mg/kg in sediment are considered to be of concern.

Lead ore is exported via the Multi-Purpose Terminal and concentrations in the bay are most elevated in this region. Other areas where elevated concentrations have been detected are the same as for other trace metals (i.e. the Small Craft Harbour and Salamander Bay).

Southern Right Whale

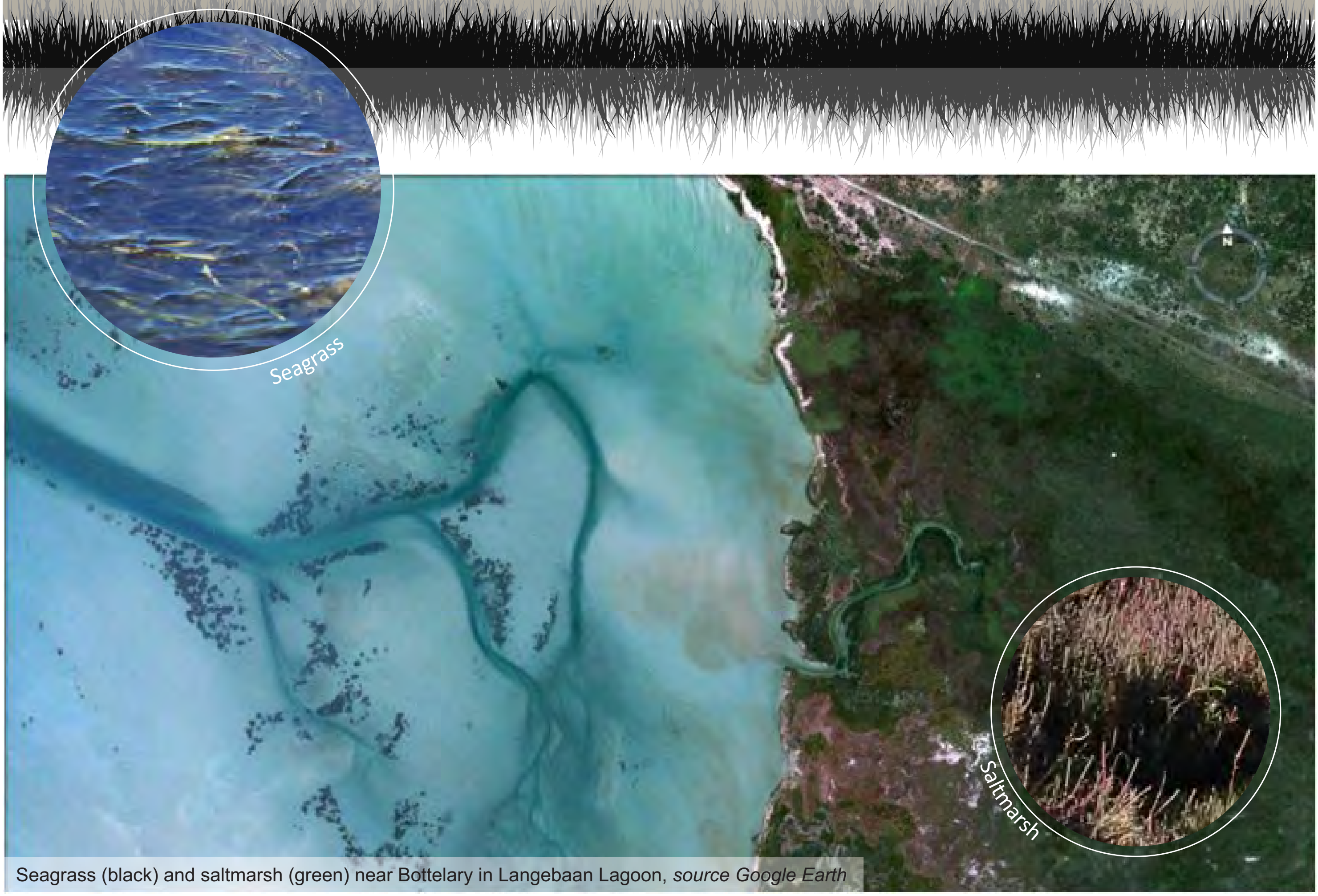
Aquatic macrophytes

Three distinct intertidal habitats exist within Langebaan Lagoon: seagrass beds, salt marshes, and unvegetated sandflats. Seagrass beds and salt marshes are extremely important as they increase habitat diversity, provide an important food source, increase the stability of sediments, and provide juvenile fish and invertebrates protection from predators. These plants are only able to survive in areas that are completely protected from wave action and are thus found only in Langebaan Lagoon.

Aerial photographs indicate that seagrass beds in the lagoon have diminished by an estimated 38% since the 1960s. Some areas, such as Klein Oostewal near the lagoon entrance, have experienced more dramatic declines than others. Corresponding changes in macrofaunal invertebrate communities have been observed, with species associated with seagrass decreasing in abundance, and species that burrow in unvegetated sand increasing.

Changes in the abundance of certain wading birds has also been linked to seagrass contraction. Populations of the Terek Sandpiper, for example, which feed exclusively in seagrass beds, have crashed during periods of low cover. Waders that do not feed on seagrass, by comparison, have maintained relatively stable numbers over time.

The loss of seagrass beds from Langebaan Lagoon indicates that an ecosystem shift is underway. Human disturbances, such as trampling associated with bait collection, are probably responsible, although burrowing sand crustaceans have played an important supporting role. *Callinassa kraussi* and other sandflat prawn species turn over massive quantities of sediment and, once established in an area, effectively prevent seagrass from recolonizing. They have thus engineered disturbed habitats towards new, unvegetated states.



Seagrass (black) and saltmarsh (green) near Bottelary in Langebaan Lagoon, *source Google Earth*

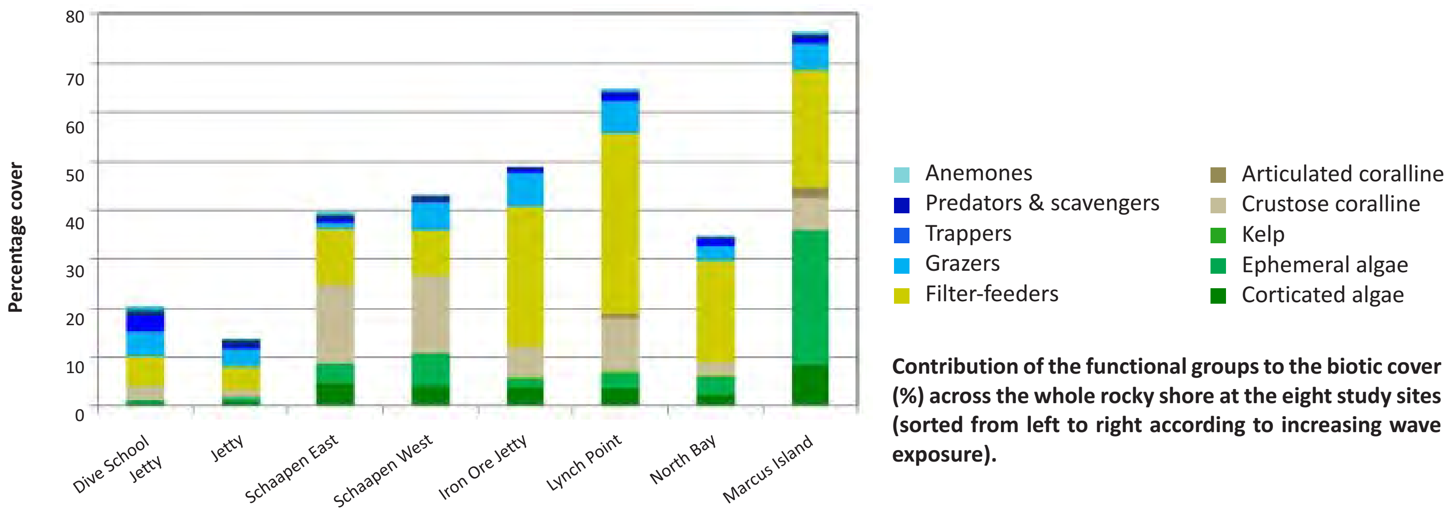
Rocky shore invertebrates

Despite known changes that have taken place within the Saldanha Bay system over the last fifty years, almost no historical data exists on the state of its rocky shores. Monitoring of intertidal rocky communities began in 2005, at eight sites in Small Bay, Big Bay and Outer Bay, spanning a wave exposure gradient from very sheltered to exposed. The surveys have been repeated annually since 2008.

