MOUTH MANAGEMENT PLAN FOR THE BOT-KLEINMOND ESTUARY SYSTEM

1 Introduction

A workshop known as the 'Bot Indaba 2009' was held at Middlevlei Estate on the south-eastern shore of the Bot River Estuary on 16 April 2009 to discuss a number of issues relating to the estuary system. The development of guidelines for the management of the Bot River Estuary mouth was one of the key items on the agenda.

The workshop was held under the auspices of the then Bot River Estuary Advisory Committee (BREAC), which had been overseeing the management of the estuary since 1993. Following the development of an Estuary Management Plan (EMP) for the Bot River Estuary as part of the Cape Estuaries Programme, BREAC was dissolved and replaced by the more broadly representative Bot River Estuary Forum (BREF), responsible for coordinating the implementation of the EMP. BREF comprises representatives of:

- All the government agencies that have the necessary jurisdiction to take actions that are necessary
- All civil society organisations with a direct interest in the proper management of the estuarine ecosystems

The Bot River Indaba was chaired by Prof George Branch of the UCT Zoology Department, and attended by a number of invited specialists and government officials, as well as representatives of interested parties that subsequently became members of BREF (see Appendix 1 for minutes and Appendix 2 for attendance register).

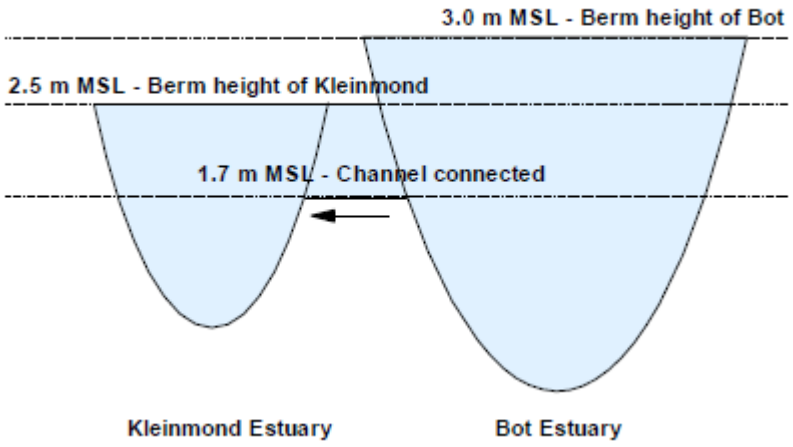
The current document represents the Mouth Management Plan for the Bot-Kleinmond Estuary System. It was agreed that it would be subject to review in five years, unless new information with bearing on the plan came to light in the interim.

1.1 The Bot-Kleinmond Estuary System

The Bot-Kleinmond Estuary System - located between the towns of Hawston and Kleinmond in the Overstrand Municipality - has been ranked 8th most important in South Africa in terms of its size, habitat, and botanical, fish and bird biodiversity (Turpie & Clark 2007, Van Niekerk & Turpie 2010). However, its natural functioning has been significantly impacted by flow reduction due to water abstraction for agricultural and domestic use, and to alien infestation in the catchment and riparian areas, as well as artificial stabilisation of coastal dunes, which altered the height of the sand berms separating the estuaries from the sea. An illegal gill-net fishery threatens the estuary's value as a nursery area for marine fish, while some nutrient enrichment and pollution of the system is likely due to urban and agricultural runoff. The Bot-Kleinmond Estuary System has therefore been relegated to the C category in terms of its current estuarine health, but allocated a B in terms of the Recommended Ecological category, or future health class, since it is considered worthy of rehabilitation and a priority for conservation (Van Niekerk & Turpie 2010, CSIR 2011).

