

# CLASSIFICATION OF SIGNIFICANT WATER RESOURCES AND DETERMINATION OF RESOURCE QUALITY OBJECTIVES FOR WATER RESOURCES IN THE USUTU TO MHLATHUZE CATCHMENTS (WP11387)

## RIVER RESOURCE QUALITY OBJECTIVES

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# River Resource Quality Objectives

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### HIGH PRIORITIES RUs AND EWR SITES

RU number	Main river	PES EC	Key Drivers	RU Priority	EWR site
<b>W1 Secondary Catchment (Main River: Mhlathuze)</b>					
W11-2	Matigulu	C	Flow, WQ, Non-flow	2	EWR MA1
W12-3	Mhlathuze	C	Flow, WQ, Non-flow	4	Linked to historical EWR 3
W12-6	Mhlathuze	C	Flow, WQ, Non-flow	4	Historical EWR3
W12-8	Nseleni	C	Flow, WQ, Non-flow	4	EWR NS1
W12-9	Nseleni	C	Flow, WQ, Non-flow	4	Linked to lakes and estuary
<b>W2 Secondary Catchment (Main River: Umfolozi)</b>					
W21-5	White Mfolozi	B/C	Flow, Non-flow	4	EWR WM1
W22-1	Black Mfolozi	B/C	Flow	3	EWR BM1
W22-5	Black Mfolozi	B	Flow Non-flow	3	Linked to EWR BM1
W23-1	Mfolozi	B	Flow	3	Linked to EWR BM2 and WM1

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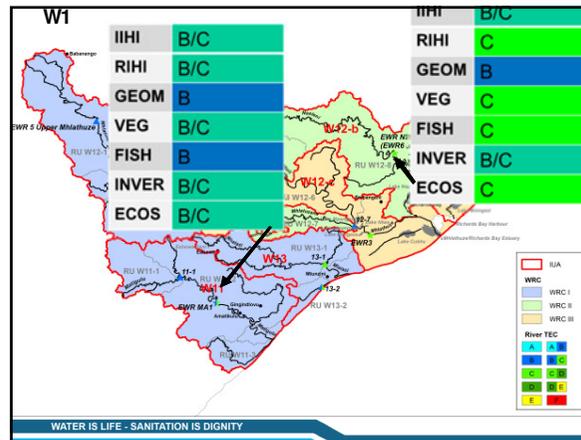
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### HIGH PRIORITIES RUs AND EWR SITES

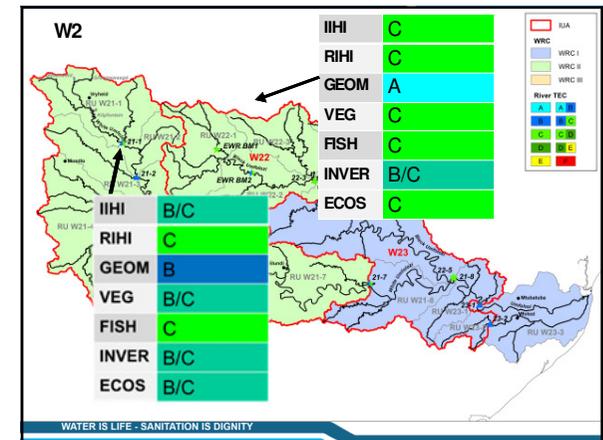
RU number	Main river	PESEC	Key Drivers	RU Priority	EWR site
<b>W3 Secondary Catchment (Main River: Mkuze)</b>					
W31-1	Mkuze	C	Flow, WQ, Non-flow	3	Linked to EWR MK1
W31-2	Mkuze	B	Flow, WQ, Non-flow	3	Linked to EWR MK1
W31-3	Mkuze	B/C	Flow, WQ, Non-flow	4	Linked to EWR MK1
W31-4	Mkuze	B	Flow, WQ, Non-flow	4	Linked to EWR MK1
W31-5	Mkuze	C	Flow, WQ, Non-flow	3	EWR MK1
W32-1	Mkuze	B/C	Flow, Non-flow	4	Linked to EWR MK1
W32-6	Munywana	B	Flow, WQ, Non-flow	4	Linked to St Lucia
<b>W4 Secondary Catchment (Main River: Pongola - excluding Eswatini)</b>					
W42-2	Phongolo	C	Flow (WQ Non-flow)	2	EWR UP1
W45-1	Phongolo	C	Flow, Non-flow (wq)	4	Linked to EWR UP1
<b>W5 Secondary Catchment (Main River: Usutu - excluding Eswatini)</b>					
W51-2	Asegaai	C	Flow, Non-flow	4	Linked to EWR AS1
W51-3	Asegaai	B/C	Flow, Non-flow (WC)	4	EWR AS1
W53-2	Mpama	B/C	Flow, Non-flow	4	IUCMA
W54-1	uSuthu	B	Flow	4	IUCMA
W57-1	uSuthu	B/C	Flow	4	Linked to pans and floodplains (Ntunoi)

