water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP
NATIONAL DEVELOPMENT PLAN
Our Future - make it work

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



WATER IS LIFE - SANITATION IS DIGNITY

RIVER EWR DETERMINATION

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EWRs IN CONTEXT

- Step 3 of Classification – information need at catchment scale
- Key biophysical nodes (or EWR sites) where (1) scenarios are evaluated, and (2) detailed full suite of RQOs are supplied
- Key biophysical nodes (or EWR sites) are key in selecting a recommended scenario and Classes
- Desktop biophysical nodes usually important for licensing or water quality scenarios – provides information for the catchment configuration

WHAT ARE EWRs?

EWR: FLOW & ITS ASSOCIATED CHARACTERISTICS (water quality, sediment, patterns) - define what should be left or provided in the river system for people and biota dependent on a naturallu functioning river (goods and services or Ecosystem Services).

These summary questions describe the process :

What state do you want your river to be in future?

How will you achieve this state?

How will you implement the EWRs?

How will you monitor the EWRs?

WHAT ARE EWRs?

To answer this, you need to know:

- WHAT state is the river in NOW & WHY: Present Ecological State (PES)
- Is the river ecologically important (fixed list of criteria to assess): Ecological Importance and Sensitivity (EIS)
- If the river is important, is it in a present state that requires improvement?
- If yes, is it realistic/attainable (from an ecological viewpoint) to improve?
- Set Recommended Ecological Category

THEN SET FLOW REGIME FOR REC (REC = PES or >PES)

- Once you know the type of flow regime that will result in different ecological states, then
- Use this information to evaluate and predict the response to different scenarios.
- Response is measured in terms of the change in river status.

REMINDER: DESCRIPTION OF RIVER STATE

Close to Natural: Good condition

Very different to Natural: Very Poor condition

A A/B B B/C C C/D D D/E E E/F F

Ecological Categories (EC)

REMINDER: EWR SITES AND SCALE

- IUA: Homogenous areas that can be managed as an entity.
- RESOURCE UNITS: RUs require different EWRs (& therefore different RQOs) due to different flow patterns, reactions of habitat and biota to stress, management and operational structures.
- BIOPHYSICAL NODES: A point in the river which can be a survey site or a hypothetical point. Survey sites are EWR sites or KEY BIOPHYSICAL NODES. Hypothetical points are DESKTOP BIOPHYSICAL NODES.
- Nodes, RUs – represent a catchment configuration which will define or unpack the class for a specific IUA

BIOPHYSICAL NODES

- Provide EWR estimates at desktop biophysical nodes.
- Provide EWR results at EWR sites (key biophysical nodes).

