



Bot River Estuary Artificial Breaching Report

BREF MEETING 29 OCTOBER 2020

Introduction

DESCRIPTION

- The Bot River estuary is the third largest in the Cape Floristic bioregion.
- The estuarine lake system system is a relatively shallow triangular estuarine lake, 7km long and about 2km wide (Koop 1982).
- Biodiversity Importance score of the Bot River estuary on a national scale was calculated as 98 (Turpie & Clark 2007).
- Resulting in the estuary being ranked eighth overall in SA (Turpie et al., 2002).
- In recognition of this the Bot River Estuary was declared a RAMSAR site in 2017.



Introduction

BREACHING HISTORY AND GUIDING TOOLS

- Bot river estuary system was artificially breached between 1981 and 2020 16 times with 2 natural breaching occurring in 1986 and 2009 due to flooding (Van Niekerk et al. 2005).
- The Bot River Estuary Management Plan (EMP) now guides the estuary management process.
- The Bot River Estuary Mouth Maintenance Management Plan guides mouth management in line with the EMP.
- The Bot Estuary ecological condition is recorded in the National Biodiversity Assessment 2019.
- The Bot Estuary ecological class is recorded in the DWS Catchment Classification system.

Introduction

BREACHING CRITERIA

- As per the Bot river estuary mouth maintenance plan the following criteria need to be met in order to artificially breach the estuary system (CSIR 2018).
- Minimum breaching level (water level should be as high as possible before breaching) $>2.5\text{m}$ (msl).
- For the 1st & 2nd year after the previous breach: Water level $> 2.5\text{m}$ msl and salinity $\leq 10\text{ppt}$ or water level $< 2.5\text{m}$ (msl), but breaching feasible and salinity $\leq 6\text{ppt}$.

Introduction

BREACHING CRITERIA

- For the 3rd year after the previous breach: Water level = 2.5m (msl). Salinity not considered or consensus decision by breaching sub-committee and specialists should salinities <6ppt and catastrophe is imminent (e.g. mass mortality of fish) even though level has not reached 2.5m (msl).
- For the 4th year after the previous breach: If no breach has occurred for 4 years and breaching is feasible, breach.

Introduction

INTERACTION BETWEEN BOT AND KLEINMOND ESTUARY MOUTHS

- The Bot Kleinmond estuarine system has two mouths which are linked when the water level is at least 1.7m above mean sea level via a shallow channel at Rooisand
- Water then flows from the Bot river estuary through the Rooisand channel and adjacent Lamloch Swamps into the estuary mouth at Kleinmond, and out to sea if the mouth is open (Van Niekerk et al. 2005)
- The total volume of water required to breach the Bot is thus strongly influenced by the amount ultimately lost to the mouth at Kleinmond if it opens prior to breaching (Willis 1985, Van Niekerk et al. 2005).

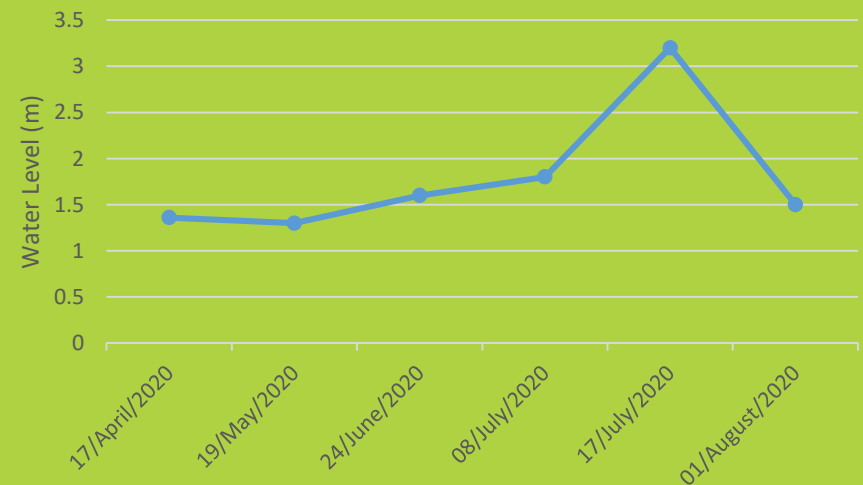
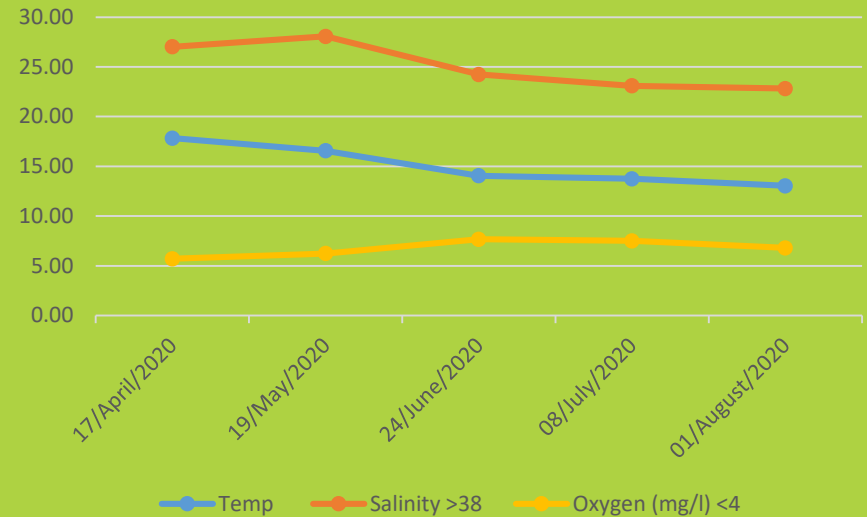
Artificial Breach of July 2020