Differences in the rocky shore plant and animal communities in the bay are driven mainly by differences in wave action and, to a lesser extent, shoreline topography, in that there are clear differences between boulder beaches and large rock platforms. Since 2005, species composition and abundance have remained relatively stable within individual sites, with observed changes having been caused by natural seasonal and annual variation rather than anthropogenic impacts.

Over a longer timescale, the largest impact on rocky shores in Saldanha Bay has been the introduction of the highly invasive Mediterranean mussel *Mytilus galloprovincialis*. Most likely introduced with ballast water discharge in the 1970s, the Mediterranean mussel has spread along the coast as far as Namibia and East London, becoming the most widely distributed and abundant invasive marine organism in South Africa. The Mediterranean mussel has had its greatest impacts in the mid-to-low shore of the intertidal area, where it has displaced native mussel and limpet species. It has also dramatically increased the depth and vertical extent of mussel beds, which has expanded the amount of available habitat for a range of invertebrate species that occupy the spaces between the shells. Overall, this has caused a substantial increase in the intertidal biomass of invaded areas. One consequence is that more food is available for a number of predator species, including the African Black Oystercatcher *Haematopus moquini*, which has experienced a steady population increase over the past two decades.

Another invasive species that has impacted rocky shores in Saldanha Bay is the barnacle *Balanus glandula*, which has come to dominate the mid shore at semi-exposed sites. It was not recorded in the 2005 baseline survey, but this is probably due to its being misidentified as a native species. Indeed, it has only been noticed in South Africa fairly recently, although evidence indicates it has been present since at least 1992.



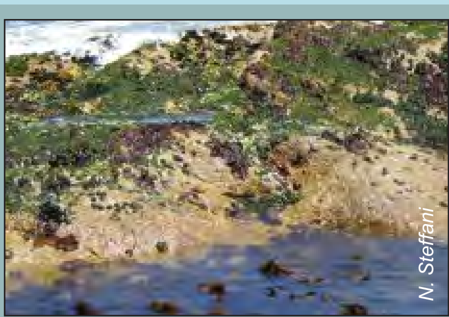
Contribution of the functional groups to the biotic cover (%) across the whole rocky shore at the eight study sites (sorted from left to right according to increasing wave exposure).

High shore

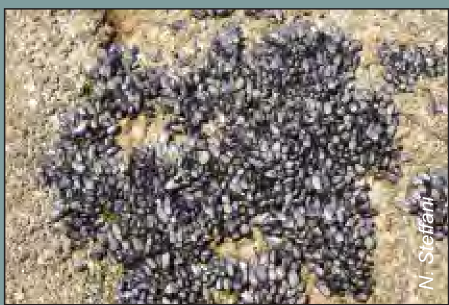
No change

Invasion by alien barnacles

Alien mussel and algae mixed shore

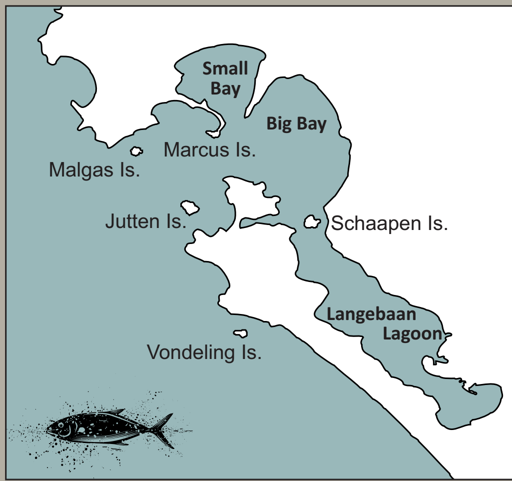


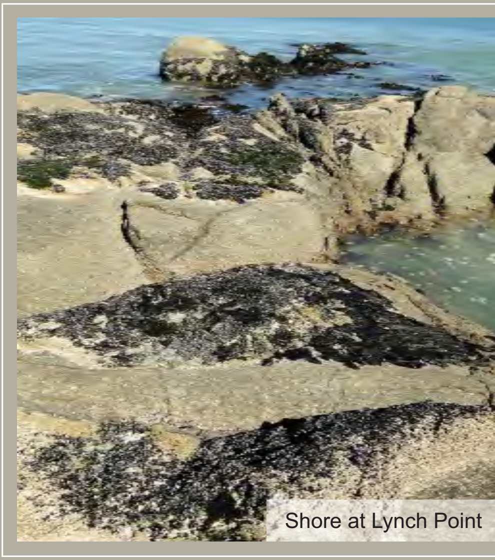
Invasive mussels become more dominant



Dominant species changed to invasive mussel

Low shore / sea




Shore at Lynch Point


Shore at Iron-Ore Terminal

Benthic invertebrates

Macrofauna (invertebrates larger than 1 mm) that live in soft sediments are relatively sedentary, and can be useful indicators of environmental change. Macrofaunal communities have been monitored in Saldanha Bay since the 1960s, although it is only more recently that regular surveys have taken place. Species richness (numbers of species), biomass, abundance and diversity (reflecting community composition) have been used to track changes in benthic communities over time. Taking into consideration differences in sampling techniques, it is evident that there have been significant changes in community structure over the last few decades. This points to significant anthropogenic disturbances occurring within the bay.

Although there have been significant increases in total macrofaunal biomass, this is predominantly due to the increased abundance of crustaceans. Overall, there has been a dramatic decrease in the diversity of benthic macrofauna in Saldanha Bay. This has been particularly pronounced in Small Bay, where substantial increases in the numbers of crustaceans, notably mud prawns and sand prawns, have been matched by sharp declines in filter feeder populations.

Species diversity in Big Bay has been less impacted overall, although crustaceans have become dominant at the expense of other taxa, such as tongue worms and members of the starfish family.