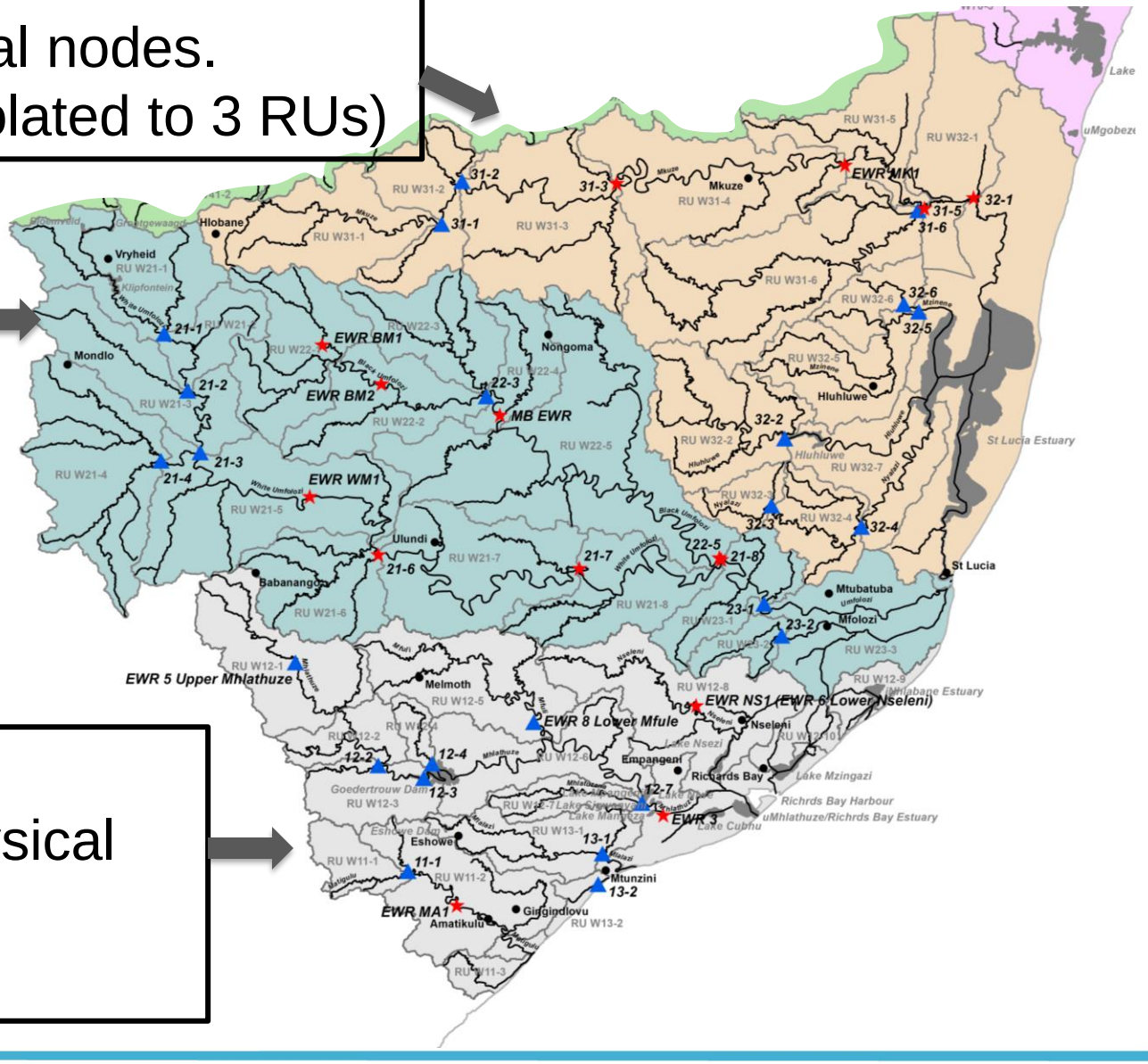
EWR ESTIMATION AT DESKTOP BIOPHYSICAL NODES

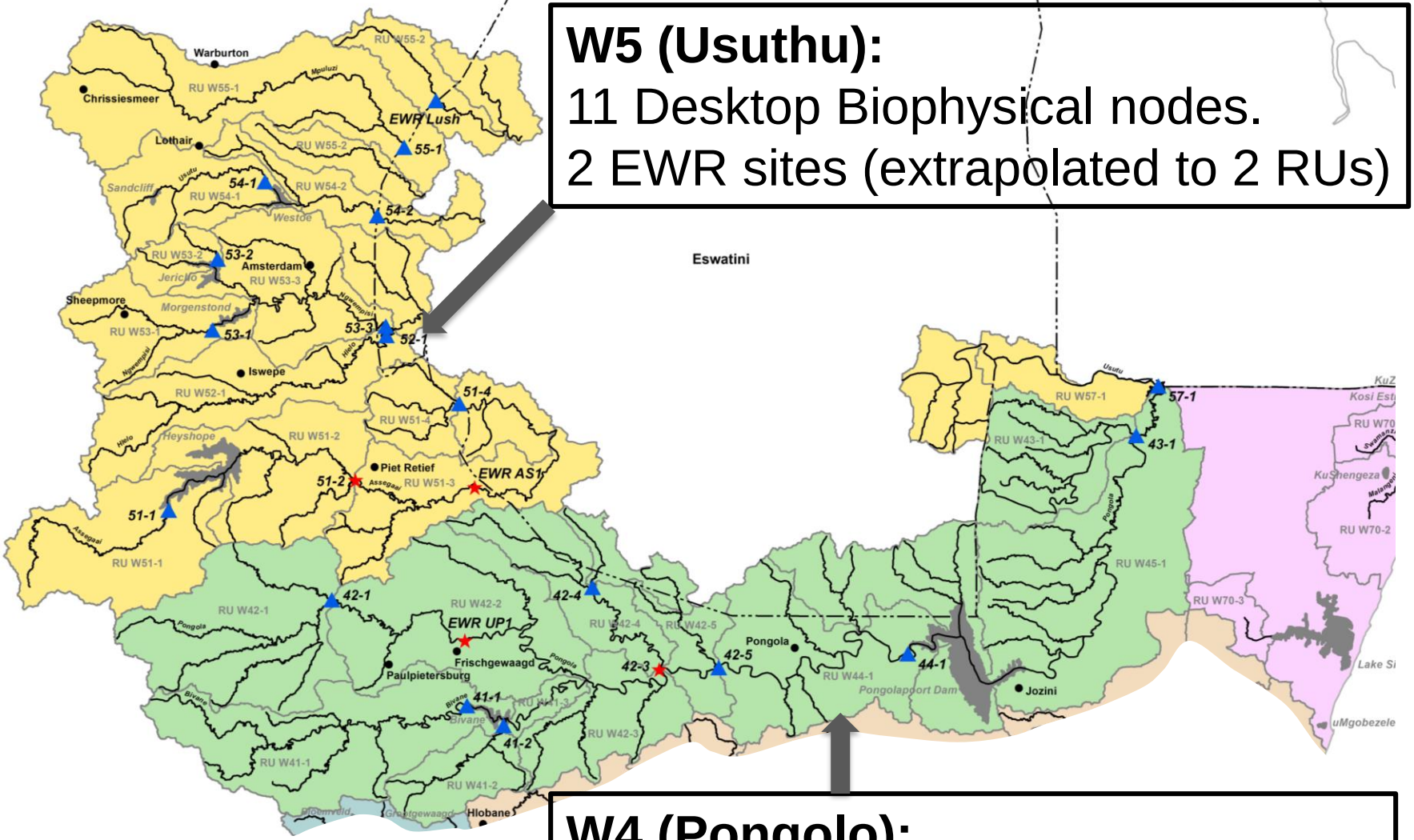
- Each of 42 Desktop Biophysical Nodes are situated at the end of a RU at a position that represents all the inflows into the RU.
- EWRs will be determined at these nodes as follows:
  - 18 of the 42 nodes require improvement (i.e. the REC is > the PES)
  - Of these 18 nodes, 7 require improvement to be achieved by changes in the current flow regime. 11 nodes require improvement by addressing non-flow related problems.

W3 (Mkuze):
8 Desktop Biophysical nodes.
1 EWR sites (extrapolated to 3 RUs)

W2 (Mfolozi):
7 Desktop Biophysical nodes.
4 EWR sites (extrapolated to 4 RUs).

W1 (Mhlathuze):
9 Desktop Biophysical nodes.
3 EWR sites.