- Bot river estuary was artificially breached on the 21st July 2020 after obtaining an emergency breach authorization directive
- In terms of Section 30A of The National Environmental Management Act 107 of 1998
- A 4m wide channel was excavated at $-34^{\circ}.3671$ E/ $19^{\circ}.0982$ S towards the sea.
- The excavation started at 14H00 and the estuary was breached at 18H20 resulting in an 80m wide channel during the night.



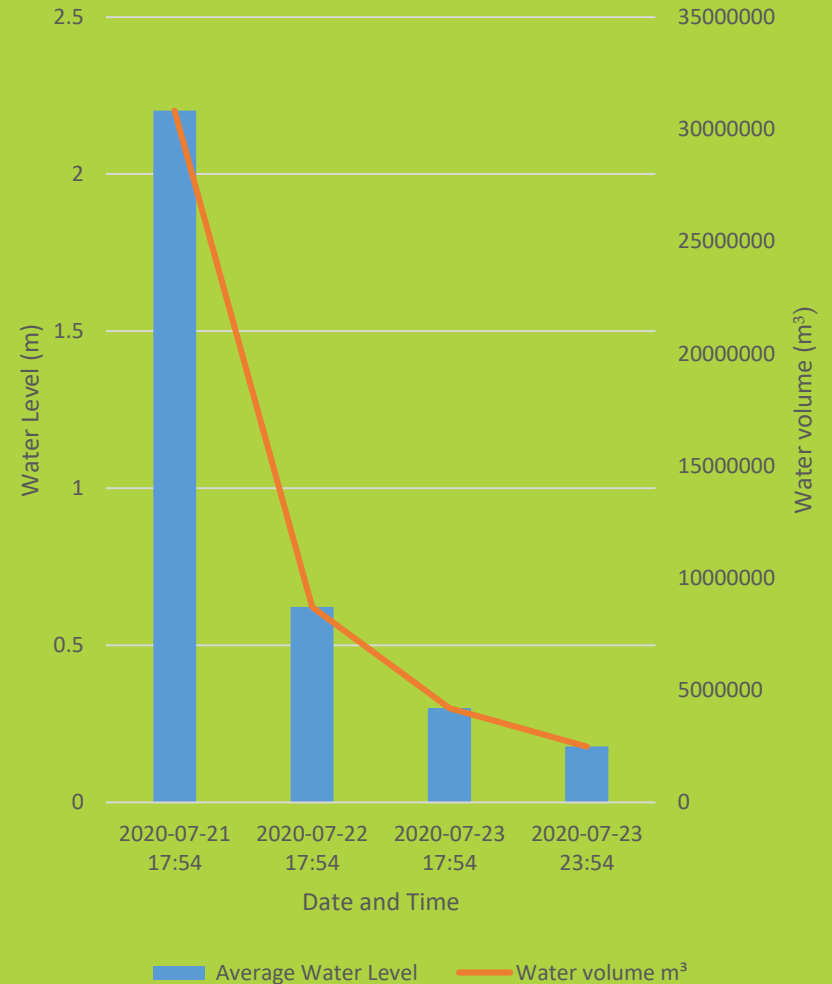
Estuary Conditions prior to breach

- Indicated an average salinity level of 23.09ppt, oxygen level of 7.50mg/l which was within the set thresholds of <4mg/l and >38ppt respectively
- The water level at the time of breaching was at 2.9m (msl)
- Sea conditions: NNW, <8m/s, SW swell off 2.2m with a low tide of 0,42m at 22H47