The Bot and Kleinmond estuaries are linked when the water level is at least 1.7 metres above mean sea level via a shallow channel at Rooisands. Water then flows from the Bot through the Rooisands channel and adjacent Lamloch Swamps into the Kleinmond estuary, and out to sea if the mouth is open (Fromme 1985). The total amount of water required to breach the Bot is thus strongly dependant on the amount lost to the Kleinmond estuary

(Willis 1985, Van Niekerk et al. 2005). Consideration has in the past been given to constructing a berm across 'Die Keel' – the connection between the Bot estuary and the Rooisands channel – but this would require a large engineering structure with potential environmental impacts. It would also have negative implications for the Kleinmond estuary, as it would lengthen the period the Kleinmond mouth remained closed.



1.2 The need for artificial breaching

The mean annual runoff (MAR) into the Bot Estuary is recorded as 89 million m^3, but this has been reduced to 72 million m^3 through water abstraction and alien infestation in the catchment area (CSIR 2011). The dampening of flood peaks and reduction in base flows mean that freshwater inflow is insufficient to scour the estuary and prevent marine sediments from blocking the mouth, resulting in sustained periods of mouth closure. The volume of water is insufficient to break through the sand berm at the Bot mouth except in flood events. In the 60 years prior to the early 1980s, the Bot mouth opened naturally only three times (although this was partly because it or the Kleinmond mouth had been opened artificially before it had reached a high enough level).

If the Bot mouth is not breached artificially it will turn into a freshwater lake within three to five years. The invertebrate communities that serve as a food source for wading birds will change significantly, with crustaceans and molluscs replaced by freshwater insects. In addition, most of the 41 fish species that occur in the estuary are estuarine or marine species that are unable to survive in fresh water. Mass mortalities of fish have occurred in the past when the estuary's salinity fell below 6 parts per thousand (ppt - seawater is 35 ppt). The Bot estuary is known to be a highly important nursery area for marine fish, providing an ecosystem service valued at some R50 million, so this function must be preserved.

The advantages of regular mouth breaching are therefore more frequent connection to the sea, greater recruitment of estuary-dependent fish, stabilisation of invertebrate communities, and prevention of extreme fluctuations in salinity. A more typical estuarine environment would in general increase the species diversity (Van Niekerk et al. 2005, which is attached as Appendix 3).

1.3 History of artificial breaching

Starting at around the turn of the 20th Century, the mouth of the Bot River Estuary was artificially breached every few years, initially to restore populations of marine fish and therefore improve fishing, and later to prevent floodwaters from threatening properties on the banks. In the 1970s there was heated debate about this practice, but a lack of scientific information on which recommendations could be based. The South African Network for Coastal and Oceanic Research therefore funded a six-year research programme, which ended in 1985. As part of this programme, a symposium was held at the University of Cape Town in 1983, which resulted in a collection of papers on the Bot-Kleinmond system being published in the journal *Transactions of the Royal Society*.

The breaching criteria recommended by the participating scientists - that the mouth be breached either when the salinity dropped to 6 ppt or every four years, whichever came first (Branch et al. 1985) - were formally accepted by BREAC in August 1995. In 2003 they were reviewed at a workshop dubbed 'Bot Indaba 2003', organised in response to motivations by Marine and Coastal Management and the CSIR aimed at boosting national fish stocks and improving sediment dynamics respectively. It was agreed at Indaba 2003 that the new breaching criteria would be reviewed in 2009 (see Appendix 4 for 1983 and 2003 breaching criteria).

The 2003 criteria were therefore implemented until they were reviewed at Indaba 2009, where the criteria outlined in section 2 were agreed upon by consensus.

Over the past 30 years, opening of the Bot mouth has taken place in the following years: 1981 (2x), 1983, 1985, 1986 (natural breach), 1990, 1993, 1995, 1998, 2000, 2003, 2006, 2008, 2009 (natural breach). See Appendix 5 for more detail.

