water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP
NATIONAL DEVELOPMENT PLAN
Our Future - make it work

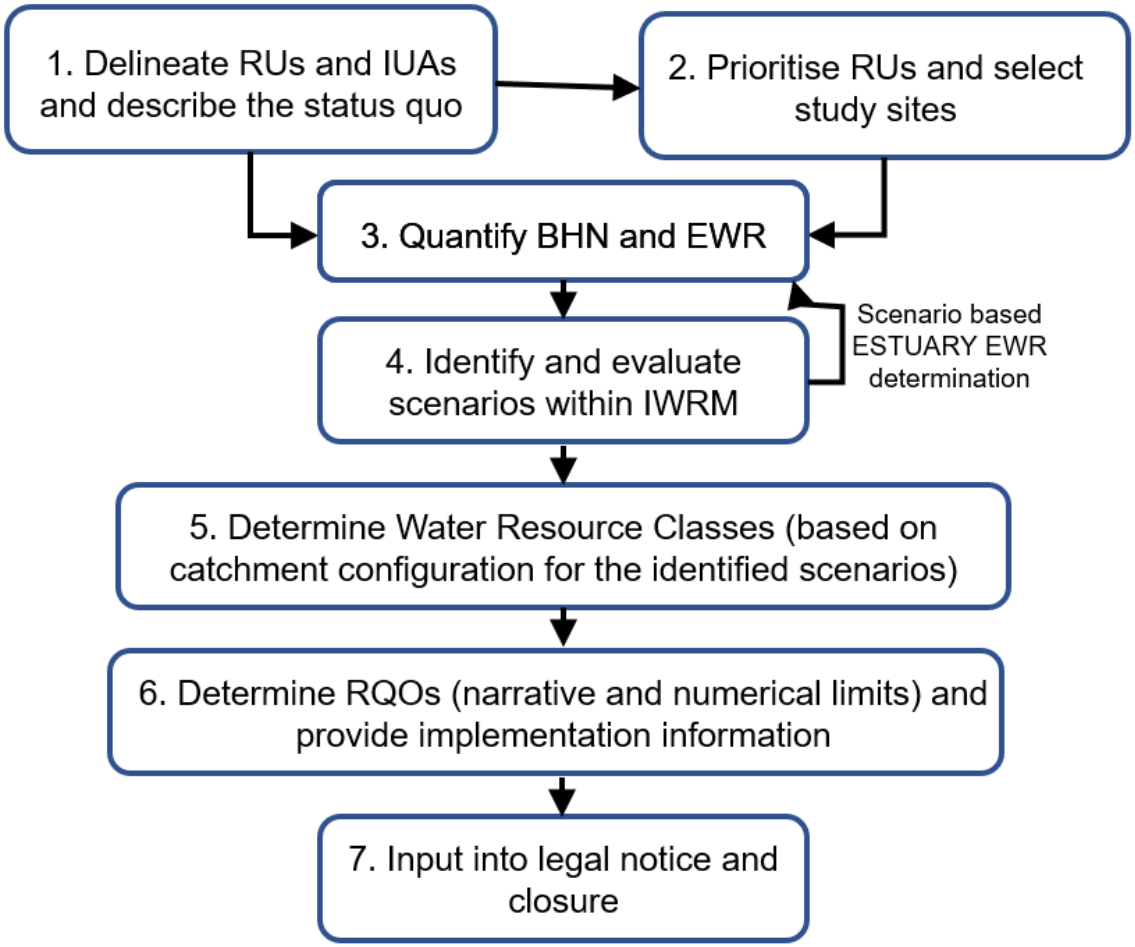
# CLASSIFICATION OF SIGNIFICANT WATER RESOURCES AND DETERMINATION OF RESOURCE QUALITY OBJECTIVES FOR WATER RESOURCES IN THE USUTU TO MHLATHUZE CATCHMENTS (WP11387)

## PUBLIC MEETING, RICHARDS BAY: 4 MAY 2022

WATER IS LIFE - SANITATION IS DIGNITY

# 4.1 STUDY APPROACH

**The Study Plan is broken down in tasks and based on the integrated approach for Water Resource *Classification*, *Resource Quality Objectives (RQOs)* and the Reserve**

