

1 JBS33 (OSAEH 26.17: GIFKLOOF (ORANGE RIVER))

1.1.1 Site description

The site is situated approximately 0.4 km downstream of Gifkloof Weir and falls within MRU D as delineated in WFA (2010a). The river has a wide river valley, with low-energy fluvial environment. Sediment banks are present, mainly colonized by *Phragmites*. Although the surrounding environment consists of undulating, rocky hills, the river bank is situated on a steep slope with patches where terraces have formed. The riparian vegetation formed a thicket, with the exotic, *Prosopis glandulosa* var. *glandulosa* as the most prominent species present. Various habitat types were available at the site namely stones in current (rapids and riffles), marginal vegetation and a limited area of gravel and sand. The macro-channel width was >50 - 100 m and the active channel and surface water width was 20 – 50 m. The substratum in the river was mostly bedrock, boulders, cobbles and pebbles with limited sand and gravel.

Location	Gifkloof	Altitude	804 m
Longitude	21° 24.046	Latitude	28° 26.240
EcoRegion	Nama Karoo 26.05	Quaternary catchment	D73E
Water Management Area	Lower Orange River	Geomorphological zone	Lowland River
		<p>Rapids and Riffles at OSAEH 26.17, Lower Orange River</p>	
		<p>Marginal vegetation at OSAEH 26.17, Lower Orange River</p>	

1.2 SAMPLING CONDITIONS

A DWA technician at the Gifkloof weir said that the water level was lower than normal for this time of the year. The river bank (just above the waterline) was covered with cobbles, boulders and pebbles and as a result of this very little gravel/sand/mud was found along the

banks. Flow at the site varied from low (0.06 m/s) to very high (1.14 m/s) in the rapid riffle section and low (0.03 m/s) to moderate (0.35 m/s) in the marginal vegetation.

1.3 PRESENT ECOLOGICAL STATE

IIHI	Changes in hydrology due to large dams (Gariep and Vanderkloof) in Upper Orange River as well as various weirs upstream, modification of the riverbank and deteriorating water quality due to irrigation return flow to the river.
RIHI	Heavy infestation of alien vegetation (Mesquite or Suidwesdoring – <i>Prosopis</i>) and a change in hydrology leading to associated changes in riparian vegetation.
Fish	The reference conditions set for the FROC-site, D7ORAN-GIFKL (Kleynhans <i>et al.</i> , 2007), was used as a starting point for setting reference conditions for the present site. Seven of the eleven expected fish species were sampled. The majority of the expected fish species are still present although the FROC of some species have been reduced from reference conditions. A decrease in the FROC of three species strongly associated with overhanging vegetation, namely <i>Barbus paludinosus</i> , <i>Pseudocrenilabrus philander</i> and <i>Tilapia sparrmanii</i> , was also observed. It is not clear why this is, but the strong flow and the low abundance of overhanging and instream vegetation cover could partly explain this. Of the two IUCN Red Data listed endemic species expected to occur in the middle Orange River, <i>L. kimberleyensis</i> (“near threatened”) and <i>A. sclateri</i> (“least concern”), only the latter species has been recorded. The other two, <i>L. umbratus</i> and <i>B. anoplus</i> , were not recorded in the middle Orange River. Although <i>C. carpio</i> is known to be present in this part of the river, albeit in low numbers (Benade, 1993), <i>C. idella</i> and <i>G. affinis</i> have been recorded for the first time.
Inverts	Nov 2010: SASS5 score: 134 No of Taxa: 22 ASPT: 6.1 Key taxa expected but not observed were generally those that prefer no to low flow and vegetation namely Gerridae, Hydrometridae, Nepidae and Protoneuridae. Flow at the site even in the vegetation was mostly moderate to high. Very few areas of low to no flow were present at the site. Prosopistomatidae that prefer very high flow and cobbles were also not sampled. This family is difficult to sample and also relatively scarce so their absence in the sample could be due to sampling error. The abundance of most macroinvertebrates at the site was as expected.
Rip veg	Marginal Zone: This zone can be described as a narrow band on the bank of the river, with <i>Cynodon dactylon</i> , and <i>Phragmites australis</i> patches. The most dominant tree was <i>Salix mucronata</i> . Lower Zone: This zone was characterized by shrubs, <i>Diospyros lyciodes</i> , and <i>Prosopis grandulosa</i> , an aggressive invasive tree, as well as a clump of <i>Equisetum ramosissimum</i> (Perdestert) and <i>Psilocalon coriarium</i> , the only succulent in this zone. The most dominant grass was <i>Stipagrostis uniplumis</i> . Upper Zone: The most dominant trees in the upper zone were: <i>Prosopis grandulosa</i> , <i>Ziziphus mucronata</i> , <i>Acacia karoo</i> , <i>A. mellifera</i> , <i>Searcia pendulina</i> and <i>Tamarix usneoides</i> . It is important to note that most dominant species was <i>Prosopis grandulosa</i> , the rest of the trees were individuals occurring on the site. Grasses that occurred were: <i>Stipagrostis uniplumis</i> , <i>Aristida ciliata</i> and <i>Brachiaria eruciformis</i> , with <i>Stipagrostis</i> being the most dominant. No annuals were noted. The rainy season has not started by the time the site visit was conducted. Crops are planted on the edge of the riparian zone, increasing the erosion potential and the amount of pesticides that will enter the river.
Diatoms	As this site falls within MRU D the EC for the reach is a B/C. See discussion under EFR O2.