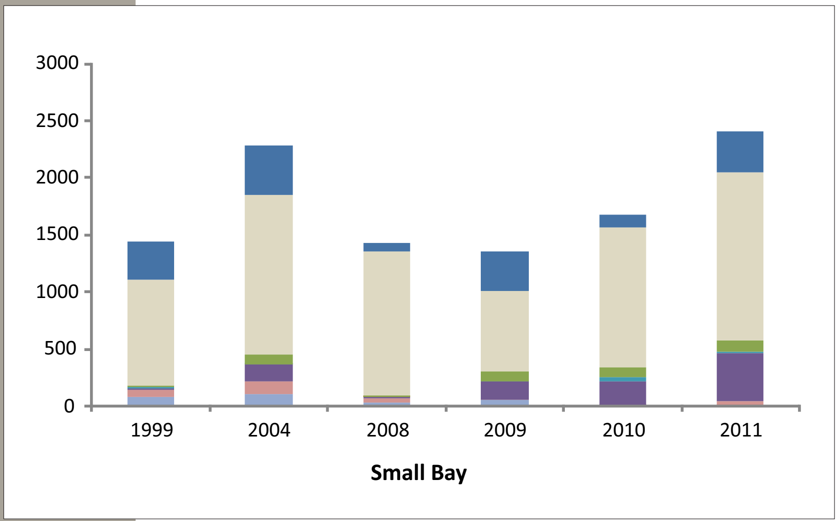
Regular monitoring from 1999-2011 has revealed some interesting trends. In both Small Bay and Big Bay, species richness and abundance increased between 1999 and 2004, declined to a low level in 2008, but has increased steadily since then (se graphs on facing page). Conditions in both areas appear to be linked to large-scale dredging events, which create massive disturbances for macrofaunal communities. These changes are mirrored by changes in the main feeding groups. When numbers are low, they are dominated by detritivores, but when they are high, they are dominated by filter feeders, including the sea pen *Virgularia schultzei*, which disappeared from samples during the 1970s but has recently begun to return again.

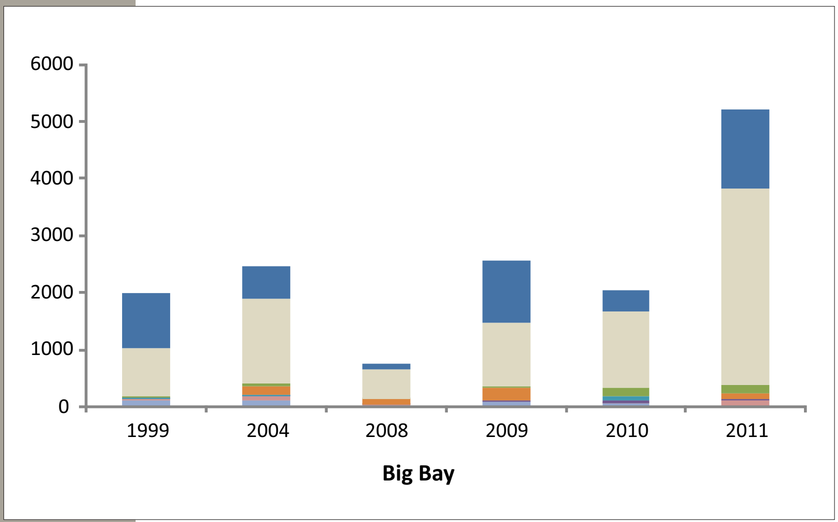
On the whole, the macrofaunal communities in Small Bay are in much poorer shape than those in Big Bay or Langebaan Lagoon. The most severely impacted sites are at the Yacht Club Basin and the base of the Iron-Ore Terminal; which are both prone to the accumulation of pollutants due to restricted water movement. Benthic fauna have been almost entirely eliminated from the Yacht Club Basin, which is also the site with the highest concentrations of heavy metals and other contaminants.

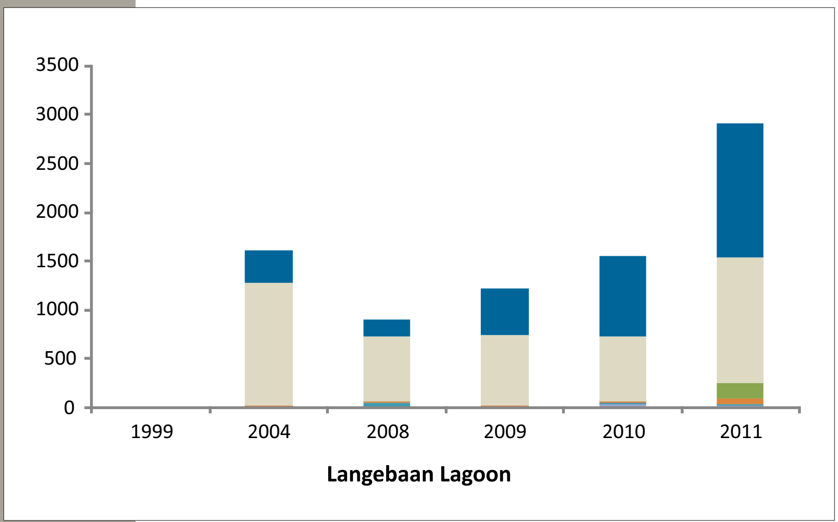
Although Langebaan Lagoon is in better condition, it has also experienced significant changes in its benthic community. Compared to the first survey in 1975, which recorded up to six species per sample, and a community dominated by bivalves, data from 2004 to 2011 indicate that benthic communities now comprise fewer species and are dominated by crustaceans, particularly sand prawns. This strongly suggests that some of the anthropogenic changes in Saldanha Bay could be influencing conditions in Langebaan Lagoon as well.

Sand prawn

Mud prawn







Abundance

KEY:

- POLYCHAETA
- CRUSTACEA
- GASTROPODA
- PENNATULACEA
- ECHINODERMATA
- BIVALVIA
- ECHIUROIDEA (TONGUE WORM)
- OTHER

Fish

Species composition and abundance

The waters of Saldanha Bay and Langebaan Lagoon support a wide variety of fish species. Being sheltered, warm and rich in nutrients, the bay is an important nursery area for the juveniles of many species. Despite the ecological importance and the long history of fishing in the bay, however, little effort has been invested in studying fish communities in the bay.

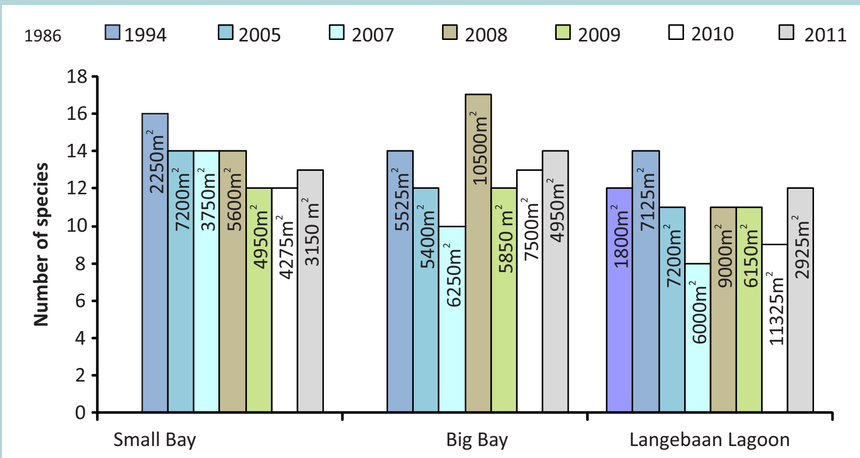
Fish monitoring by means of experimental seine-netting began in 1986 but has only been conducted on a regular basis since 2006. No significant negative trends have been observed over this period. Surveys in 2011 recorded remarkably good harder recruitment, as well as encouraging upward trends in the abundance of white stumpnose, gobies and silversides in Big Bay. In Small Bay, however, where commercially important species like white stumpnose have traditionally been most abundant, there have been clear signs of decline. 2011 saw the lowest blacktail density and the second lowest white stumpnose density recorded to date. That Small Bay also happens to have experienced the highest levels of anthropogenic disturbance in the Saldanha Bay/Langebaan system is unlikely to be coincidental.