W5 (Usuthu):
11 Desktop Biophysical nodes.
2 EWR sites (extrapolated to 2 RUs)

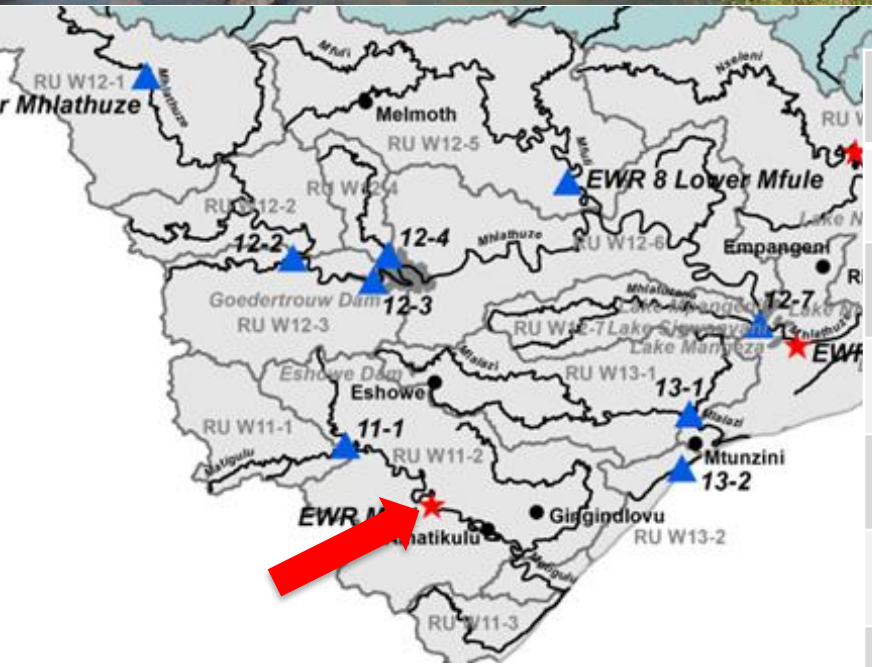
W4 (Pongolo):
7 Desktop Biophysical nodes.
1 EWR site (extrapolated to 1 RU)

- The results at the 42 desktop nodes were determined using the Revised Desktop Reserve Model (RDRM).
- The RDRM includes 4 submodels:
  - Hydrology: Natural and present day hydrology.
  - Hydraulics: Hydraulic parameters, likely channel characteristics, geomorphological zones.
  - Ecology low flow: Estimate the low flows using hydrology, hydraulics and the indicator fish species.
  - Ecology high flow: Estimate the flood regime.
- Flows are estimated using the above information as well as the Ecological Category.

EWR DETERMINATION AT KEY BIOPHYSICAL NODES (EWR SITES)

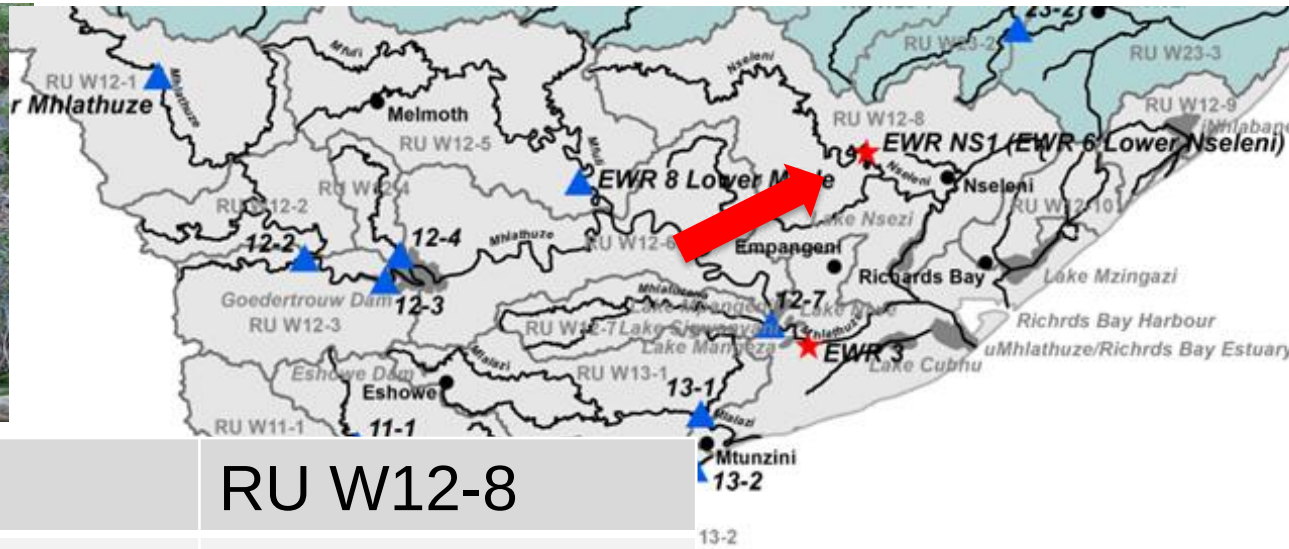
- 7 existing EWR sites. EWRs set during 2014 were updated.
- One new EWR site was selected (Ngwempisi River).
- The Comprehensive EWR assessment facility built into the EWR RDRM model (based on the Habitat Flow Stressor Response method) was used to determine flows.
- Determination preceded by hydrological (2022) and hydraulic modelling (2014 & 2022), biophysical (2022) and x-section surveys (2014 & 2022). EWR NS1 & AS1: also 2006 data.
- Multi-disciplinary virtual specialist meeting.
- EcoClassification (PES, EIS, REC)
- EWR determination for above categories for:
  - low (base) flows – instream components
  - floods – riparian vegetation and geomorphology
  - combining the requirements to provide EWR as flow duration tables

