

1 JBS10 (EWR 10: SUIKERBOS DS (SUIKERBOSRAND RIVER))

The information is summarised from DWA (2008a,b; 2009a; 2010a).

EWR 10 occurs downstream of the Blesbokspruit River which is heavily impacted and in close proximity to OSAEH 11.14 which is downstream of EWR 10. During the Reserve assessment there was very low confidence in the hydrology and after personal communication with Ms Delana Louw it was decided to include EWR 10 in the current study and instead of assessing OSAEH 11.14, EWR 10 was assessed in March 2011. The EWR study allowed for good data availability and understanding of the site however the major issue at this site is that the PES baseline could have changed due to the uncertainties regarding the hydrology. Therefore the results provided below are mainly the results from the EWR study, and any significant changes in the condition of the biota observed during the 2011 assessment is included.

1.1 SITE DESCRIPTION

MRU Suiker B is delineated as the Suikerbosrand River reach from the Blesbokspruit confluence to the Vaal River confluence. EWR 10 is below the Blesbokspruit confluence and the morphology is generally representative of the reach, but impacts concentrated around the road/bridge access results in the banks being in a poorer condition than generally seen along the reach. Upper and lower terraces are paired on opposite bank. Some channel manipulation from roads is present although this has a minor influence on the site. There is up to 60% exotics in places. Fish habitat, flow-depth categories and cover is well represented at site while excellent macroinvertebrate habitat is present.

Location	EWR 10	Altitude	1453 m
Longitude	28.16798	Latitude	-26.68137
EcoRegion	Highveld/Southern Central Kalahari 11.01	Quaternary catchment	C21G
Water Management Area	Upper Vaal	Geomorphological zone	Lowland
			
EWR 10, Suikerbos DS, August 2008			

1.2 PRESENT ECOLOGICAL STATE (PES)

Geom	The site is representative of the reach. Although the floods are relatively natural, the upstream confluence with the Blesbokspruit River has resulted in increased base flows due to mine dewatering. The banks are largely natural, although some erosion is present in places and has increased in the catchment due to increased fines load of the river. Water quality is impacting the marginal vegetation, which is in turn is destabilizing the banks as the vegetation dies off.
WQ	The current water quality status of the lower Suikerbosrand River is driven by the water quality of the Blesbokspruit River discussed under Section 15. Low and moderated flows in the Suikerbosrand River are being changed by increased Blesbokspruit River base flows.
Fish	Most of the expected fish species are still present within this reach. It is expected that <i>B. pallidus</i> has been lost from this reach as a result of the deteriorated water quality and increased flows (loss of slow habitats). This loss of slow habitats also influenced other species with a preference for this habitat such as <i>B. anoplus</i> , <i>L. umbratus</i> and possibly also <i>C. garipepinus</i> . <i>A. sclateri</i> and <i>L. kimberleyensis</i> assemblages have been altered due to substrate deterioration (sediment and algae) as well as water quality. Another prominent reduction in FROC is evident in the small species (<i>B. anoplus</i> , <i>B. pallidus</i> and <i>P. philander</i>) as a result of the presence of the predatory alien <i>M. salmoides</i> . Other alien species <i>G. affinis</i> and <i>C. carpio</i> are also expected to have an impact on the indigenous species, especially regarding breeding (egg and larvae disturbance and predation). Migration barriers in the form of weirs also affect the fish assemblages of this reach to some extent.
Inverts	<p>Sep 07: SASS5 score: 64 No of Taxa: 13 ASPT: 4.9 Apr 08: SASS5 score: 85 No of Taxa: 15 ASPT: 5.7</p> <p>The SASS Scores (64 and 86) were significantly lower than expected (182), and results were very low in relation to the quality of biotopes available. Likewise, the ASPT results (4.9 and 5.7) were significantly lower than expected (6.1). The results suggest that habitat availability is having a significant impact on the composition. Three species of caddisflies and three species of blackflies indicate significant improvement compared to EWR 9, further upstream. However, all species present were tolerant of water quality deterioration. Taxa that were missing or scarce were those that prefer moderately fast-flowing water (e.g. Elmidae; Hydraenidae; Turbellaria), and taxa that are sensitive to water quality deterioration and found in cobble biotopes (e.g. Baetidae; Hydropsychidae; Elmidae). Heptageniidae were present on one occasion, and shrimps were present on both occasions.</p>
Rip veg	This site occurs within the Soweto Highveld Grassland vegetation type, which has an endangered conservation status with 52.7% of the type remaining and only 0.2% protected. Increased dry season base flows have resulted in the loss of marginal vegetation. There are high levels of exotic species present in the lower and upper zones.
Diatoms	Four diatom samples were taken at this site (August and December 2007 and January and April 2008). All four samples indicate that pollution levels are extreme and that the poor water quality of the Blesbokspruit River impacts heavily on this site. Nutrient loading, organic pollution and salinity are a major concern and mine water decant and industrial effluent impact at critical levels. Toxics, oxygen and temperature are also variables of concern at this site. Due to the continual elevated flows the impacts are diluted constantly. The biological water quality was assessed as a C/D EC due to the dilution effect. It must however be noted that this is not a true reflection of prevailing conditions and that a slight reduction in flows will cause the biological water quality to deteriorate rapidly to a D or E category. This site is the most severely impacted site of all the EWR sites assessed, and urgent management action is needed to prevent major biological water quality impacts on biota in the near future.