Historic changes in benthic invertebrate communities and reductions in the extent of seagrass in Langebaan Lagoon, both of which occurred in the 1970s, would also have had significant impacts on fish populations in the bay as a whole. Two species that tend to favour seagrass habitats, namely pipefish and super klipvis, do appear to have decreased in abundance since 1986. By this time, however, major ecosystem changes had already occurred; a lack of earlier data means that population declines associated with these events can only be speculated upon.

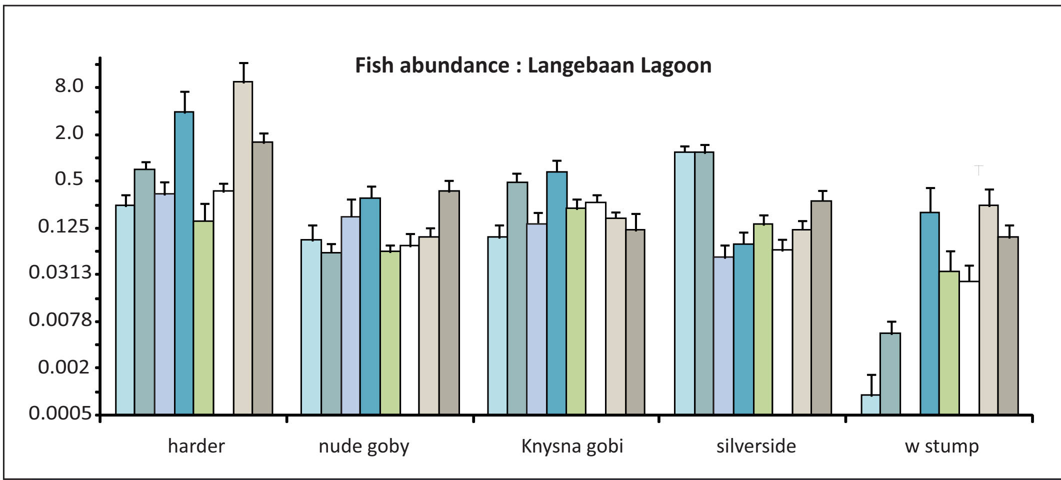
Fishing boats moored at Small Bay harbour

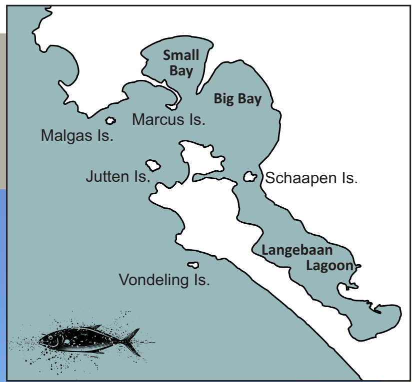
The Sea Harvest fish factory

Fishing boats moored at Saldanha Bay

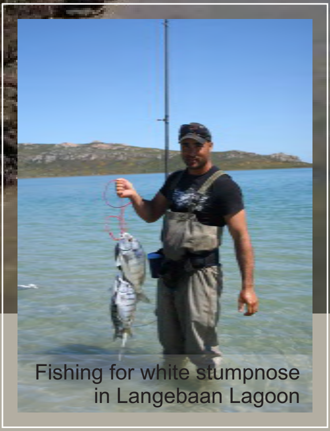


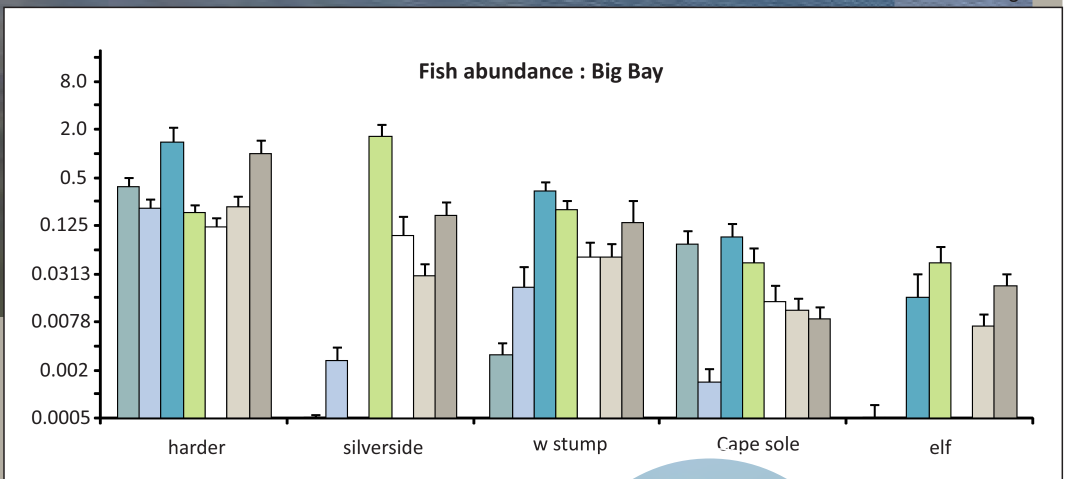
Variations in the number of fish species recorded in seven seine-net surveys in Saldanha Bay and Langebaan Lagoon conducted over the period 1986-2010. The total area netted in each area and survey is shown.

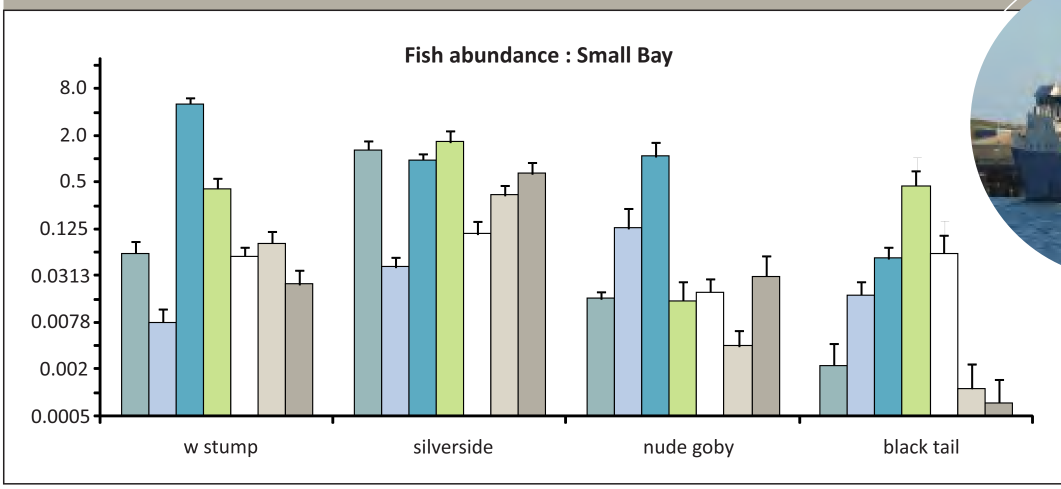





Trek netting


Fishing for white stumpnose in Langebaan Lagoon





- 1986-87
- 1994
- 2005
- 2007
- 2008
- 2009
- 2010
- 2011

Variation in abundance of the most common fish species recorded in annual seine-net surveys within Saldanha Bay and Langebaan Lagoon in the period 1986-2011.