Water outflow rate

- A maximum outflow rate of a 255.96 m³/s occurred in the first 24 hours after breaching which is within the outflow level estimates of 254m³/s - 409m³/s (Fromme, 1985a).
- It is important to note that the estuary mouth at Kleinmond breached on the 17th July 2020 resulting in a decrease in water level of 0.38 cm which calculates to a approximate loss of 5338000 m³ of water



Estuary Conditions after artificial breach

- Mouth closed on the 13th of August 2020 due to severe sea conditions depositing sand onto the berm at the mouth. The mouth remained closed up to the 2nd of September 2020.
- A natural breach occurred on the 3rd of September 2020 due to good freshwater inflow from the catchment. The mouth remains open with noticeable seawater inflow into the estuary



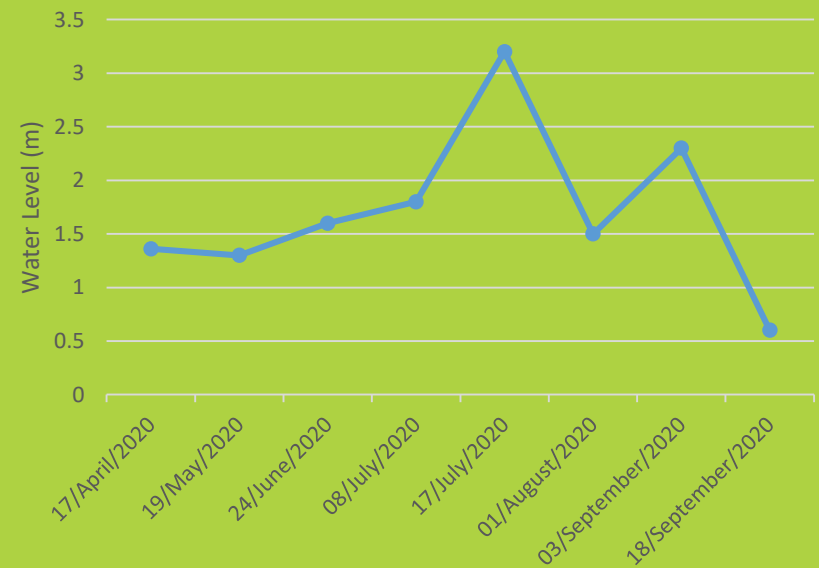
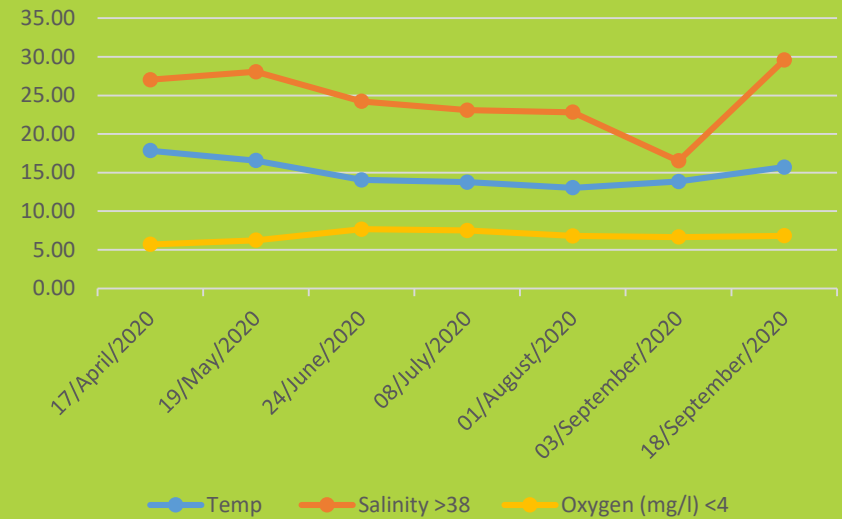
Estuary Conditions prior to and after natural breach

Before

- Depicted and average salinity level of 16.52ppt, oxygen level of 6.65ml/g which was within the set thresholds
- Water level 2.3m