1.3 MAIN IMPACTS AT THE SITE

	PES	Causes	Sources	F/NF
WQ	D/E	High salts (electrical conductivity and sulphates).	Mine water decants (point sources) of saline water – some of which are being pretreated and released above Merrievalle (Blesbok RAMSAR) wetland.	F
		Faecal contamination (potential water borne disease) and high nutrients (mainly phosphates).	Diffuse runoff from mining activities and urban runoff.	NF
		Increased nutrient loading and algal growth.	Point source discharges from WWTW, runoff from formal and informal settlements.	
Geom	C	Increased transport capacity.	WWTW, agriculture.	
		Increased sediment supply.	Moderate floods are larger due to baseflow increase from mine dewatering as well as development from the upper catchment.	F
		Slight reduction in connectivity.	Erosion of the headwaters of upstream tributaries in farming areas has increased the sediment load.	NF
		Change in sediment structure.	Upstream small farm dams and two moderately large dams.	NF
Rip veg	C	Loss of marginal zone vegetation.	Sedimentation, reduced floods and increased base flow together may offset each other slightly.	F/NF
		Reduction in lower and upper zone species cover and composition.	Increased dry season base flows.	F
Fish	C/D	Altered habitat composition (slow habitats transformed to fast habitats).	High levels of aliens.	NF
		Decreased overhanging vegetation as cover for fish.	Increased flows / altered hydrological regime.	F
		Increased sedimentation result in deterioration of substrate as habitat (clogging interstitial spaces, loss of important spawning habitats, etc.).	Grazing, agriculture and water level fluctuations.	NF
		Decreased species diversity and abundance (especially small species).	Bank erosion and vegetation removal (grazing) contribute to increased sedimentation.	
		Decreased bottom substrate quality.	Presence of aggressive alien predatory species (<i>M. salmoides</i>) and <i>G. affinis</i> naturally spreading and introduced for recreation / angling.	
		Presence of migration barriers reduces migration success (breeding, feeding and dispersal) of some species.	Impact of bottom feeding alien <i>C. carpio</i> and siltation.	
Inverts	C/D	Water quality problems, particularly elevated salinity and bacteria.	Dams and various weirs. Also farm dams in tributaries reduce refuge areas.	
		Benthic algae.	Industries (Mines, Sappi) and urban storm water.	NF
		High base flows.	Elevated nutrients and clear water.	F
		Decanting mines, sewage treatment works and seepage from urban development.		

1.4 RESULTS: PRESENT ECOLOGICAL STATE

Driver Components	PES	Trend
GEOMORPHOLOGY	C	Negative (C)
WATER QUALITY	D/E	Negative
DIATOMS	C/D	
Response Components	PES	Trend
FISH	C/D	Stable
MACRO INVERTEBRATES	C/D	Stable
INSTREAM	C/D	
RIPARIAN VEGETATION	C	Negative
ECOSTATUS	C/D	

The C/D EcoStatus can be attributed to flow related impacts which include elevated base flows and increased floods due to mining, SAPPI, urban runoff and Blesbokspruit input. Non-flow related impacts include deteriorated water quality due to industries, agriculture and urban activities; erosion, and exotic alien invasion (fish and vegetation).

1.5 SUITABILITY AS FUTURE BIOMONITORING SITE

EWR 10 occurs downstream of the Blesbokspruit River which is heavily impacted. This site should be included to detect these impacts and to determine if the site improves when the planned water quality management plan for the Blesbokspruit is initiated which would include desalination of mine water decant.