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### EWB WM1 (WHITE MFOLOZI RIVER)

RU	RU W21-5
IUA	IUA W21
PES	B/C
EIS	Moderate
REC	B/C
TEC	B/C



#### HYDROLOGICAL RQO

ECOLOGICAL WATER REQUIREMENTS (EWR)			
Natural MAR: 222.51 MCM		Present Day MAR: 191.8 MCM	
Low flow EWR		Total flow EWR	
MCM	% of nMAR	MCM	% of nMAR
54.74	24.6	89.31	40.1

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### GEOMORPHOLOGY RQO

METRICS	ECOSPECS	TPC
Extent of sand in fast flowing habitat	Sand patches less than 25%	Sand deposits exceeding 20% persist over several seasons
Extent of sand in pool habitat	Mid-channel sand bars should not be present	Sand bars present in pool habitat
Width of active channel at transect	Width between upper flood bench stable at 64m on transect line	Visible erosion or sediment accretion along either bank - width exceeds 65m or less than 63m
Lower flood bench: Present-absent	Should not be present on both banks	Actively eroding, absence of marginal vegetation
Lower flood bench: Sediment deposits	Evidence of fine sediment deposits (silt to medium sand) but not excessive	No recent fine sediment deposits or excessive deposits

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### GEOMORPHOLOGY RQO

METRICS	ECOSPECS	TPC
Upper flood bench: Present-absent	Not be present on both banks.	Upper flood bench actively eroding.
Upper flood bench: Sediment deposits	Evidence of fine sediment deposits but not excessive.	No recent sediment deposits linked to the last wet season; Evidence of excessive deposition and terrestrialisation indicating elevated flood bench.
Channel type	Channel should not change from a single thread channel with pool-rapid morphology.	Change to a different channel type.

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### RIPARIAN VEGETATION RQO

ECOSPECS	TPC
Marginal / Lower zones	
The dominant vegetation type should remain non-woody (mostly sedges and grasses), with open (unvegetated) cobble / boulder.	An absence of non-woody riparian vegetation or an increase in non-woody vegetation cover (% aerial) above 50%.
The presence of <i>Cyperus longus</i> and <i>Juncus effusus</i> .	The absence of <i>Cyperus longus</i> or <i>Juncus effusus</i> .
Maintain perennial alien plant species cover below 5%.	An increase in perennial alien plant species cover above 10%.
Maintain an absence of terrestrial woody species.	An occurrence of terrestrial woody species.
Maintain indigenous riparian woody species cover below 20%.	An absence of indigenous woody species or an increase in woody species cover above 25%.
Maintain non-woody cover above 20%.	A decrease in non-woody vegetation cover below 10%.
Maintain the absence of reeds.	An increase in reed cover above 10%.