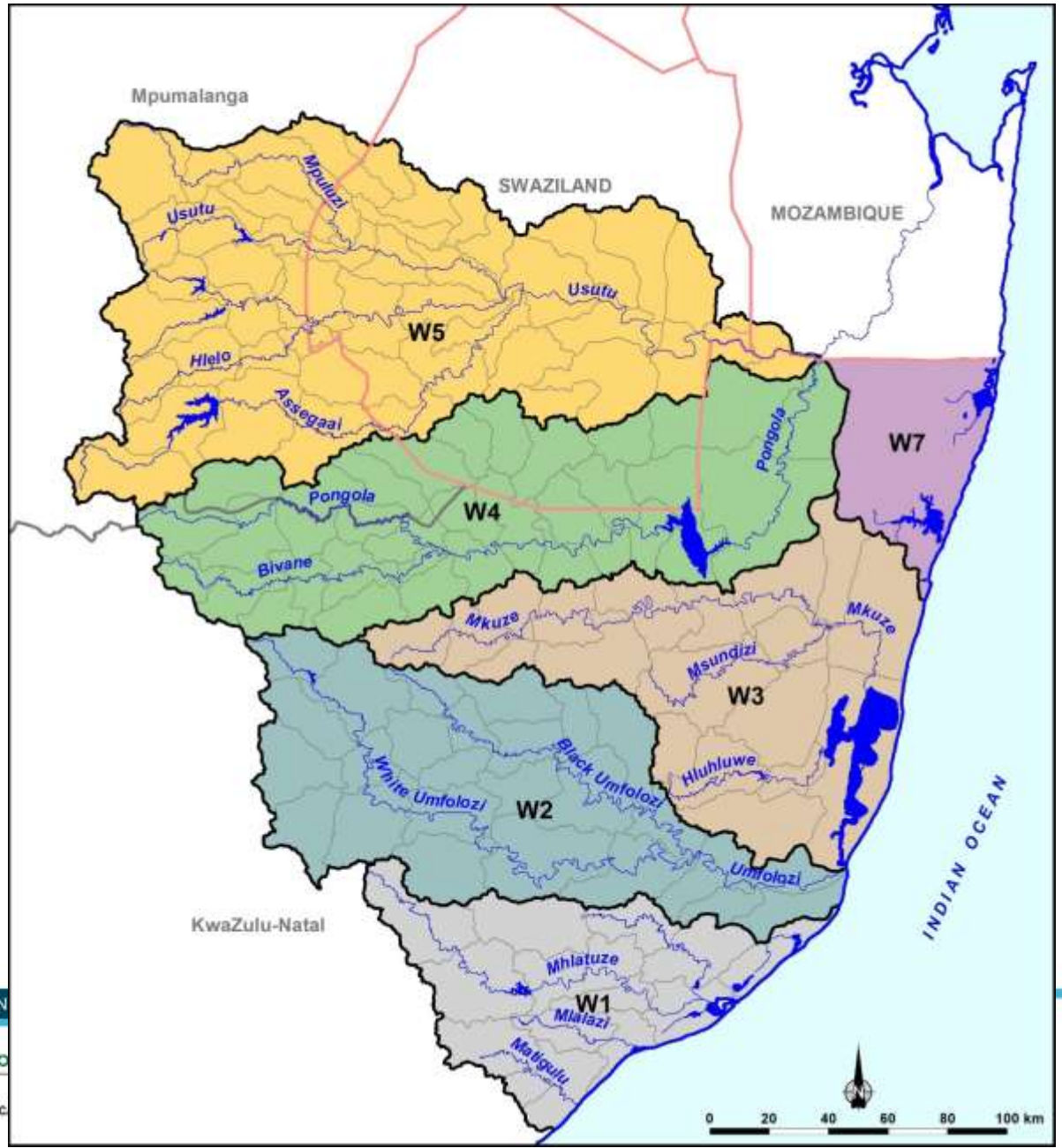


# INTEGRATED WATER RESOURCE MANAGEMENT

- **Resource Directed Measures**
  - **Measures that focus on the quality of the resource itself, i.e. ecological state**
  - **Classification, RQOs, Reserve**