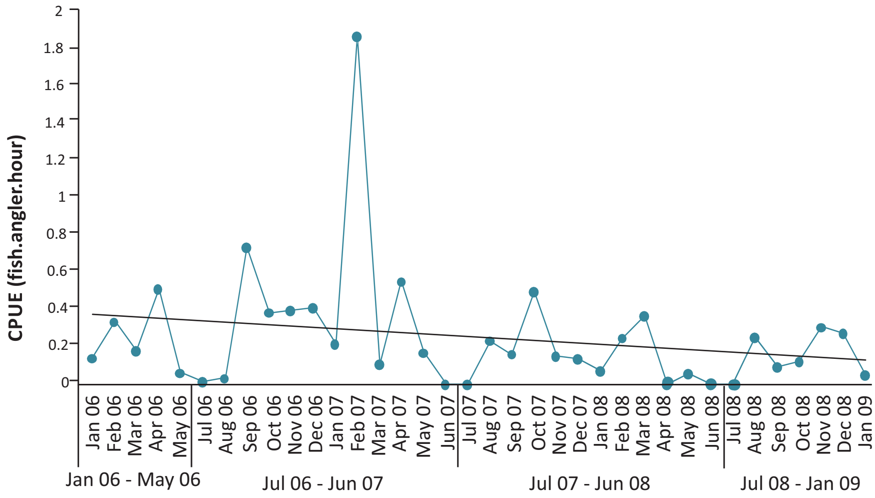
Commercial and recreational fisheries in the bay

Commercial exploitation of the fish in Saldanha Bay was initiated shortly after the first European colonists arrived at the Cape. These colonists quickly established beach-seine fishing operations in the region targeting harders and other shoaling species such as white steenbras and white stumpnose. Commercial net fishing continues in the area today, and although beach-seines are no longer used, gill-net permits holders land an estimated 590 tons of harders per annum, valued at approximately R1.8 million.

Species such as white stumpnose, and to a lesser extent white steenbras, silver kob, elf, steentjie, yellowtail and smoothhound shark, support important shore angling and boat-based line-fisheries in Saldanha and Langebaan. Detailed monitoring of catches taken by these fishers has been ongoing since 2006.

Catches taken by both groups of fishers have been more or less stable since 2006, but may have decreased slightly in the case of the shore anglers and conversely, appear to have increased for boat based fishers.


Fishing for white stumpnose

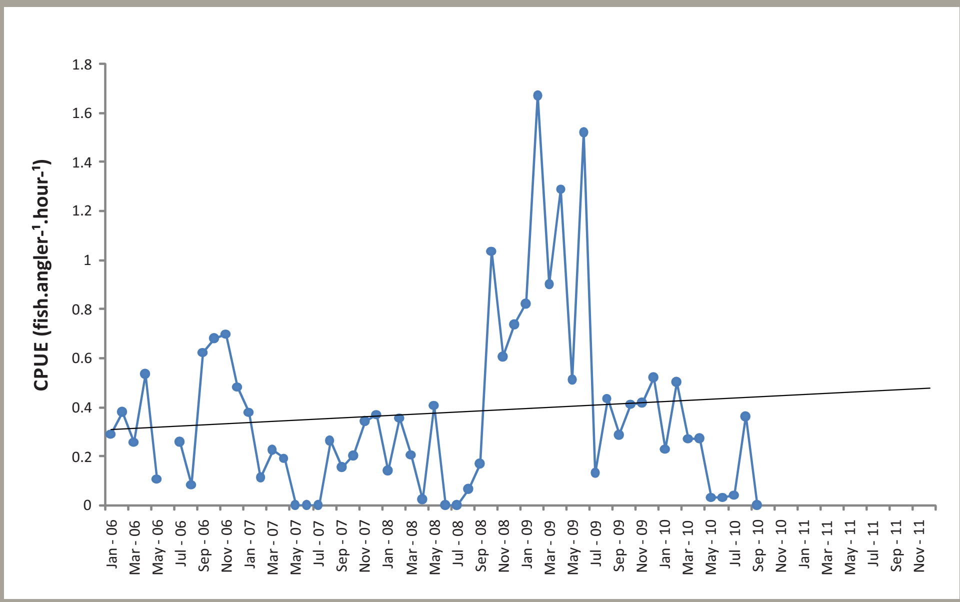



white stumpnose

Catches for white stumpnose by shore based anglers in the Saldanha - Langebaan area over the period 2006-2009. Catches have declined slightly over this period.


Anglers at Langebaan Lagoon


Gill nets




harder


steentjie

Catches of white stumpnose by commercial line fishermen in Saldanha Bay for the period 2006-2011.


Sandshark


A fishing trawler returning with its catch

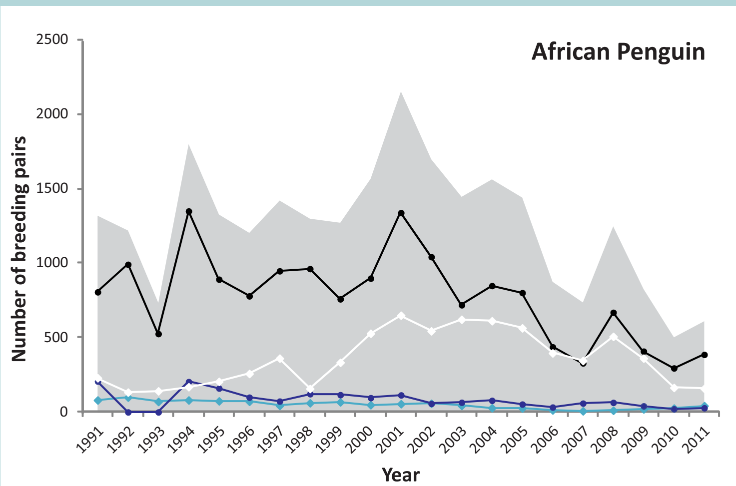
Birds of Saldanha Bay islands

Saldanha Bay and Langebaan Lagoon provide extensive, varied habitat for a large number of marine and coastal bird species. At least 53 species use the area for feeding or breeding; 11 breed on the islands of Malgas, Marcus, Jutten, Schaapen and Vondeling alone. Key habitats in the area include sheltered beaches, exposed rocky shores and islands, and tidal saltmarshes, sandflats and mudflats in the lagoon.

The islands of Malgas, Marcus, Jutten, Schaapen and Vondeling are important seabird breeding colonies, and support nationally important populations of African Penguin, Cape Gannet, Swift Tern, Kelp and Hartlaub's Gull, and four species of marine cormorant. The islands also support important populations of the rare and endemic African Black Oystercatcher.

African Penguin

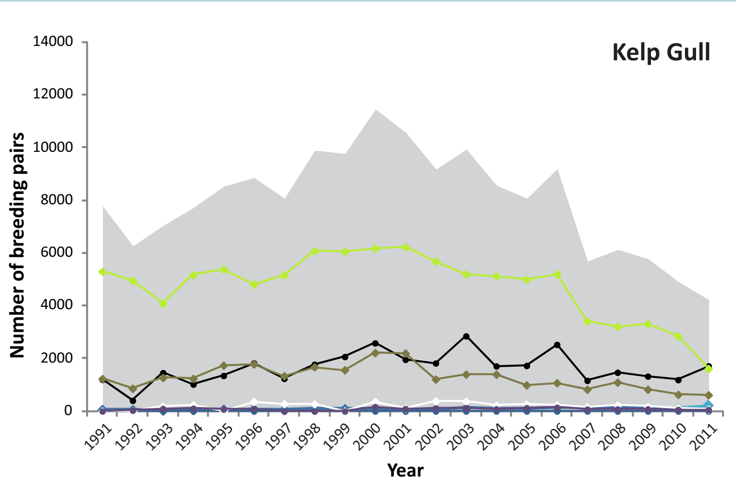
Populations of the African Penguin *Spheniscus demersus*, which is endemic to southern Africa, have declined sharply in Saldanha Bay over the last few decades. Annual counts of breeding pairs dropped from 2 049 in 1987, when monitoring began, to 506 in 2010—a decrease of some 75%. Although numbers appeared to increase slightly again in 2011 (614 pairs), the overall downward trend shows no sign of reversing. Migration to other islands on the west coast (particularly Robben and Dassen) and a reduced availability of anchovies (the birds' main food source), are thought to be the main causes of the decline. Immediate conservation action is required if these declines are to be arrested.