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### RIPARIAN VEGETATION RQO

ECOSPECS	TPC
Flood features / Upper zone	
The dominant vegetation type should remain non-woody but with scattered woody individuals	Reduced proportion of aerial non-woody cover below 30% in the zone.
The presence of <i>Nuxia oppositifolia</i> , <i>Salix mucronata</i> and <i>Miscanthus junceus</i> .	The absence of <i>Nuxia oppositifolia</i> or <i>Salix mucronata</i> or <i>Miscanthus junceus</i> .
Maintain perennial alien plant species cover below 10%.	An increase in perennial alien plant species cover above 15%.
Maintain indigenous terrestrial woody species cover below 10%.	An increase in terrestrial woody species cover above 10%.
Maintain indigenous riparian woody species cover above 5%.	An absence of indigenous riparian woody species or an increase in woody species cover above 40%.
Maintain non-woody cover above 50%.	A decrease in non-woody vegetation cover below 40%.
Maintain reed cover below 10%.	An increase in reed cover above 10%.

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### RIPARIAN VEGETATION RQO

ECOSPECS	TPC
Macro Channel Bank	
The dominant vegetation type should remain non-woody but with open vegetation areas	Reduced proportion of aerial woody cover below 30%.
The presence of <i>Ficus sur</i> .	The absence of <i>Ficus sur</i> .
Maintain perennial alien plant species cover below 10%.	An increase in perennial alien plant species cover above 15%.
Maintain indigenous terrestrial woody species cover below 60%.	An increase in terrestrial woody species cover above 60%.
Maintain cover of indigenous riparian woody species above 10%.	A decrease in woody species cover below 5%.
Riparian zone	
Maintain PES score of at least 78%	A decrease in PES score below 77
Maintain the presence of at least 26 indigenous plant species.	A decrease in the number of indigenous plant species below 20.

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FISH RQO (summary)	
ECOSPECS	TPC (Biotic)
Present ecological status C (73.1%).	Decrease of PES into a lower EC than PES (<C).
<b>EWR site:</b> Four indigenous fish species confirmed (sampled) previously at EWR site (2014 and 2022).	<b>EWR site:</b> Less than three (3) indigenous fish species sampled at EWR site during any survey. Absence of range of life stages (juveniles to adults) of all species sampled at site during various surveys may also indicate deterioration.
<b>EWR site:</b> AURA sampled at EWR site 100% of surveys (2014/07 and 2022/07).	<b>EWR site:</b> AURA absent from EWR site during any survey OR absence of range of life stages (juveniles to adults) during various surveys.
<b>Reach:</b> BVIV most applicable indicator in reach, estimated to be scarce in reach (present <10% of sites in reach: FROC=1)	<b>Reach:</b> BVIV absent from all sites sampled in reach (FROC=0)
<b>Reach:</b> BUNI most applicable indicator in reach, estimated to be scarce in reach (present <10% of sites in reach: FROC=1).	<b>Reach:</b> BUNI absent from all sites sampled in reach (FROC=0)

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FISH RQO (summary)	
ECOSPECS	TPC (Biotic)
<b>Reach:</b> BPAU most applicable indicator in reach, estimated to be scarce in reach (present <10% of sites in reach: FROC=1).	<b>Reach:</b> BPAU absent from all sites sampled in reach (FROC=0)
<b>Reach:</b> MMAC most applicable indicator in reach, estimated to be scarce in reach (present <10% of sites in reach: FROC=1).	<b>Reach:</b> MMAC absent from all sites sampled in reach (FROC=0).
No alien species previously sampled at EWR site or known from reach.	Presence of any alien/introduced species in reach or at EWR site during any survey.
Three catadromous eel species and various potadromous species expected in reach	<b>EWR site:</b> Absence of LNAT, LMOL and CGAR from site during any survey.