EWR MA1 (MATIGULU RIVER)



RU	RU W11-2
IUA	IUA W11
PES	B/C
EIS	Moderate
REC	B/C
LOW FLOW (% nMAR)	17.4
TOTAL FLOW (% nMAR)	26.3

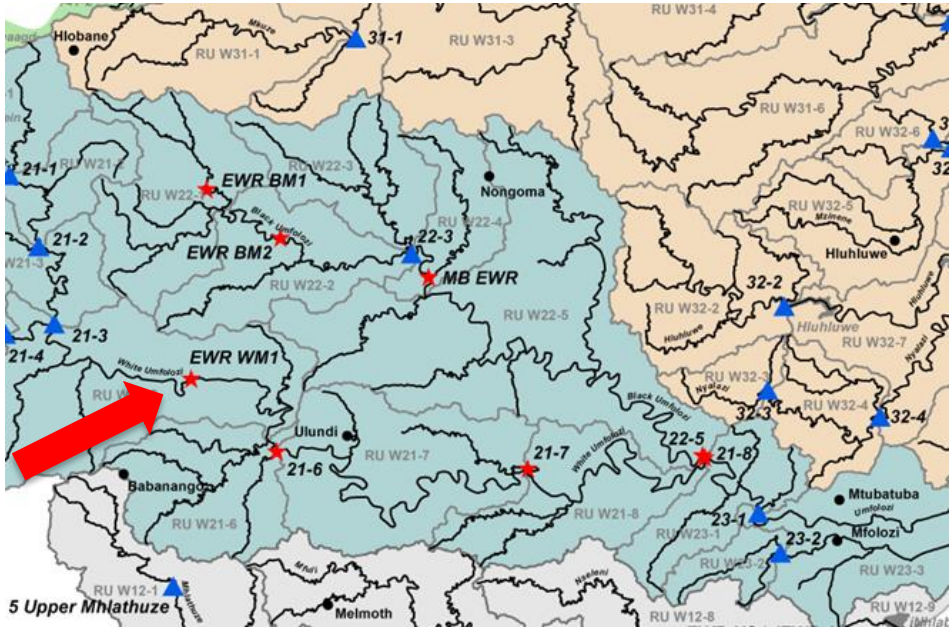
EWR NS1 (NSELENI RIVER)