- **Source Directed Controls**
  - **Measures designed to control water resource activities at the source of impact, e.g. discharge standards and license conditions**

# STUDY AREA


Mpumalanga
SWAZILAND
MOZAMBIQUE
KwaZulu-Natal
INDIAN OCEAN
W1
W2
W3
W4
W5
W7
Mpuluzi
Usutu
Usutu
Hlelo
Assegaai
Pongola
Pongola
Bivane
Mkuze
Mkuze
Msundizi
Hluhluwe
White Umfolozi
Black Umfolozi
Umfolozi
Mhlatuze
Mlalazi
Matigulu
0 20 40 60 80 100 km

# 4.2 SCOPE OF WORK

**Technical tasks (see next slides) according to the Study Plan / Integrated Framework**

# TASK 1 AND 2: STATUS QUO, IMPORTANCE AND PRIORITIES, DELINEATION INTO UNITS

- **How do we divide the study area into manageable units, i.e. Delineation?**
  - **Primary Catchment W consisting of six secondary catchments: W1, W2, W3, W4, W5, W7**
- **What is the status of these units in terms of water resources, ecology, economy, social, water quality etc., i.e. Status Quo?**
- **How important (from various perspectives) are these units?**
- **How do we prioritise these units to know where to do detailed work – given the large study area, i.e. Prioritization + Site selection?**

# STEPS 1 AND 2 (cont.)

**Actions:**

- **Study area is delineated into Sub-quaternary Reaches (SQRs). Desktop Present Ecological State (PES) for each (reviewed during this study) and Ecological Importance + Sensitivity (EIS) is available for each SQR.**

- **Delineation 1: Group SQRs into Resource Units (RUs). Resource Units are the scale at which all evaluations are undertaken.**

- **Group RUs into Integrated Units of Analysis (IUA). Each IUA consists therefore of RUs and this represents an IUA and its Catchment Configuration.**

- **All information captured in a working spreadsheet which forms the basis of all classification results.**

# STEP 3: BHN AND EWR

- **What are the discharge and quality required to achieve a certain ecological state in rivers, wetlands, and estuaries, i.e. ecological water requirements (EWR)?**
- **How many persons do not have access to piped water or water from boreholes? Calculate a range of basic human needs (BHN) allocations.**

**Actions**

**EWRs**

- **Reserve study undertaken (2014).**
- **River results (eight EWR sites) will be used and adjustments made where required .**
- **Desktop model will be used to provide desktop estimates for RUs not represented by EWRs.**
- **Estuaries and wetlands will also use results from previous studies and review where required.**

# STEPS 4 AND 5: OPERATIONAL SCENARIOS, CONSEQUENCES, PROPOSED CLASSES

- **What future water resource developments or related developments (development scenarios) are planned that could effect the status quo; and how?**
- **How do we manage (operate) our water resources to balance use considering impacts?**
- **How do we manage our current water resources to possibly reach an improvement in the environmental / ecological status in certain areas, if required?**
- **Which of these scenarios are acceptable for Classification?**
- **What are the Target Ecological Categories (TECs) associated with the accepted scenario?**

# STEPS 4 AND 5 (cont.)

**Actions**

- **Identify a range of scenarios in those systems where one has detailed EWR information available.**
- **Test the range with stakeholders.**
- **Model the scenarios and provide the consequences on state in terms of ecology, economy, socio-economics.**
- **Develop an optimised scenario to maximise yield and have minimal impacts on socio-economics and ecology, and improve states where necessary.**
- **Present to stakeholders.**
- **Recommend an operational scenario considering the implication on the ecological state.**
- **Provide the Target Ecological Categories (TECs) *(catchment configuration)* and associated Water Resource Classes for the accepted operational scenario.**

# STEP 6: RESOURCE QUALITY OBJECTIVES

- **How do you determine whether you are complying to the Class and the TECs?**
- **What do you measure to determine whether you are complying?**
- **How do you operate/implement to determine whether you are complying?**

**Actions**

- **Define (quantify and quality) the TECs for high priority RUs in terms of RQOs.**
- **Provide a monitoring programme on how to measure and implementation information.**