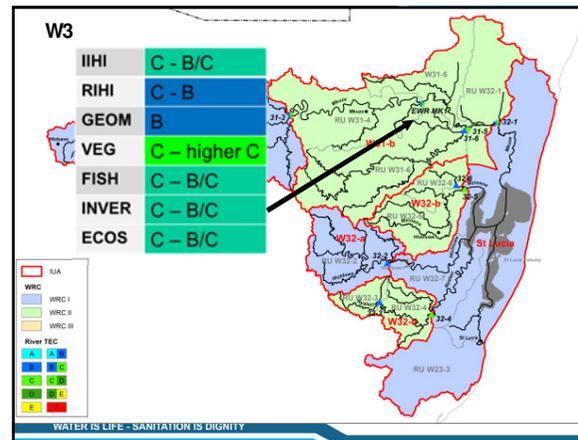
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MACRO-INVERTEBRATE RQO (summary)	
ECOSPECS	TPC (Biotic)
SASS5 score range 140 to 180; ASPT value: >6.0.	ASPT below 5.8 - grading from a biological band B towards a B/C
Ensure that the MIRAI score is within the range of a B/C category (>77.4 and <82.01) using the same reference data used in this study.	A MIRAI score of 80% or less.
To maintain suitable conditions for the flow-dependent Hydropsychidae (>2 species) in the SIC biotope.	Hydropsychidae less than three species in any two consecutive surveys.
To maintain suitable flow velocity (0.3 - 0.6 m/s) and clean, unembedded surface area (cobble) to support the following flow-dependent taxa in the FFCS biotope: <ul style="list-style-type: none"> <li>Paleomonidae</li> <li>Tricorythidae</li> </ul>	Any one of Paleomonidae and Tricorythidae missing in two consecutive surveys.

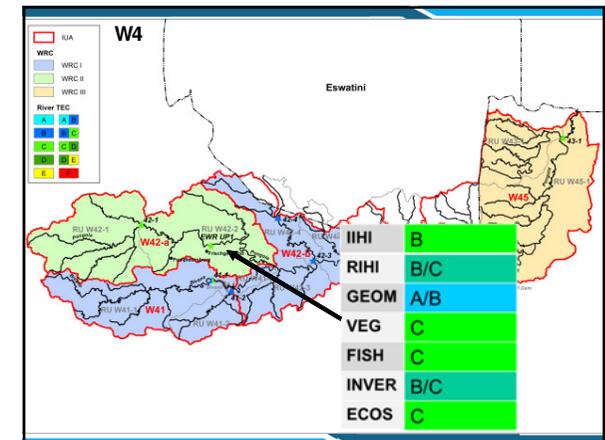
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MACRO-INVERTEBRATE RQO	
ECOSPECS	TPC (Biotic)
Maintain suitable conditions for the following flow-dependent species in the SIC biotope: <ul style="list-style-type: none"> <li>Elmidae: Abundance A.</li> <li>Leptophlebiidae: Abundance B.</li> </ul>	Any one of Elmidae and Leptophlebiidae missing in two consecutive surveys.
To maintain sufficient quantity and quality of inundated vegetation to support the Coenagrionidae and Atyidae.	Any one of Coenagrionidae and Atyidae missing in two consecutive surveys.
To ensure that no group consistently dominates the fauna, defined as any taxon occurring in an abundance (>1000) over more than two consecutive surveys.	Any taxon occurring in an abundance (>1000) over more than two consecutive surveys.

