SALDANHA BAY WATER QUALITY FORUM TRUST
SALDANHABAAI WATERGEHALTE FORUM TRUST
DIE VOORSITTER: THE CHAIRMAN MANAGER
POSBUS: 446: P.O. BOX 446
LANGEBAAN
7357

SRK Consulting
P Bag X18
Rondebosch
7701

30 March 2017

Attention: Sue Reuther

SBWQFT comments on the proposed ADZ, Saldanha Bay.

This report had been compiled by FC van Wyk in conjunction with Dr. Barry Clarck and Dr. Ken Hutchings of Anchor Environmental.

The SBWQFT would like to state that our 18 years' of monitoring of the Saldanha Bay and Langebaan Lagoon **provides scientific evidence that this marine ecosystem is under ecological stress**. Threats include alien species invasion, heavy metal contamination, loss of fish production (documented declines in White Stumpnose population shore bird populations) and other impacts such as beach erosion.

With this back ground we would hereby officially comment on the BAR for the proposed ADZ in Saldanha Bay.

The SBWQFT acknowledge that the final BAR for the ADZ proposed a reduced aquaculture footprint from the original proposal, however the SBWQFT is concerned about the environmental impact of the proposed (reduced) ADZ footprint on our very sensitive and stressed Saldanha Bay and Langebaan Lagoon marine ecosystem.

We base our concerns on several issues that we believe were not properly investigated or addressed in the current studies presented in the EIA Basic Assessment Report , namely:

- ## General Observations/ Concerns

- Saldanha ADZ BAR Appendix F - Impact Assessment Report – 2.1 Potential Marine Ecology Impacts.
    - The SBWQFT noted that **no catchment specific** marine biophysical **specialist monitoring or modeling** were undertaken in the Saldanha ADZ BAR Appendix F - Impact Assessment Report – 2.1 Potential Marine Ecology Impacts.

    - The Impact Assessment Report on Marine Ecology Impacts is a desk top study, no site specific biophysical specialist studies (monitoring and modeling) were under taken in the process and conclusions are based on assumptions not site specific monitoring.

- We noted that the BAR did not take into consideration the current challenges the aquaculture industry experience with regard to insufficient Dissolved Oxygen (DO). DO levels are very low at certain times of the year for fin fish farming. (Personal note from Dr. Sue Tonin).

- The SBWQFT would like to mention that the BAR did not fully take the assimilative impacts of the current and proposed industrial and other activities using the bay into consideration. We would like to mention that current fish factory and aquaculture processing plants effluents, proposed fish factory effluent loads (Premier Fishing) and the proposed ADZ land based activities loads on small bay has not been taken into consideration in the BAR. We would also like to mention that activities such as manganese, lead, zinc handling and RO effluent in the Port, the proposed ship repair and IDZ rig maintenance hub will have a negative impact on water quality and could pose a real risk to an expanded aquaculture industry. The SBWQFT is currently initiating a monitoring program in Small Bay to determine the effect on mussel farming.

- The BAR did not include the proposed long term expansion of the port (TNPA) in Big Bay, the proposed quays and civil structures could have an effect on currents and sediment movement. The effect of dredging on an increased aquaculture footprint was not mentioned in the BAR.

- The BAR does not address the potential effect of the aquaculture footprint in Big Bay with regard to sediment movement and beach erosion – not sure if it does pose a risk, but should be addressed. Beach erosion is a real problem in near vicinity to the proposed ADZ.

- ## Carrying Capacity

Saldanha ADZ BAR Appendix D1 – Concept for a proposed Sea-Based Aquaculture Development Zone in Saldanha Bay, South Africa

The SBWQFT noted that **no catchment specific marine biophysical specialist monitoring studies or modeling** were undertaken in the Saldanha ADZ BAR Appendix D1, this was a desk top study and analysis of previous studies done in this catchment with reference to mariculture and the biophysical conditions related to support such an industry were used to make conclusions and assumptions in this desk top study.

The SBWQFT noted that the **Estimated Production Carrying Capacity** (page 35 of Appendix D1) of the very sensitive bay system was **based on one specific study** done by Probyn et al. (2015). **This study was based on a single sampling station and 12 months of data collection**.