RU	RU W12-8
IUA	IUA W12-b
PES	C
EIS	Moderate
REC	C
LOW FLOW (% nMAR)	15.2
TOTAL FLOW (% nMAR)	21.9

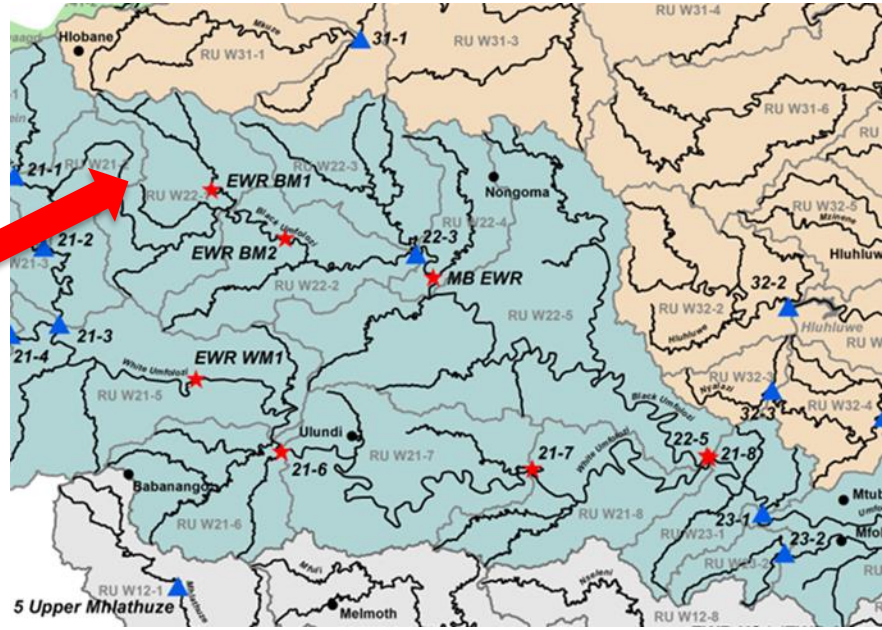
EWR WM1 (WHITE MFOLOZI RIVER)

RU	RU W21-5
IUA	IUA W21
PES	B/C
EIS	Moderate
REC	B/C
LOW FLOW (% nMAR)	24.6
TOTAL FLOW (% nMAR)	40.1



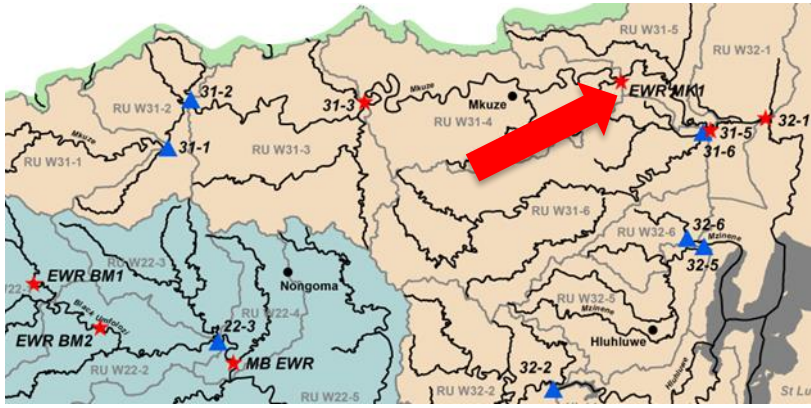
EWR BM1 (BLACK MFOLOZI RIVER)