# DELIVERABLES (1 OF 2)

- **Basic Human Needs**
- **Groundwater**
- **Estuary**
- **Wetland**
- **Ecological Water Requirements**
- **Scenario Descriptions**

# DELIVERABLES (2 OF 2)

- Consequences
  - Rivers
  - Estuaries
  - Ecosystem Services
  - Water Quality
  - Economics
- Water Resource Classes Report
- Resource Quality Objectives
  - Rivers
  - Estuaries
  - Wetlands
  - Groundwater

# OTHER ASPECTS

- Training and Capacity Building
- Management
  - Project Management Committee
  - Project Steering Committee
- Stakeholder Engagement
  - Public meetings
  - Technical Task Team meetings, as required
  - Sectoral meetings (ad hoc basis)
  - Comments register
- Input into Legal Notice for gazetting

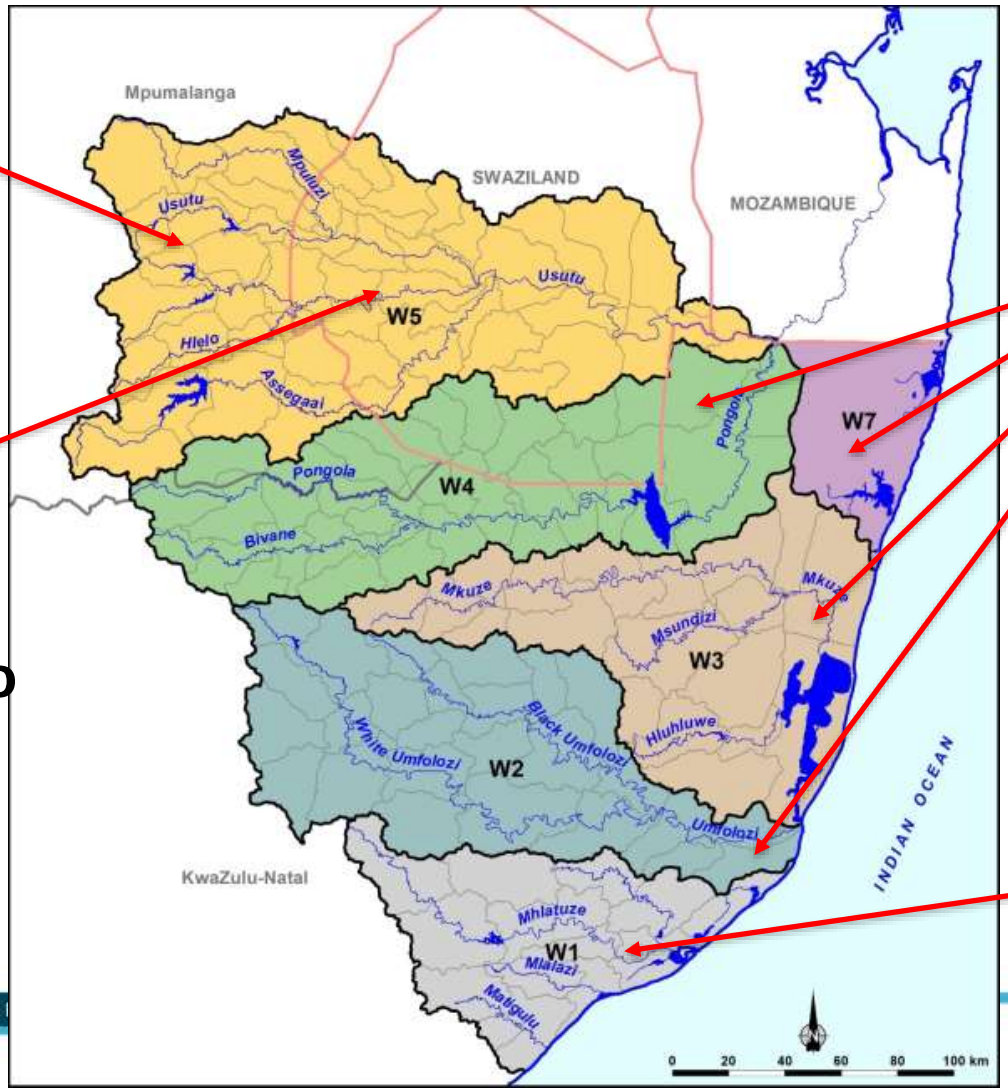
# 4.3 OVERVIEW STATUS OF THE CATCHMENTS: STATUS QUO AND PRIORITIZATION

- **Describe the current catchment conditions**
- **Prioritize catchments from various perspectives:**
  - **Water Resources (groundwater & surface water)**
  - **Water Requirements (use for economic activity)**
  - **Water Quality**
  - **Socio-economics**
  - **Goods & services**
  - **Rivers, wetlands, estuaries**