The SBWQFT noted that the **Ecological Carrying Capacity of the very sensitive bay system was a rough estimate** as stated on page 38 of Appendix D1.

The SBWQFT would like to express our concern that a project of such size is based on assumptions and rough estimates, that no site specific monitoring and modeling had been initiated to support these assumptions or were proposed by the consultants initiating this study.

We would like to refer the reader to the CSIR REROrt ENV-S-C 2004-083 : Water Quality Management Plan for Saldanha Bay: Phase III: Setting of Critical Loads using a modeling based ecosystem approach. The summary of this modeling based study concluded that:

3.2.2 Scenarios MF05 and MF06: Sensitivity to increases in Stoking Density

The ecological impact of mussel farming is measured not only as area farmed but also in the biomass of mussels that is stocked per unit area. This sensitivity was tested by increasing the phytoplankton mortality term within the same farming scenarios. The sensitivity test was undertaken using the MF04 farming scenario which by its scale poses the most significant ecological threat. The results confirm that the sensitivity of phytoplankton biomass in Small Bay to changes in stocking density in Big Bay are not significant (<10%) (Fig.18) but the impacts in Big Bay are significant (>>10%) and closely linear in the dependence of the anomaly on the change in mortality rate (Fig.3.19). No significant anomalies were found with oxygen and POC.

To summarise: The critical loading rates of the system with mussels are suggested to be related to those of the major expansion in Big Bay. These are summarised below in Table 3.2.

Table 3.2: Critical mussel farming thresholds.

System Quality Objective	*Critical Load*	*Sensitive Ecosystem Indicator*	*Most Sensitive Monitoring Location*
Impact of mussels on phytoplankton biomass in Big Bay <10%	500Ha maximum farming area in Big Bay	Phytoplankton biomass (Chlorophyll)	NE Buoy (Big Bay)
Impact of mussels on phytoplankton biomass in Big Bay <10%	Stocking density result in mortality rates < $2d^{-1}$	Phytoplankton biomass (Chlorophyll)	NE Buoy (Big Bay)

I quote from this CSIR report (Page 23):

"The results of our simulation runs for mussel farming scenarios show that the main threshold of negative ecological impact is associated with the 1000 ha scenario and its effect on phytoplankton biomass in Big Bay."

"The depletion of phytoplankton biomass from Big Bay at the 1000 ha farming level poses the most serious ecological risk to the system because the mussels are effectively out competing other part of grazer food web for energy (Fig 3.17). This includes the possible impacts on Langebaan lagoon whose main energy supply is from productivity in Big Bay through tidal pumping.

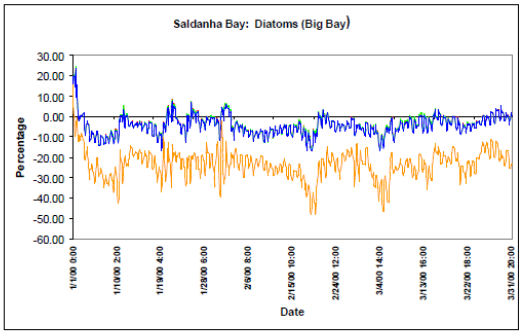

Figure 3.17: Shows the significant sensitivity (> 30%) of phytoplankton biomass in Big Bay to the expansion of mussel production to 1000Ha under scenario MF04. The depletion of biomass is significant and likely to cause ecological impacts to other competing grazers and filter feeders.

Objection/Concern:

- **The SBWQFT hereby objects to the way the Ecological Carrying Capacity has been determined in a desk top study (Appendix D1) that was mainly based on assumptions – no real site specific monitoring studies and modeling were initiated to determine or verify the mentioned Ecological Carrying Capacity.**

- **The Ecological Carrying Capacity is the basis of how the size of the ADZ has been determined and what was assumed what the marine system can handle.**

- **As determined in the 2004 CSIR modeling study phytoplankton depletion could pose a detrimental risk to the Langebaan Lagoon.**

Recommendations:

- **The tidal interaction of Big Bay with the Lagoon has not been investigated or modeled, we request that this interaction be investigated and verified to understand the movement and dispersion of the waste derived from proposed aquaculture footprint and to better understand the risk and threat to the Lagoon associated with it.**