African Penguin, Kelp Gull, Hartlaub's Gull

Kelp Gull

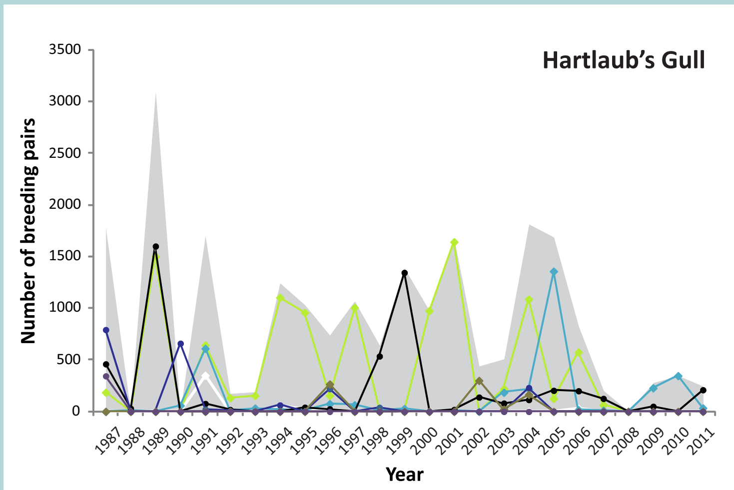
Populations of Kelp Gulls *Larus dominicanus* steadily increased in the Saldanha Bay area until 2000, most likely due to the increase in food represented by the introduction and spread of the invasive Mediterranean mussel, *Mytilus galloprovincialis*. Since 2000, however, they have been heavily impacted through predation by Great White Pelicans *Pelecanus onocrotalus*, a phenomenon that was first observed in the mid 1990s. This was severe enough to cause total breeding failure at Jutten and Schaapen Islands in 2005 and 2006, the effects of which are still apparent today.



Since 2000, numbers of Kelp Gull have been heavily impacted through predation by Great White Pelicans.

Hartlaub's Gull

Of the approximately 50 gull species in the world, Hartlaub's Gull *Larus hartlaubii* is considered the 10th rarest. It is endemic to southern Africa and breeds on islands in Saldanha Bay. Numbers fluctuate widely from year to year, with no clear population trends since monitoring began.



KEY TO DATA

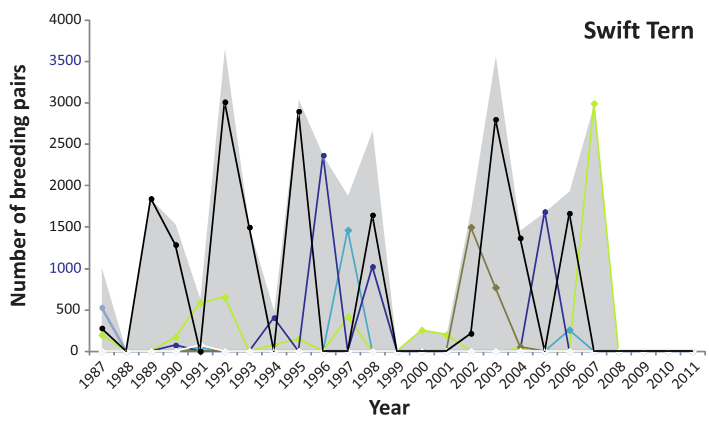
- Malgas
- Marcus
- Meeuw
- Jutten
- Schaapen
- Vondeling
- Total

Birds of Saldanha Bay islands

Swift Tern

The Swift Tern *Sterna bergii* is a widespread species that is common in southern Africa. Jutten Island is the most important breeding site for these birds in Saldanha Bay.

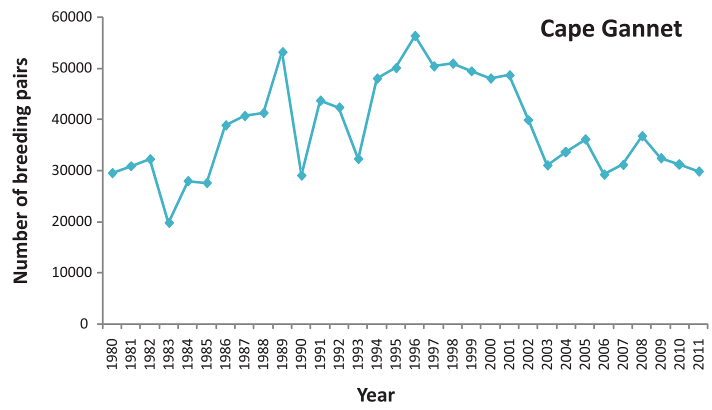
Numbers in the bay have been erratic since the 1990s, with no clear long-term trends. There is concern, however, that no breeding pairs have been observed for the last four years. Swift Terns are sensitive to human disturbance and predation by Kelp Gulls, Hartlaub's Gulls and Sacred Ibises—these factors should be monitored in the future to determine if they are having negative impacts.

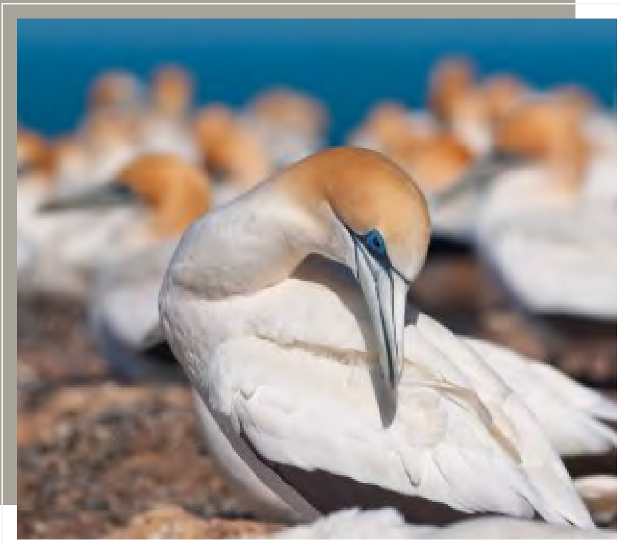


Numbers of Swift Terns have been erratic since the 1990s and no breeding pairs have been observed in the past 4 years.

Cape Gannet

Cape Gannets *Morus capensis* are restricted to the coast of Africa and are known to breed on only six offshore islands, one of which is Malgas Island in Saldanha Bay. Their numbers have been declining on the West Coast since the late 1990s, when the pelagic fish stocks they feed on (sardines and anchovies) began shifting southwards and eastwards, probably due to altered ocean circulation patterns. Populations in Saldanha Bay have fluctuated over the years, showing an overall trend of decrease. This has been influenced by increased predation by Cape Fur Seals and Great White Pelicans, which caused a 25% reduction in the size of the colony at Malgas Island between 2001 and 2006. There have been no subsequent signs of recovery.