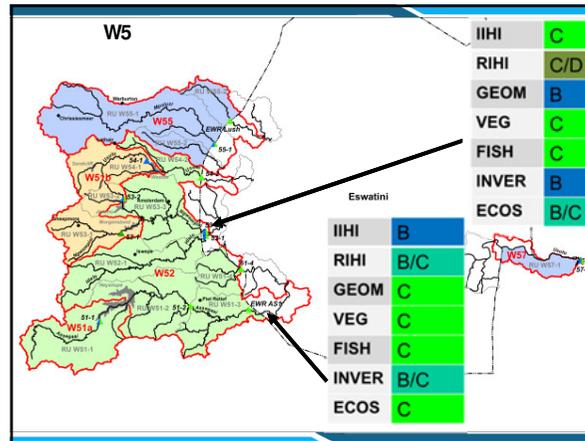
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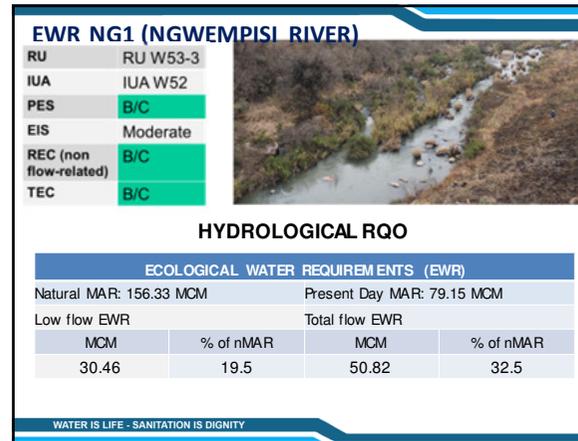
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### GEOMORPHOLOGY RQO

METRICS	ECOSPECS	TPC
Bed armouring in fast flowing habitat	Fine to medium gravels cover >10% of bed within run or glide habitat; 50% of cobbles are mobile	Fine to medium gravels cover <10% of bed within run habitat; <50% of cobbles are mobile, >50% imbricated.
Lower flood bench: Present-absent	Present on at least one bank	Actively eroding, absence of marginal vegetation
Lower flood bench: Sediment deposits	Evidence of fine sediment deposits (silt to medium sand)	No recent fine sediment deposits
Upper flood bench: Present-absent	Present on right bank.	Upper flood bench actively eroding.
Upper flood bench: Sediment deposits	Evidence of fine sediment deposits.	No recent sediment deposits linked to the last wet season. Terrestrialisation of riparian veg
Channel type	Channel pattern should not change from an anastomosing channel with islands and multiple channels	Loss of secondary channels; coalescence of islands

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### RIPARIAN VEGETATION RQO

ECOSPECS	TPC
Marginal / Lower zones	
The dominant vegetation type should remain mixture of non-woody and woody	A decrease of non-woody riparian vegetation cover (% aerial) below 40%.
The presence of <i>Phragmites australis</i> and <i>Cliffortia strobilifera</i> .	The absence of <i>Phragmites australis</i> and <i>Cliffortia strobilifera</i> .
Maintain perennial alien plant species cover below 10%.	An increase in perennial alien plant species cover above 10%.
Maintain an absence of terrestrial woody species.	An occurrence of terrestrial woody species.
Maintain indigenous riparian woody species cover below 20%.	An absence of indigenous woody species or an increase in woody species cover above 40%.
Maintain non-woody cover above 40%.	A decrease in non-woody vegetation cover below 40%.
Maintain the absence of reeds.	An increase in reed cover above 10%.

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### RIPARIAN VEGETATION RQO

ECOSPECS	TPC
Macro Channel Bank	
The dominant vegetation type should remain woody.	Reduced proportion of indigenous aerial woody cover below 30%.
Maintain perennial alien plant species cover below 20%.	An increase in perennial alien plant species cover above 20%.
Maintain indigenous terrestrial woody species cover below 30%.	An increase in terrestrial woody species cover above 30%.
Maintain cover of indigenous riparian woody species above 10%.	A decrease in woody species cover below 10%.
Maintain the presence of non-woody cover.	An absence of non-woody vegetation cover.
Riparian zone	
Maintain PES score of at least 65%	A decrease in PES score below 65%
Maintain the presence of at least 10 indigenous plant species.	A decrease in the number of indigenous plant species below 10.