- **Phytoplanton depletion by the proposed ADZ and the influx of nutrient rich or phytoplankton poor water into the lagoon needs to be investigated before a decision is made and the size of the ADZ is concluded, it may well be further reduced in size due to the posed risks. This request is based on the conclusions made in the CSIR RERORT ENV-S-C 2004-083 : Water Quality Management Plan for Saldanha Bay: Phase III: Setting of Critical Loads using a modeling based ecosystem approach study, according this study the proposed ADZ poses a real ecological risk for the Lagoon.**

- **The SBWQFT also recommend that real time biophysical monitoring being initiated in the proposed ADZ area before any activity starts due to the unknown risks this development poses on the already stressed ecosystem. Baseline monitoring of biophysical conditions such as turbidity, dissolved oxygen, dissolved nutrients (nitrogen and phosphorus),chlorophyll – phytoplankton, current strength and direction etc. should be introduced in the proposed area to measure and determine the current status.. Hydrodynamic modeling should then be used to make more accurate predictions about the potential environmental impacts at different scales of ADZ development, the model used should be calibrated with the current real time data that were obtained in the specific area to be used, especially in Big Bay that is close to the Lagoon.**

• Nitrogen flux from fish farming

The SBWQFT noted that the Carrying Capacity for Finfish in Saldanha Bay was based on several critical assumptions (Page 50 of Appendix D1). An assumption is not a fact, but a guestimate.

The Nitrogen flux from fish Production as described in Appendix 3 pages 49 to 53 are based on assumptions and I quote: “that site specific information for determination of ecological risk related to

fish waste production was not found and taken into consideration" for this sensitive ecosystem. (Page 53 of Appendix D1)

Due to assumptions used in this report to develop the Ecological Carrying Capacity of the proposed system and the assumed waste loads derived from the Fin Fish farms, a precautionary approach had been proposed by the author. The proposed precautionary approach poses an economical risk for fish farming based on historic information gained in Algoa Bay. (Page 54 of Appendix D1).

Objection:

- **<u>The SBWQFT hereby objects to the assumptive way Nitrogen loads and influx were derived to in this report, Appendix D1 of the BAR, and these unverified Nitrogen loads' ecological impact on the bay and lagoon system.</u>**

Our objection and concern is based on The State of the Bay Reports that indicated that the upper Lagoon is a nutrient deficient area with shallow warm waters, that nutrient influx (Nitrogen or phosphates) into this area could pose a detrimental ecological effect on the upper lagoon, which is home of a few red data species, including resident waders.

Also the State of the Bay Report scientifically confirmed that the upper lagoon is linked to Big Bay and Small Bay. Historic dredging events in Small Bay around the Port Terminals caused negative impacts on the sea weed footprint in this sensitive lagoon area, habitat lost occurred.

Recommendations:

- **<u>The SBWQFT propose that a site specific specialist monitoring study, including a modeling approach, be initiated to determine the potential impact of Nitrogen influx from Big Bay into the upper Lagoon (Geelbek area).</u>**

- **The SBWQFT also recommend that real time biophysical monitoring being obtained in the proposed ADZ area before any activity starts due to the unknown risks this development poses on the already stressed ecosystem. Thermistor chains should be introduced in the proposed area to measure and determine the actual or real biophysical conditions such as chlorophyll – phytoplankton (production, movement and depletion), DO, Nitrogen, Diatoms, current movement, etc. Modeling should then be used to make more trusted or accurate predictions, the model used should be calibrated with the current real time data that were obtained in the specific proposed ADZ area, especially in Big Bay that is close to the Lagoon. (monitoring criteria should be determined by specialist in this field)**

- **The SBWQFT agrees with the author of the BAR that a precautionary approach be taken with the fish farming sizes and areas, but only after the current biophysical conditions of the proposed area is determined and the risks associated verified, a modeling approach could be used for verification. We surely cannot solely use information and data that was obtained in other ecosystems and not data of the specific earmarked area, the risk is too high and lagoon too valuable to make decisions on this assumption based approach.**