RU	RU W22-2
IUA	IUA W22
PES	C
EIS	Moderate
REC	C
LOW FLOW (% nMAR)	11
TOTAL FLOW (% nMAR)	26.1



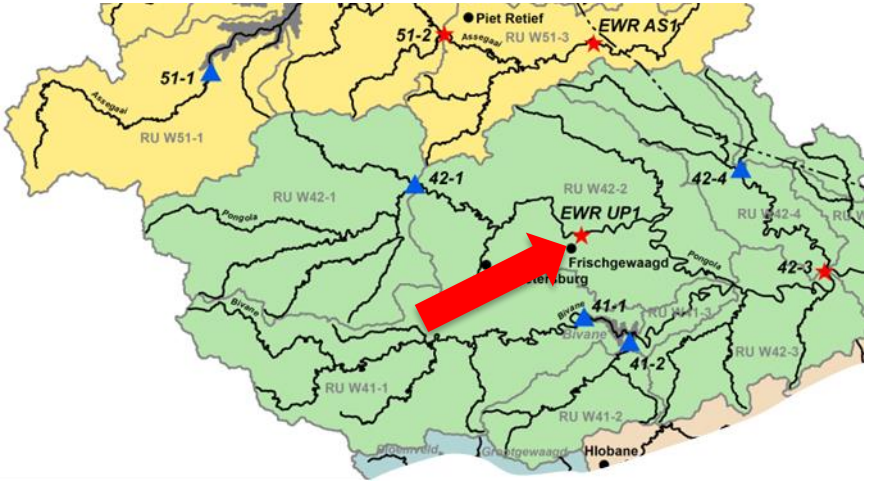
EWR MK1 (MKUZE RIVER)

RU	RU W31-5
IUA	IUA W31-b
PES	C
EIS	High
REC (non flow-related)	B
LOW FLOW (% nMAR)	21.9
TOTAL FLOW (% nMAR)	37.1



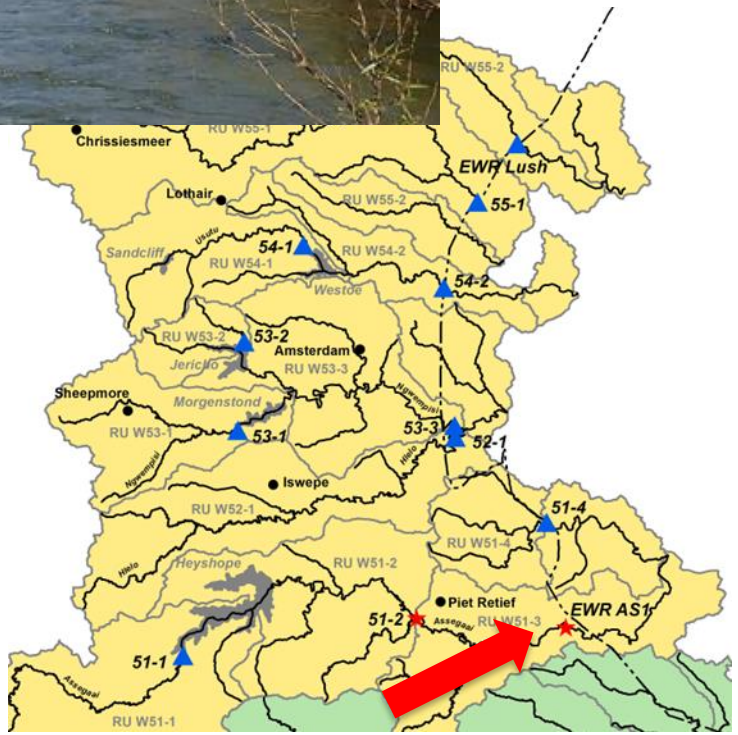
EWR UP1 (UPPER PONGOLA RIVER)

RU	RU W42-2
IUA	IUA W42-b
PES	C
EIS	Moderate
REC (non flow-related)	C
LOW FLOW (% nMAR)	15.4
TOTAL FLOW (% nMAR)	27.3



EWR AS1 (ASSEGAAI RIVER)

RU	RU W51-3
IUA	IUA W52
PES	C
EIS	Moderate
REC (non flow-related)	C
LOW FLOW (% nMAR)	12.2
TOTAL FLOW (% nMAR)	21.6



EWR NG1 (NGWEMPISI RIVER)

RU	RU W53-3
IUA	IUA W52
PES	B/C
EIS	Moderate
REC (non flow-related)	B/C
LOW FLOW (% nMAR)	19.5
TOTAL FLOW (% nMAR)	32.5