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### FISH RQO (summary)

ECOSPECS	TPC (Biotic)
Present ecological status C (72.8%).	Decrease of PES into a lower EC than PES (<C).
<b>EWR site:</b> Eight indigenous fish species confirmed (sampled) previously at EWR site (4 surveys: 2010 - 2022).	<b>EWR site:</b> Less than 5 indigenous fish species sampled at EWR site during any survey. Absence of range of life stages (juvenile to adults) of all species sampled at site during various surveys may also indicate deterioration.
<b>EWR site:</b> CANO, LMAR, AURA & MMAC was sampled 100% of the surveys.	<b>EWR site:</b> Absent during 2 consecutive surveys
<b>EWR site:</b> TSPA sampled 50% of the surveys.	<b>EWR site:</b> Absent during 3 consecutive surveys
MSAL previously sampled at EWR site, confirmed in reach.	Presence of any additional alien/introduced species in reach or at EWR site during any survey.
One catadromous eel species (AMOS) and various potamodromous species expected and confirmed in reach. Various potamodromous species (including LMAR, LPOL) sampled at EWR site and various other potamodromous species expected at EWR site.	<b>Reach:</b> AMOS, LMAR, LPOL absent from all sites sampled in reach during two consecutive surveys. <b>EWR site:</b> Absence of LMAR and/or LPOL during two consecutive surveys.

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MACRO-INVERTEBRATE RQO (summary)	
ECOSPECS	TPC (Biotic)
SASS5 score range 180 to 220; ASPT value: >6.5.	ASPT below 6 - grading from a biological band B towards a B/C
Ensure that the MIRAI score is within the range of a B category (>82 and <87.4) using the same reference data used in this study.	A MIRAI score of 80% or less.
Maintain suitable flow velocity (maximum > 0.6 m/s) and clean, unembedded surface area (cobble) to support the Psephenidae, Perlidae and Hydropsychidae (>2 species) assemblages in the Very fast flow over coarse sediment biotope (VFCS).	More than one of Psephenidae, Perlidae or Hydropsychidae (>2 species) assemblages missing in a survey.

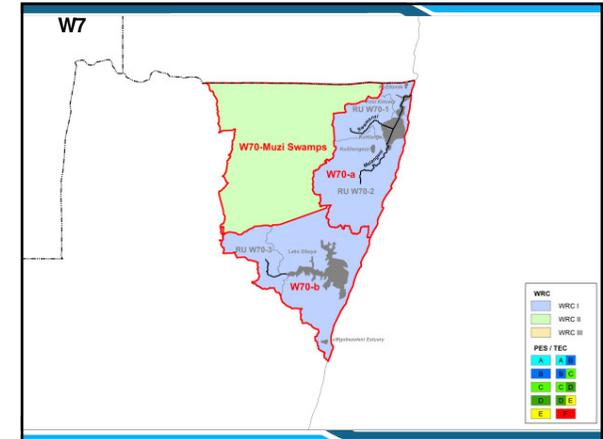
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MACRO-INVERTEBRATE RQO	
ECOSPECS	TPC (Biotic)
To maintain suitable flow velocity (0.3 - 0.6 m/s) and clean, unembedded surface area (cobble) to support the following flow - dependent taxa in the FFCS biotope: <ul style="list-style-type: none"> <li>▫ Paleomonidae</li> <li>▫ Tricorythidae</li> </ul>	Any one of Paleomonidae and Tricorythidae missing in two consecutive surveys.
Maintain suitable conditions in the SIC habitat regarding moderate velocity (0.3 - 0.6 m/s) and good water quality to support Heptageniidae.	Heptageniidae: This taxon missing in two consecutive surveys.
To maintain sufficient quantity and quality of inundated vegetation to support the Pyralidae and Coenagrionidae.	More than one of Pyralidae and Coenagrionidae assemblages missing in a survey.
To ensure that no group consistently dominates the fauna, defined as DAny taxon occurring in an abundance of (>1000) over more than two consecutive surveys.	Any taxon occurring in an abundance of (>500) over more than two consecutive surveys.

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