- **Fin Fish Farming in Big Bay and the associated waste loads poses a real risk to the Langebaan Lagoon, it is recommended that this type of aquaculture be reconsidered and the No Go Option be applied in Big Bay for Fin Fish Farming by DEA and the minister. The BAR recommends that sensitive ecological areas be excluded for ADZ – due to the Uncertainties (no site specific data collection) and Risk to the lagoon we thus base our appeal to eliminate fin fish farming out of Big Bay.**

• Alien invasion

The SBWQFT would like to emphasize that our studies revealed that more than 50 alien invasive species already exist in Saldanha Bay and Langebaan Lagoon; this is the single most impacted marine catchment in South Africa. The ecosystem is under stress.

Objection/ Concern:

- **The SBWQFT is concerned about the impact of alien species and fouling pests on the Lagoon ecosystem. Current mitigation measures are not effective. Further stress in this regard could have irreversible effect on the ecosystem. Therefor our appeal to the minister to the NO-GO option for fin fish farming in Big Bay.**

- **The effect of alien species and fouling pests could be detrimental to local species. We object to the proposed Fin Fish farming in Big Bay, our opinion is that the risk is just too high to allow an activity that had a proven track record that severely impacted other ecosystems elsewhere in the world. The Langebaan Lagoon and the value of the red data species that could be compromised is too high a risk to allow fin fish farming.**

Recommendations/ Appeal:

- **<u>The SBWQFT appeal to DEA to reconsider in total Fin Fish farming specifically due to the risks associated with this type of industry and especially so close to an internationally approved RAMSAR site. We base our appeal on 18 years of monitoring the ecosystem and that the system is already compromised and under stress.</u>**

• Additional comments

- The **<u>SBWQFT</u>** have several concerns about the proposed siting and scale of development of the ADZ within Saldanha Bay. Saldanha bay is an area with diverse users including recreational water sports enthusiasts, recreational and commercial fishing, existing mariculture operations and large industrial scale shipping; it also adjoins unique and internationally important Lagoon and Island habitats that are included in Marine Protected Areas (MPAs). Three of the proposed ADZ areas abut directly onto MPAs that serve to protected vulnerable species and habitats. The annual state of the Bay monitoring has provided scientific evidence that the ecology of the Bay and Lagoon are negatively impacted by existing

activities developments. Mariculture development of the proposed scale would have devastating impacts on the already stressed ecosystem and further threaten many endangered bird (e.g. waders, gannets, bank and crowned cormorants, African Penguins) and overexploited fish species (e.g. white stumpnose, white steenbras). Most of our concerns relate to the proposed area of **finfish farming**, an activity that has had severe environmental impacts globally and for reasons given below, we do not believe can be effectively mitigated at the scale of the proposed development.

Siting

- Marine specialist report identified buffers of 1000 m from existing MPAS for finfish cage culture, this would have excluded Big Bay south, and large portions of both the Outer bay sites. The EIA practitioner does recommend excluding areas to accommodate the recommended buffers, but the BAR report drastically reduces the buffers recommended by the marine specialist to just 250-500m from the MPAs in outer bay. **We are not comfortable that the specialist recommendations in this respect were ignored (dramatically reduced)?**
- According to international guidelines (FAO 2015), finfish cage farming requires at least 5 m below the bottom of the nets to allow for sufficient dispersal of wastes (uneaten food, fish faeces, fouling organisms) below cages. Nutrient enrichment and resulting eutrophication of sediments under fish cages is regarded as a serious issue in some areas. Nearshore marine environments with low flushing rates and or sediments susceptible to organic loading should be avoided when selecting sites for finfish cages. Big bay is such an environment, and furthermore the depth within the identified ADZ areas in Big Bay is shallower than 15 m. Commercial scale fish cages are typically 15 m deep, hence nowhere within Big Bay is suitable for commercial scale fin fish cages. The FAO (2015) actually recommends that cages should be no deeper than one-third of the site's depth and at least 15 meters should be left between the net base and the sea bed (at low tide). This is substantially more than the 5m recommended in the BAR. Furthermore current velocities within Big Bay typically do not exceed 10 $cm.s^{-1}$ for much of the time, considered the minimum necessary to adequately disperse wastes below cages (FAO 2015).