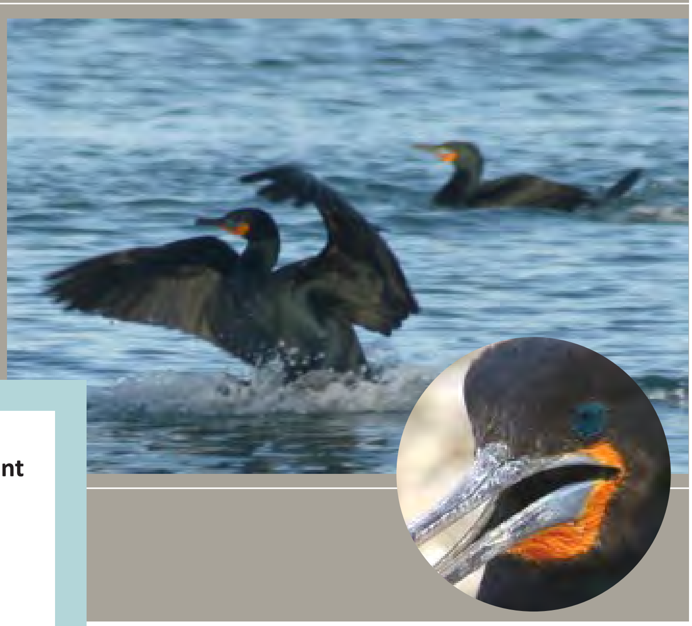


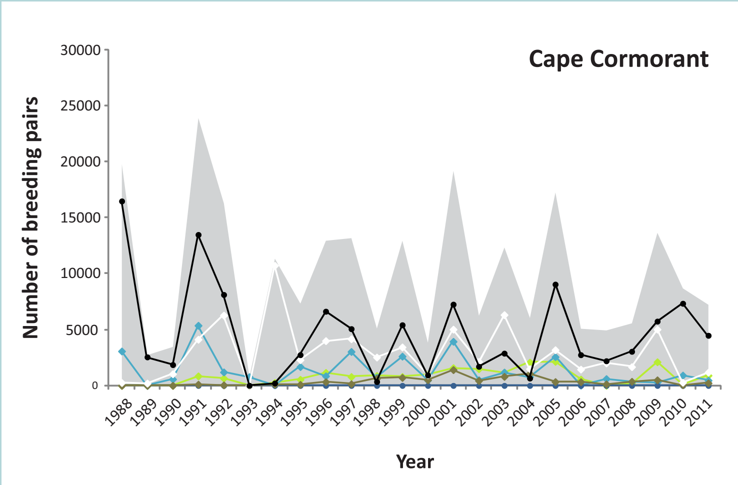


Swift Tern, Cape Gannet, Cormorant

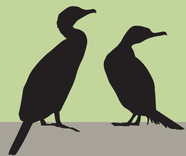
Cape Cormorant

Cape Cormorant *Phalacrocorax capensis* are endemic to southern Africa and abundant on the west coast. They breed on Malgas, Vondeling, Schaapen and Jutten Islands in Saldanha Bay, and have shown large fluctuations in population size over the years. This may be attributed to breeding failure, nest desertion and variations in the availability of food (e.g. anchovy). No clear long-term population trends are evident.





Declines in numbers of Bank Cormorants are attributed to scarcity of prey, increased egg and chick predation, and human disturbance

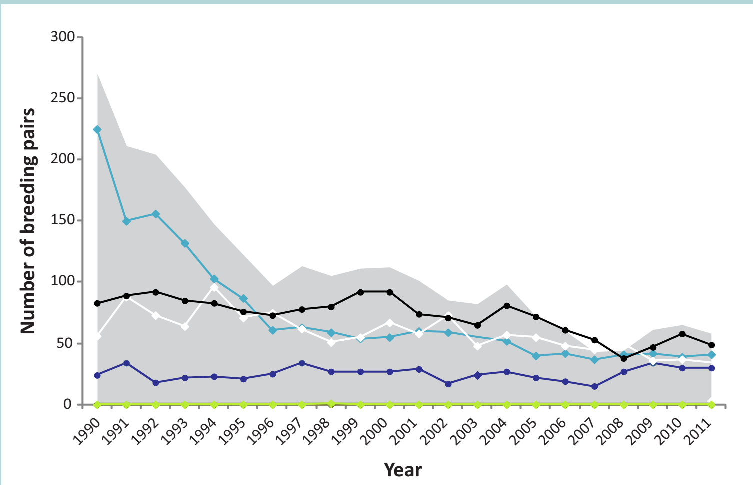


Bank Cormorant

Bank Cormorants *Phalacrocorax neglectus* are also endemic to southern Africa. Declines in the Saldanha Bay area—from a peak of more than 250 breeding pairs in 1991 to fewer than 50 in 2007—appear to have stabilized recently, and the species is no longer considered to be at serious risk. There are currently just under 60 breeding pairs in the bay. Previous declines were mainly attributed to a scarcity of prey (fish, crustaceans and cephalopods), increased egg and chick predation, and increased human disturbance. It is recommended that these threats be monitored in the future.

KEY TO DATA

- Malgas
- Marcus
- Meeuw
- Jutten
- Schaapen
- Vondeling
- Total

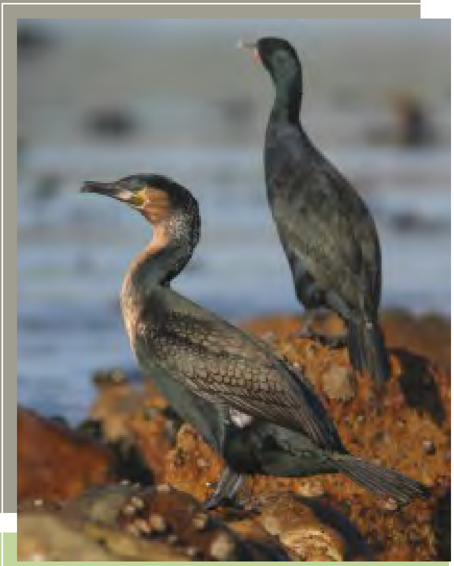


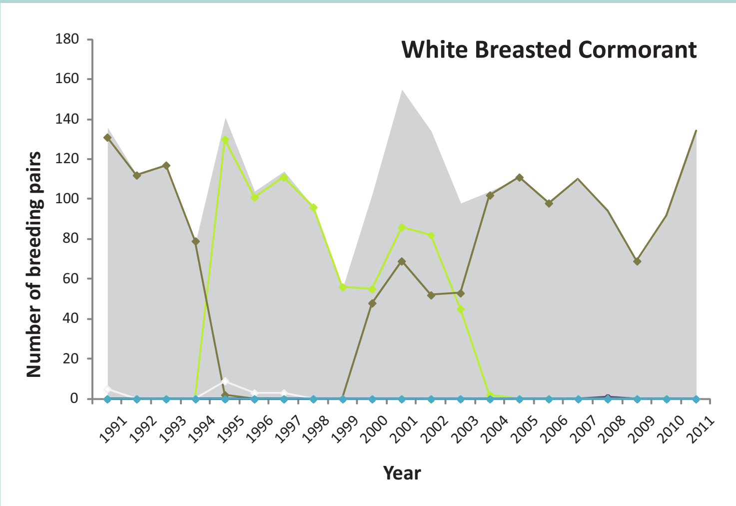
Birds of Saldanha Bay islands

Cormorant and Oystercatcher

White-breasted Cormorant

White-breasted Cormorants *Phalacrocorax carbo lucidus* occur along the entire southern African coastline. Variable numbers of breeding pairs have been counted on the islands in Saldanha Bay since the 1970s and these have remained relatively constant since detailed records began in 1991. Breeding populations shifted from Meeuw to Schaapen Island and back again between the early 1990s and 2004. Numbers have increased overall over the last two years, and the species is not considered to be at risk. It is more susceptible to disturbance than other marine cormorants, however, as adults abandon their nests for extended periods when distressed, exposing their eggs and chicks to predation. There is thus a need to monitor (and limit) human activity in the future.