1.4 MAIN IMPACTS AT THE SITE

	PES	Causes	Sources	F ¹ /NF ²
Rip veg	D	Altered species composition.	Exotic vegetation, especially in the upper and lower zones.	NF
		Bank erosion.	Cultivation farming.	

	PES	Causes	Sources	F ¹ /NF ²
Fish	B/C	Change in seasonality of the flow regime could influence spawning reproduction (of e.g. <i>L. kimberleyensis</i>).	River regulation has leveled out seasonal differences in the total annual flow and changed character of seasonal floods. Increased flow in the dry season and practically eliminated periods of flow intermittence.	F
		Changes in the natural structure of fish community due to increased flow during dry season.		
		Temperature regime altered downstream of dam and weirs.	Presence of Boegoeberg Dam and a number of other weirs.	
		Presence of migration barriers reduces migration success (breeding, feeding and dispersal) of some species.		
Inverts	B	Decreased flows during wet season and increased dry season flow as well as a change in the seasonality (winter and summer flows are not as distinct as before dams were built upstream).	Dams and weirs upstream.	F
		Loss of habitat due to decrease in flow.		
		Water quality and associated benthic growth.	Agriculture. Increase in nutrients as result of irrigation.	NF

1.5 BASELINE SURVEY RESULTS: PRESENT ECOLOGICAL STATE

Driver Components	PES	Trend
IHI: INSTREAM	C	
IHI: RIPARIAN	C/D	
DIATOMS (WQ)	B/C	
Response Components	PES	Trend
FISH	B/C	Stable
MACRO INVERTEBRATES	B	Stable
INSTREAM	B/C	
RIPARIAN VEGETATION	D	Negative
ECOSTATUS	C	

1.6 SITE SUITABILITY

Habitat at the site is moderate to good for SASS sampling although the biotope availability according to the SASS5 template (attached as appendix) indicates a poor (D) category. Habitat was restricted at the time of sampling as a result of lower flow than normal for November (DWA official (*pers. comm.*)). Depending on flow at time of sampling most biotopes and flow types would be present. Marginal habitat is restricted mostly to reeds and very little grass. No aquatic vegetation was present at time of sampling. Gravel/sand and

mud are available during normal flow. A number of fish were missed during electro-shocking in the fast flowing deeper habitats (FD) due to the strong flow present at the time of sampling and this could be a constraint that should be considered for future monitoring programmes. A very clear distinction can be made between the riparian zone and the terrestrial zone although there is a high occurrence of exotic species.

Access to site is good – permission has to be obtained from Stanley at 054 334 0067 and a DWA official has to accompany you to site.