Carrying capacity

- The estimation of shellfish carrying capacity in the BAR and marine specialist report is based entirely on estimated potential surplus production in the bay and a rough estimate of the ecological carrying capacity (estimated at ~10% of PCC). This may be appropriate or even considered a precautionary approach in areas with deeper water and higher flushing rates than Saldanha Bay, but we do not think this approach is adequate in this instance given the acknowledged sensitivity of the Saldanha Bay Langebaan lagoon system (where there is tidal water exchange with a nutrient poor shallow lagoon system).
- The fish carrying capacity is similarly assessed using a rough (not validated) estimate that an addition of 15% of the naturally nitrogen load is acceptable. There is no evidence to indicate that this is the case, and possibly more critically, the natural nitrogen load comes in as dissolved nitrate, whilst fish waste is

excreted as ammonia which is toxic to marine life and behaves completely differently to dissolved nitrate.

- The estimate of natural nitrogen load in the bay also appears excessive on several accounts. Firstly, the estimated 300 days of upwelling is not realistic. Westerly winds dominate for at least four months of the year (May-August). Even during the remaining 245 days, upwelling and hence density driven flows of nutrients into Saldanha Bay does not take place consistently, it operates on a 6-7 day cycle with full intrusion of the cold bottom water only occurring immediately after relaxation of upwelling favourable winds (Monteiro 1998). From this, it appears that the nitrogen flux entering the Bay is only applicable on at most 150 days per year if it occurs during 5 day bouts of upwelling, or possibly as few as 50 days if it only occurs mainly during relaxation of upwelling favourable winds. Both these scenarios indicate that the actual nitrogen load is probably much lower than reported in ten BAR and hence the arbitrary 15% addition of fish waste would bring production levels down to 1000-2500 t, not the 5000 t suggested in the BAR. To bring these figures into perspective, the entire national commercial yellowtail catch (the second most abundant species after snoek) ranged between 200-888 t over the period 2000-2012 (DAFF 2015). Attempting to produce five times this volume from a relatively small Bay is excessive. Calculation of finfish farming carrying capacity using the lower figure of 50 days of dissolved nitrogen influx into Saldanha Bay suggests that as little as 854 tons of finfish production will increase the nitrogen load by 15% of that naturally available.
- The anticipated future production figures for shellfish are provided as graded and ungraded (total) but for finfish only production figures are given. This is a serious omission as the total biomass of fish in the cages incorporates all the grow out stages, not just the final production tonnage. This will be many times estimated production amount and the environmental authorization must specify that the total mass of fish in the cages must not exceed the recommended level.

Disease and parasites associated with finfish farming

- The SBWQT is concerned that the impact assessment for the transmission of diseases from cultured stock to wild populations that is rated as VERY LOW with mitigation is incorrect. The recommended mitigation will help reduce the impacts slightly but internationally these measures have proved only partially effective in mitigating the very serious issue of disease transmission from cultured finfish to wild stocks. **The SBWQT is of the opinion that the impact should be rated as VERY HIGH without and HIGH with mitigation for the following reasons**:
    - Infectious diseases and parasites are regarded as the single biggest threat to aquaculture, with the estimated losses from sea lice (genus *Caligus*) infections of salmon stock alone amounting to hundreds of millions of dollars annually (Staniford 2002, Heuch *et al*. 2005).
    - The cultured stock is often prevented from exercising natural parasite shedding behaviours and the high number of concentrated hosts facilitates parasite and disease reproduction and transmission. This is not only a concern for the productivity of the cultured stock, but also threatens wild stocks due to enhanced transmission of parasites and diseases (Heuch *et al.* 2005, Krosek *et al*. 2007, Ford and Myers 2008).