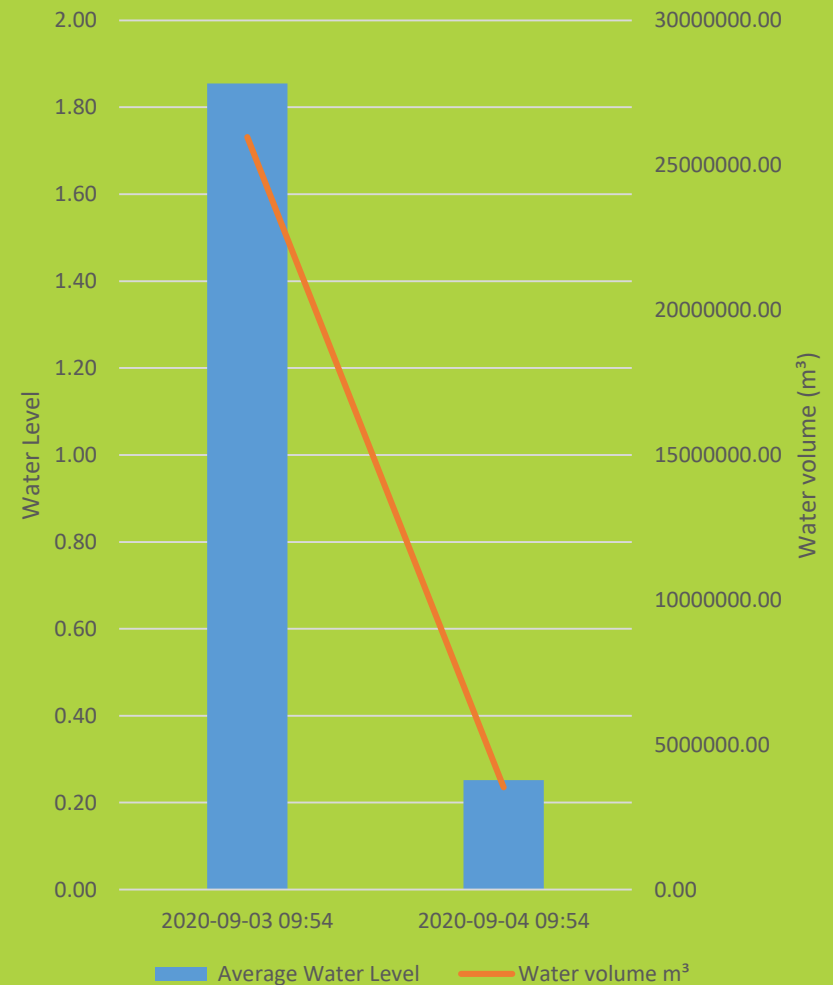
After

- Average, salinity level of 29.57ppt, oxygen level of 6.82ml/g.
- Water level of 0.60m.



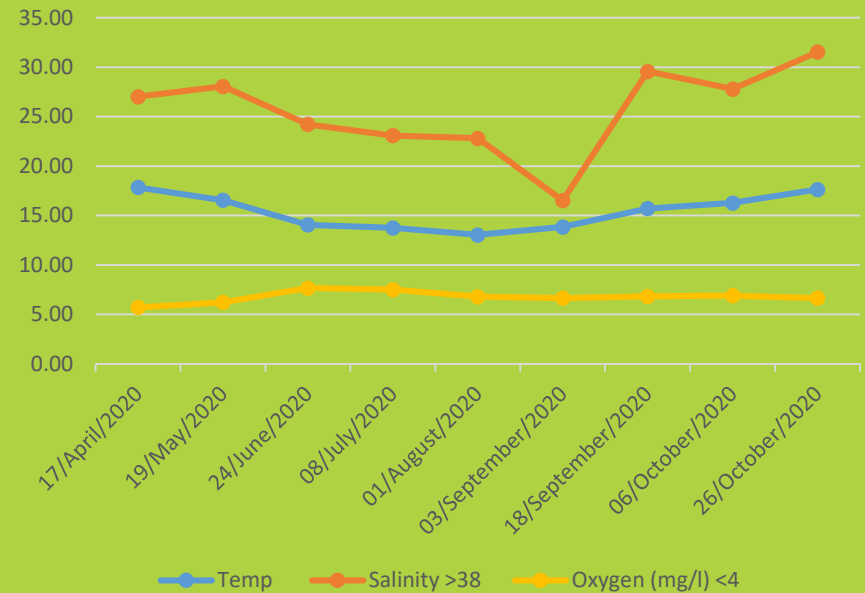
Water outflow rate natural breach

- A maximum out flow rate of $259.74\text{m}^3/\text{s}$ occurred in the first 24 hours after the natural breaching



Current Estuary Conditions

- Depicted and average salinity level of 31.54ppt, oxygen level of 6.65 ml/g
- Water level 0.7m
- Mouth Condition: Open



THANK YOU.