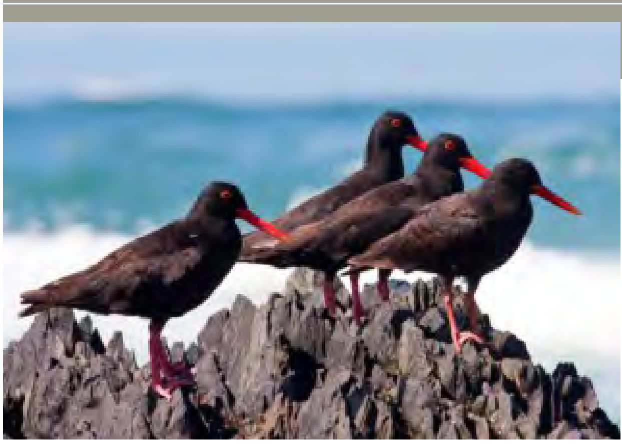
Variable numbers of breeding pairs have been counted on the islands in Saldanha Bay since the 1970s and these have remained relatively constant since detailed records began in 1991.

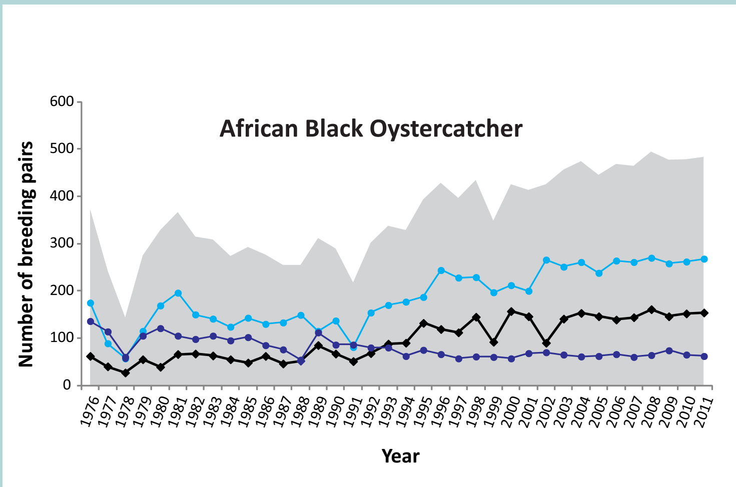
KEY TO DATA

- Malgas
- Marcus
- Meeuw
- Jutten
- Schaapen
- Vondeling
- Total

African Black Oystercatcher

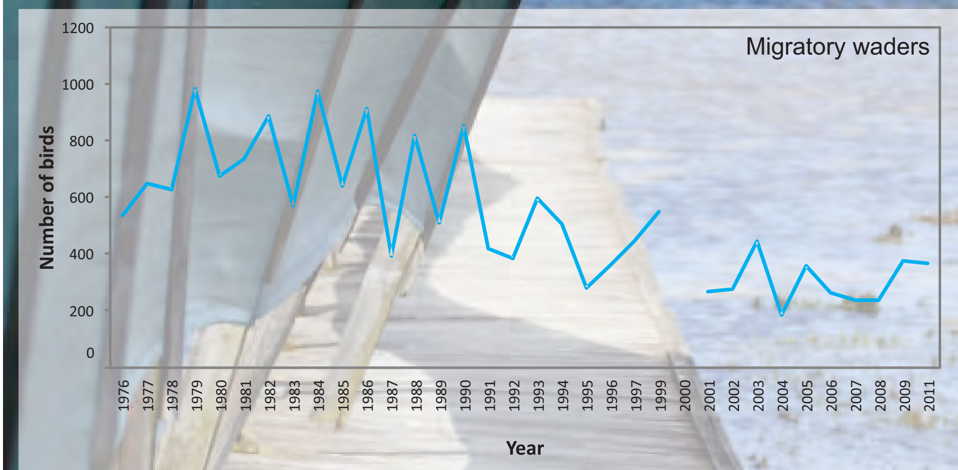
African Black Oystercatchers *Haematopus moquini* are endemic to southern Africa. They are listed as a Red Data species. All five islands in Saldanha Bay support important numbers of these birds, but they are most numerous on Jutten and Malgas Islands. Numbers have steadily increased over the past decade, most likely due to the introduction and proliferation of the invasive Mediterranean mussel, which has dramatically increased the amount of food available for this species. Population growth has slowed in recent years, however, suggesting that the carrying capacity of the islands has been reached.

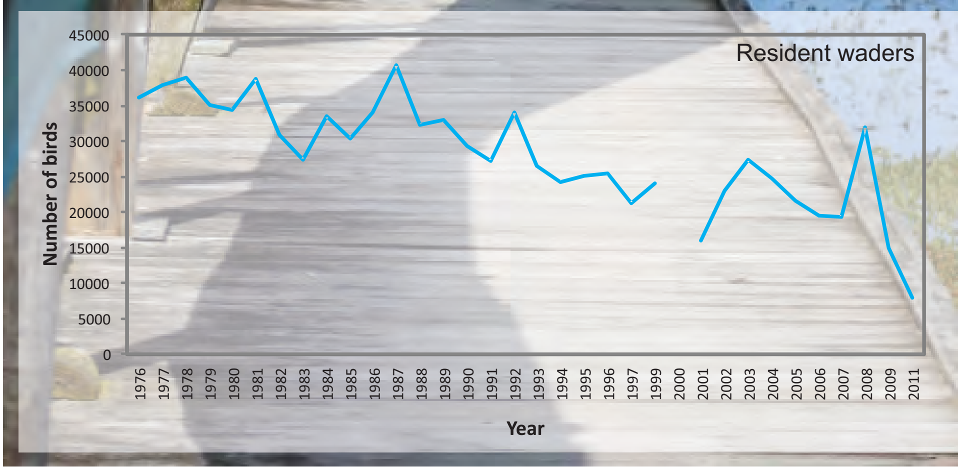




Langebaan Lagoon, with its warm, sheltered waters and abundance of prey, provides an important habitat for migrant waterbirds. During summer, waders—nearly all of them migratory—account for more than 90% of the birds in the lagoon. In winter, when most of the migratory waders are gone, resident waders account for most of the birds present. The lagoon is considered particularly important for the number of waterbirds it Supports: an estimated 27 000 in summer, and about 9 500 in winter. It is also the most important 'over-wintering' area for many coastal bird species.

Waders feed on invertebrates (which mainly live in intertidal areas) at low tide. They thus require undisturbed expanses of sandflat habitat, as well as sites to roost in at high tide. The number of migrant waders using Langebaan Lagoon has decreased over the years, reflecting a global trend mainly driven by increasing human disturbance at breeding sites. Of greater concern though is the decrease in resident waterbird populations—this is most likely a consequence of persistent unfavorable conditions in the lagoon, including increased siltation and human disturbance. However this latter trend appears to have stabilized recently.





Bird hide at Geelbek

REPORT BY:

ANCHOR
environmental

FOR:

Saldanha Bay Water Quality Trust

TRUST MEMBERS:

KUMBA RESOURCES

PPC

Black Mountain

MITTAL

TRANSNET national ports authority

South African NATIONAL PARKS

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