- Transmission to wild stocks may take place by direct contact between wild fish and farmed stock as wild fish are often attracted to the cages, or simply as a result of the much higher concentration of pelagic parasite life history stages arising from fish farms.
- Wild salmon in particular have suffered increased parasite infection rates due to contact with cage cultured stock (Carr and Whoriskey 2004, Heuch *et al.* 2005). Documented effects of high parasite loads on wild salmonids include increased mortality rates, reduced fecundity and delayed maturity, all of which reduce the fitness of individuals and the productivity of the wild stock as a whole (Bjorn *et al.* 2002, Carr and Whoriskey 2004, Heuch *et al.* 2005, Ford and Myers 2008). Intensive sea bass and sea bream culture in the Mediterranean has also resulted in severe disease problems in fish farms; problem diseases include *Pasteurellosis* and *Nodavirosis*, and parasitic infections include *Ichtyobodo* sp*., Ceratomyxa* sp., *Amyloodinium ocellatum, Trichodina* sp., *Myxidium leei, and Diplectanum aequans* (Agius and Tanti 1997 cited in Staniford 2002).
- In Australia, experiments have revealed that Monogenean parasites, infected yellowtail up to 18 km downstream of the cages (Chambers and Ernst 2005). Gill and skin flukes were identified as one of the major factors holding back Australian yellowtail production (Moses *et al.* 2009).
- Commercially important indigenous species that are found and caught in the nearshore region of the Saldanha Bay area (will occur in the vicinity of the proposed finfish cages within the ADZ) include white stumpnose *Rhabdosargus globiceps*, hottentot *Pachymetepon* blochii, silver kob *Argyrosomus inodrus*, elf P*omatomus saltatrix*, smoothhound sharks *Mustelus mustelus* and yellowtail S*eriola lalandii*. The parasites and diseases infecting these (and other finfish) species in South African waters are not well studied, although silver kob are known to be infected by sea lice of the same genus (*Caligus*) that caused serious problems amongst salmonids, as well as other copepod, trematode, Acanthocephalan (parasitic worm) monogean (specifically the gill fluke *Diplectanum oliverii),* dinoflagellates (*Amyloodinium ocellatum*) and myxozoan species (DEAT undated Grobler *et al.* 2002, Christison & Vaughan 2009, Joubert *et al*. 2009).
- Sciaenids farmed elsewhere, namely *A. japonicus* in Australia and meagre *A. regius* in the Mediterranean have also proved susceptible to monogean gill parasites that caused disease and mortality (Hayward *et al.* 2007, Merella *et al.* 2009).
- White stumpnose and hottentot are largely resident sparid species, yellowtail are regarded as nomadic, smooth hound sharks and elf undertake extensive coast wide movement, whilst silver kob within the vicinity (10-100 km) of future sea cages will also likely come into contact with farmed stock (Mann 2000). White stumpnose, elf and smooth hound shark movements in the Saldanha Bay and Langebaan lagoon area have been studied using acoustic telemetry techniques. These species have been shown to varying degrees of residency within the Langebaan lagoon MPA, but also undertake regular (often seasonal) movement into and out of the Saldanha Bay system (Kerwath *et al.* 2009, Hedger *et al* 2010, da Silva *et al* 2013). All three of these species (and any others with nomadic or migratory movement patterns) will therefore be at an increased risk of contracting diseases and or parasites from stocked fish and spreading them through wild populations including those inhabiting the nearby Langebaan MPA.
- Potential negative effects on wild stocks are particularly concerning as all three of these species are important in the commercial and recreational line fisheries and furthermore silver kob are

assessed as collapsed and the status of the Saldanha Bay white stumpnose stock is considered overexploited (Grifitths 2000, Parker *et al* in prep).

- Although treatment of cultured stock to control disease and parasite outbreaks is possible (unlike wild stocks), chemical treatment is not without further environmental impacts, whilst build-up of antibiotic and chemical resistance is becoming increasingly problematic (Staniford 2002).
- Potential disease and parasite transmission to wild stocks could have negative impacts throughout the natural distributional range of the species, the magnitude of the potential impact will be high as it could alter wider natural (ecosystem impacts) and social functions (fisheries), and the impact will be ongoing.