1.4 Authority to artificially breach

According to the new Environmental Impact Assessment (EIA) Regulations promulgated on 18 June 2010 in terms of the National Environmental Management Act 1998, the following activity may not commence without an environmental authorisation from the competent authority :

"The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock from

(i) a watercourse;
(ii) the sea;
(iii) the seashore;
(iv) the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or an estuary, whichever distance is the greater

but excluding where such infilling, depositing, dredging, excavation, removal or moving

(i) is for maintenance purposes undertaken in accordance with a management plan agreed to by the relevant environmental authority; or
(ii) occurs behind the development setback line."

[Listing Notice 1, Activity Number 18]

Application for special dispensation to implement the mouth management plan for a period of five years (at which time it will be subject to specialist review) is hereby made to DEA&DP in terms of the need for ecosystem maintenance.

2 Bot-Kleinmond mouth management plan for the period 2009-2014

The following criteria apply to the Bot mouth only. It was agreed that the Kleinmond mouth should not be breached artificially, as this reduces the likelihood of the Bot water level reaching the required height for breaching (Van Niekerk et al 2005).

Furthermore, the Kleinmond mouth has frequently been artificially breached to flush polluted water from the estuary, but it is considered preferable to address the pollution at source.

Neither estuary should be artificially breached for the sole purpose of preventing floodwater damage to surrounding properties, while natural breachings should be allowed to take place without interference.

2.1 Artificial breaching criteria

Breaching only to take place between 01 May – 31 September

1st & 2nd year after previous breach:

- Water level > 2,5m msl and salinity =< 10 ppt

OR

- Water level < 2,5m msl, but breaching feasible and salinity =< 6 ppt

3rd year

- Water level = 2.5m msl
- Salinity not considered

OR

- Consensus decision by breaching sub-committee and specialists should salinities <6 ppt and catastrophe is imminent (e.g. mass mortality of fish) even though level has not reached 2.5m msl

If no breach has occurred for 4 years and breaching is feasible, breach.

2.2 Timing

- Only during daylight hours
- Preferably just after spring high tide, but this shall not be considered a deciding factor.

2.3 Site of artificial breach

At the mouth of the Bot between Meerensee Resort and Rooisand Nature Reserve, within 300 m of the 2008 breach position and well away from dunes to prevent unnecessary sand entrainment.

2.4. Method

A deep, relatively wide trench to be dug with a backactor.

2.5 Deciding to artificially breach

The decision to artificially breach will be made by a breaching sub-committee comprising the BREF Chairperson, the Overstrand Estuary Management Coordinator, the Overstrand Municipality's Environmental Manager and the Cape Nature: Boland Area Manager or his representative.

Data on water level and salinity will be collected by Cape Nature according to the Monitoring procedures set out below in point 3 – Monitoring, and submitted to the Overstrand Estuary Management Coordinator.

2.6 Implementing artificial breaching

Once the breaching sub-committee has decided that an artificial breach must occur, the manager of the Cape Nature: Boland Area or his representative shall be responsible for overseeing the breaching activities. The Overstrand Municipality will make a backactor and operator available.

3. Monitoring

3.1 Measurements and equipment

Salinity (in parts per thousand, o/oo) will be measured using a properly calibrated instrument, supported by associated equipment to measure water depth (in metres above mean sea level, m AMSL), and surface temperature (in degrees Celsius, °C)

The salinity level at which artificial breaching may be considered will be determined as follows:

- Salinity samples will be taken at the surface, middle and bottom of the water column at each monitoring point, and the results averaged.
- The five site values will then also be averaged to arrive at a single salinity value.

3.2 Monitoring points

Salinity measurements will be taken at the following five locations:

- Opposite the Department of Water Affairs jetty near Ysterklip Farm*
- Afdaks bay
- Central position in the lagoon
- At the mouth near Meerensee Resort
- At Rooisand near De Keel (when water depth permits)

* water reading at the Water Affairs jetty should not be allowed to skew the other four readings to result in a lower average salinity.

3.3 Monitoring frequency

> 10 ppt : once a month
9 -10 ppt : once a week
< 9 ppt : weekly to daily, depending on the weather.

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