- ## Conclusion/Summary

- **Monetary Value of Ecosystem: The SBWQFT feels very strongly that for the minister to evaluate this EIA, including the NO-GO option, the monetary value of Langebaan Lagoon Ecosystem, the monetary value of Tourism and other Lagoon dependent industries should be determined. This will enable the minister to weigh-up "apples" against "apples". The BAR indicated the monetary value of the proposed ADZ. The negative impact of the proposed ADZ on other industries and the ecosystem could only be fairly considered if the other industries and ecosystem is considered in terms of monetary value as well.**

- **Unacceptable Impact on Bay: The SBWQFT would like to emphasize a huge contradiction in the BAR, we refer to Section 8: Summary and Conclusion of the Executive summary. It states that the most significant impacts are related to marine ecological impacts, e.g. modify seabed characteristics due to fish waste and increased risk of introducing alien species and fouling pests. Then a phased approach is proposed while monitoring determines the impact, this is to avoid unacceptable impacts on the bay. *We would like clarity on what an unacceptable impact on the bay is as stated in the BAR – could the writer or the minister please give clarity it is very important*, taking into consideration that science has revealed that the Bay is already compromised and under stress as per the State of the Bay Report. *The minister and the DEA need to take note that the Bay is already unacceptably impacted, that the White Stumpnose population is declining, that heavy metal pollution in Small bay is a reality, that a 50 hectare ulva bloom did occur some years ago in Small Bay due to increased organic loading from fishing factory effluents, Filter feeder harvesting on the Northern shores are discouraged due to bacterial pollution exceeding the recommended levels, that we have more than 50 alien species monitored in the bay – most affected area in South Africa in terms of Alien infestation.***

- **Acceptable thresholds in the Bay: The SBWQFT would like to emphasize a second contradiction in the BAR, we refer to Section 8: Summary and Conclusion of the Executive summary. It states that the "While total shellfish and finfish production volumes have been stipulated for the ADZ, these may**

have to be revised if environmental (water and sediment quality) monitoring during early implementation phases indicates that impacts exceed acceptable thresholds with regard to marine ecology. ***We would like clarity on what an acceptable threshold in terms of marine ecology in the bay is as stated in the BAR. The minister and the DEA need to take note that should we use the ecological thresholds used in the Water Quality Criteria for Marine Waters by DWAF, the Bay is already in certain areas exceeding these thresholds, in Small Bay we are in exceedance of some heavy metal thresholds (Pb), we are exceeding in certain areas of this ecosystem bacteriological thresholds for filter feeding collection and at times for full contact recreation activities – warning signs has been erected by SBM in this regard to protect them from claims. We altered the seabed characteristics in Small Bay and have physical Dead Zones with limited meio and macro fauna activity around the yacht club basin. We have more than 50 alien species monitored in the bay – most affected area in South Africa in terms of Alien infestation, another exceeding threshold.***

To conclude, The SBWQFT believes that the BAR too much depends on assumptions and that insufficient scientific information and data based on site specific monitoring and data collection exist in the earmarked ADZ. The determined Eco Carrying Capacity of the Bay is questionable and should not be used to make the specific recommendations that were made in the BAR on size and location (Big Bay) of the proposed ADZ. The DEA and the minister cannot make an informed decision if the assumptive based BAR is used to determine the Risk to the Lagoon. It will be an ill decision making process with high risks should no physical monitoring and specialist studies be initiated before the ADZ is declared.

References

Bjorn P.A., Tveiten H., Johnsen H.K., Finstad B. and R.S McKinley (2002) Salmon lice and stress: effects on reproductive performance in Arctic charr. In: Riehl M. and Struthers M. (eds.) Aquanet II, *Proceedings of the 2002 Annual Research Conference of Aquanet*, September 14-17, 2002, Delta Beausejour, Moncton, New Brunswick, Canada.

Christison K W and D B Vaughan (2009) The velvet assassins – *Amyloodinium ocellatum* potential disease risk for captive marine fishes in South Africa. Oral presentation at the e 37th Annual Congress of the Parasitological Society of Southern Africa (PARSA), 7–9 October 2008, Faculty of Veterinary Science, University of Pretoria, Pretoria, South Africa. Jl S.Afr.vet.Ass. (2009) 80(2): 126–140

da Silva C, Kerwath SE, Attwood CG, Thorstad EB, Cowley PD, Økland F, Wilke CG, & TF Næsje. 2013. Quantifying the degree of protection afforded by a no-take marine reserve on an exploited shark. *African Journal of Marine Science*, 35(1): 57-66

Department of Agriculture, Forestry and Fisheries (DAFF). 2015. Status of the South AfricanMarine Fishery Resources 2014. Republic of South Africa Department of Agriculture, Forestry and Fisheries. Cape Town, South Africa.

Food and Agricultural Organization of the United Nations (FAO) 2015. Aquaculture operations in floating HDPE cages. A field handbook. Cardia F. & A. Lovatelli Fisheries and Aquaculture Technical Paper 593.

Ford, J.S. and R.A. Myers. 2008. A global assessment of salmon aquaculture impacts on wild salmonids. PLoS Biology 6(2): e33. doi:10.1371/journal.pbio.0060033

Grobler NJ, Van As JG, Olivier PAS 2002. Description of the previously unknown male of *Caligus mortis* Kensley, 1970 (Copepoda: Caligidae), parasite of intertidal fish from South Africa. *Folia Parasitologic*A 49: 131-136 .

Hayward CJ, Bott NJ, Itoh N, Iwashita M, Okihiro M & BF Nowak 2007. Three species of parasites emerging on the gills of mulloway, *Argyrosomus japonicus* (Temminck and Schlegel, 1843), cultured in Australia. Aquaculture 265:27-40.

Heuch P.A., Bjorn P.A., Finstad B., Holst J.C., Asplin L. and F. Nilsen (2005) A review of the Norwegian 'National plan of Action against salmon lice on salmonids': the effect on wild salmonids. *Aquaculture* 246: 79-92.

Hedger RD, Næsje TF, Cowley PD, Thorstad EB, Attwood C, Økland F, Wilke CG & Kerwath S. 2010. Residency and migratory behaviour by adult *Pomatomus saltatrix* in a South African coastal embayment. *Estuarine, Coastal and Shelf Science* 89:12-20

Joubert C J H, Christison K W and H Kaiser 2009. An egg-laying rhythm *in Diplectanum oliveri* (Monogenea:Diplectanidae), a gill parasite of dusky kob (*Argyrosomus japonicus*). Oral presentation at the e 37th Annual Congress of the Parasitological Society of Southern Africa

(PARSA), 7–9 October 2008, Faculty of Veterinary Science, University of Pretoria, Pretoria, South Africa. Jl S.Afr.vet.Ass. (2009) 80(2): 126–140.

Kerwath SE, Thorstad EB, Næsje TF, Attwood CG, Cowley PD, Økland F & Wilke C. 2009. Crossing Invisible Boundaries: The effectiveness of the Langebaan Lagoon marine protected area as a harvest refuge for a migratory fish species in South Africa. *Conservation Biology* 23 (3): 653-661.

Krkošek, M., J.S. Ford, A. Morton, S. Lele, R.A. Myers, and M.A. Lewis. 2007. Declining wild salmon populations in relation to parasites from farmed salmon. Science 318 (5857): 1772.

Mann BQ 2000. Southern African Marine Linefish Status Reports. *Special Publication of the Oceanographic Research Institute of South Africa.* **7**: 257pp.

Merella P, Cherchi S, Garippa G, Fioravanti ML, Gustinelli A & F Salati 2009. Outbreak of Sciaenacotyle panceri (Monogenea) on cage-reared meagre Argyrosomus regius (Osteichthyes) from the western Mediterranean Sea. Dis Aquat Organ.86(2):169-73.

Monteiro PMS & Largier JL. 1999. Thermal stratification in Saldanha Bay (South Africa) and subtidal, density-driven exchange with the coastal waters of the Benguela Upwelling System. *Estuarine and Coastal Shelf Science* 49: 877-890.

Moses M, Booth M, Allan G & D Boot 2009. Carbohydrate utilisation in Yellowtail kingfish (*Seriola lalandi*). Presentation given at the Asia Pacific Aquaculture Conference November 3-6 2009.

Staniford D. (2002). Sea cage fish farming: an evaluation of environmental and public health aspects (the five fundamental flaws of sea cage fish farming). Unpublished paper presented to the European parliament's Committee on Fisheries Public hearing on 'Aquaculture in the European Union: present situation.