# HYDROLOGY AND WATER RESOURCES

**IUCMA detailed assessment**

**PRIMA (Progressive Realization of the IncoMaputo Agreement)**




**Parallel Study (Recon Strategy)**

**MWAAS, Compulsory Licensing**



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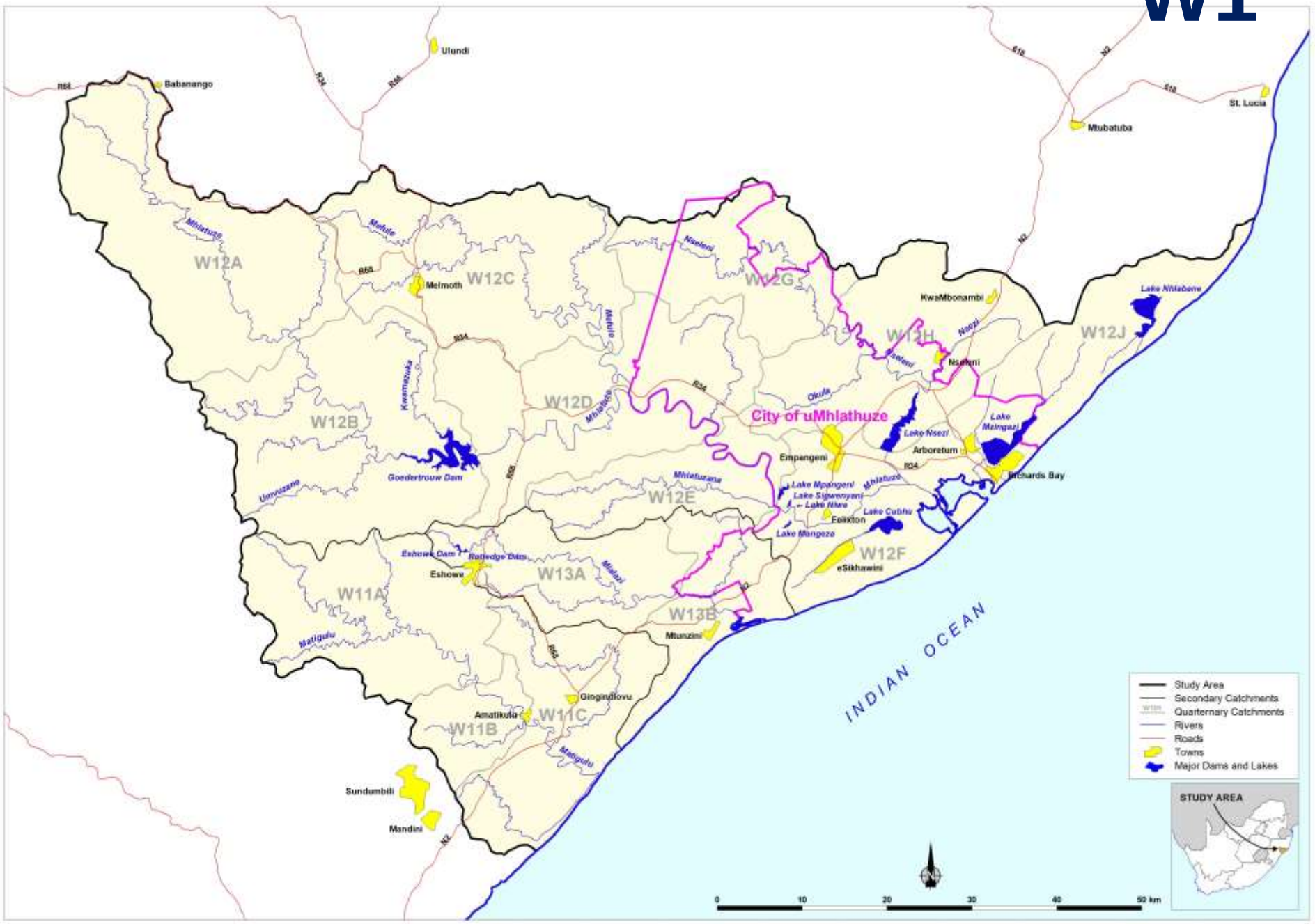
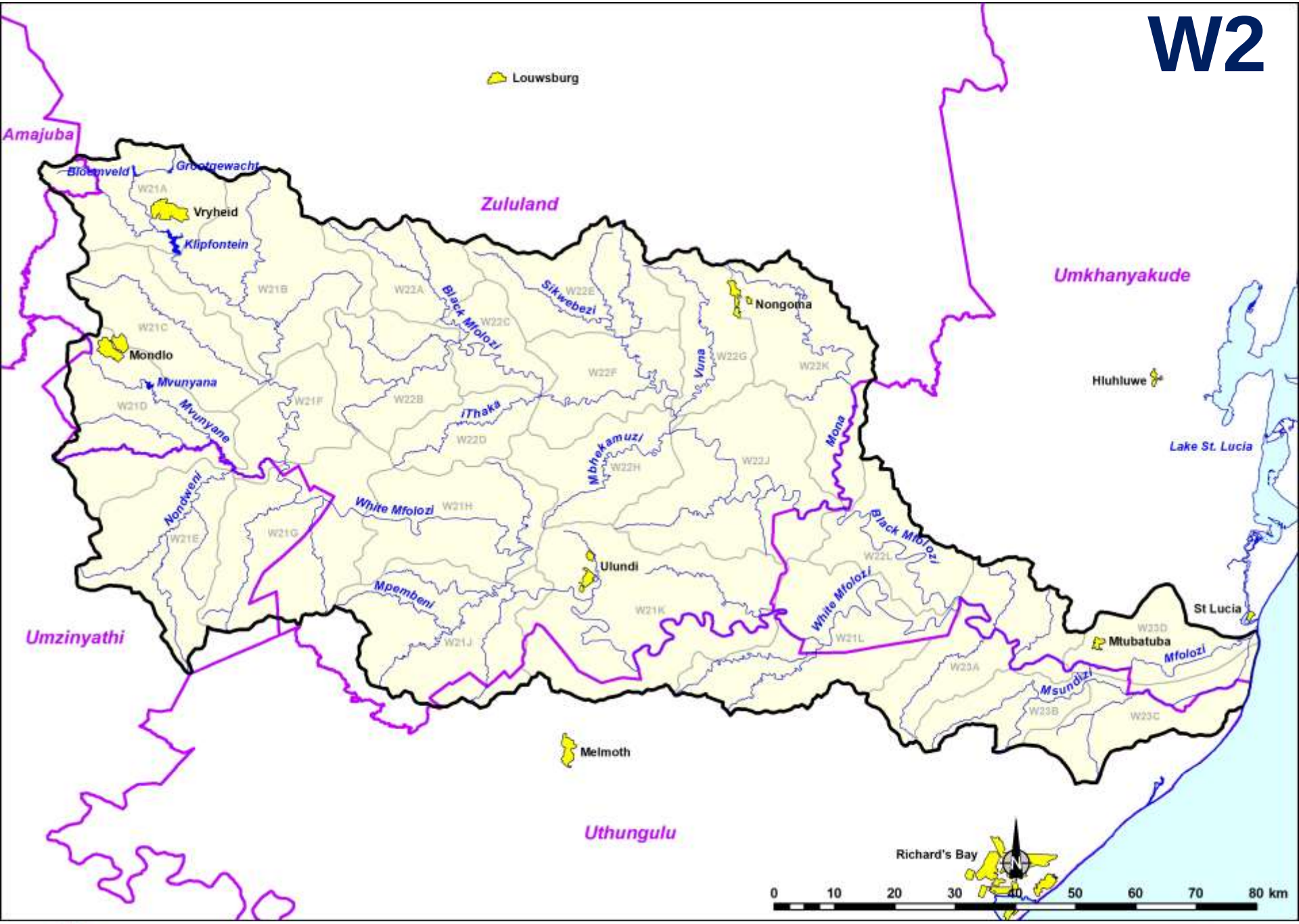
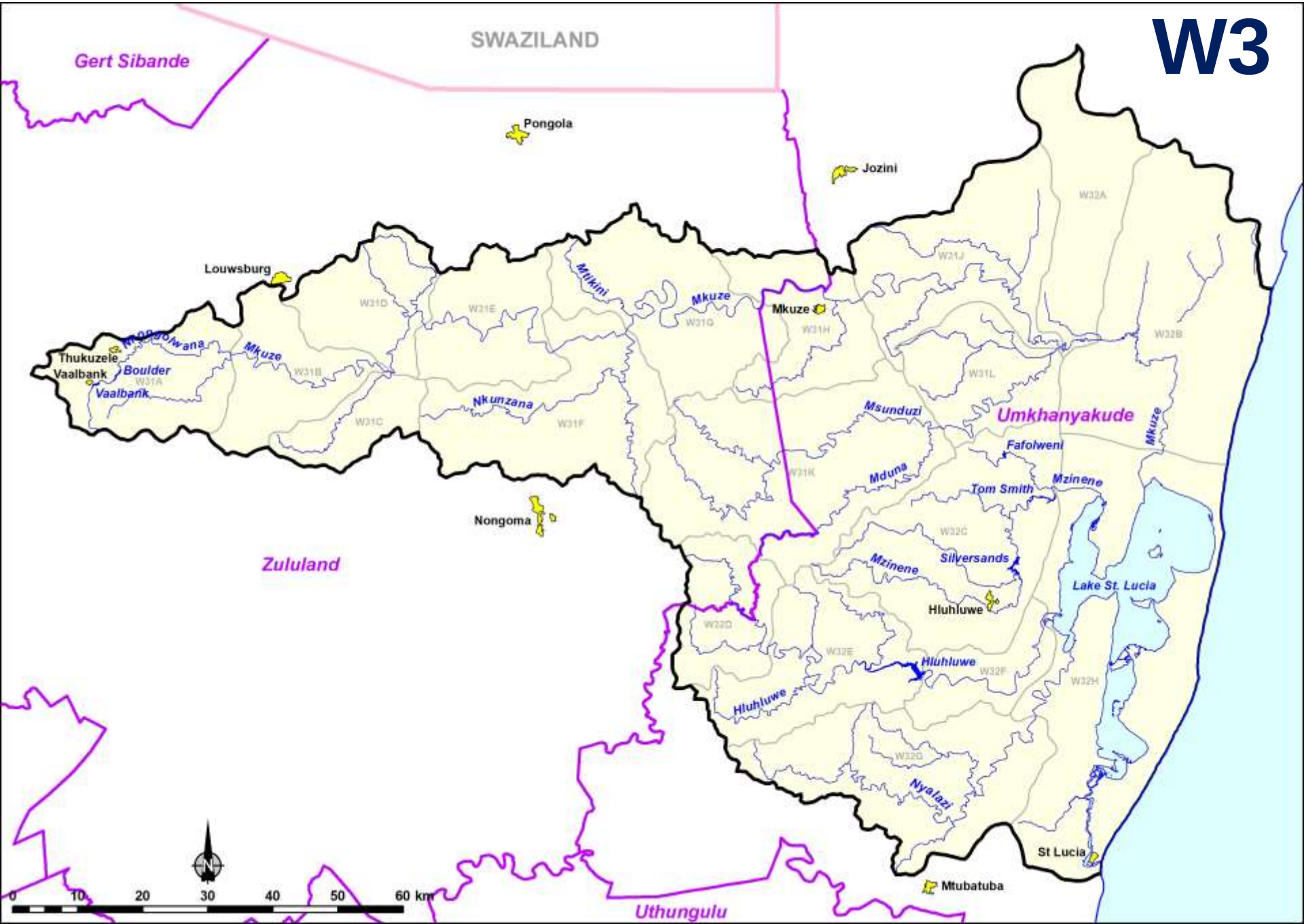
NDP 2030

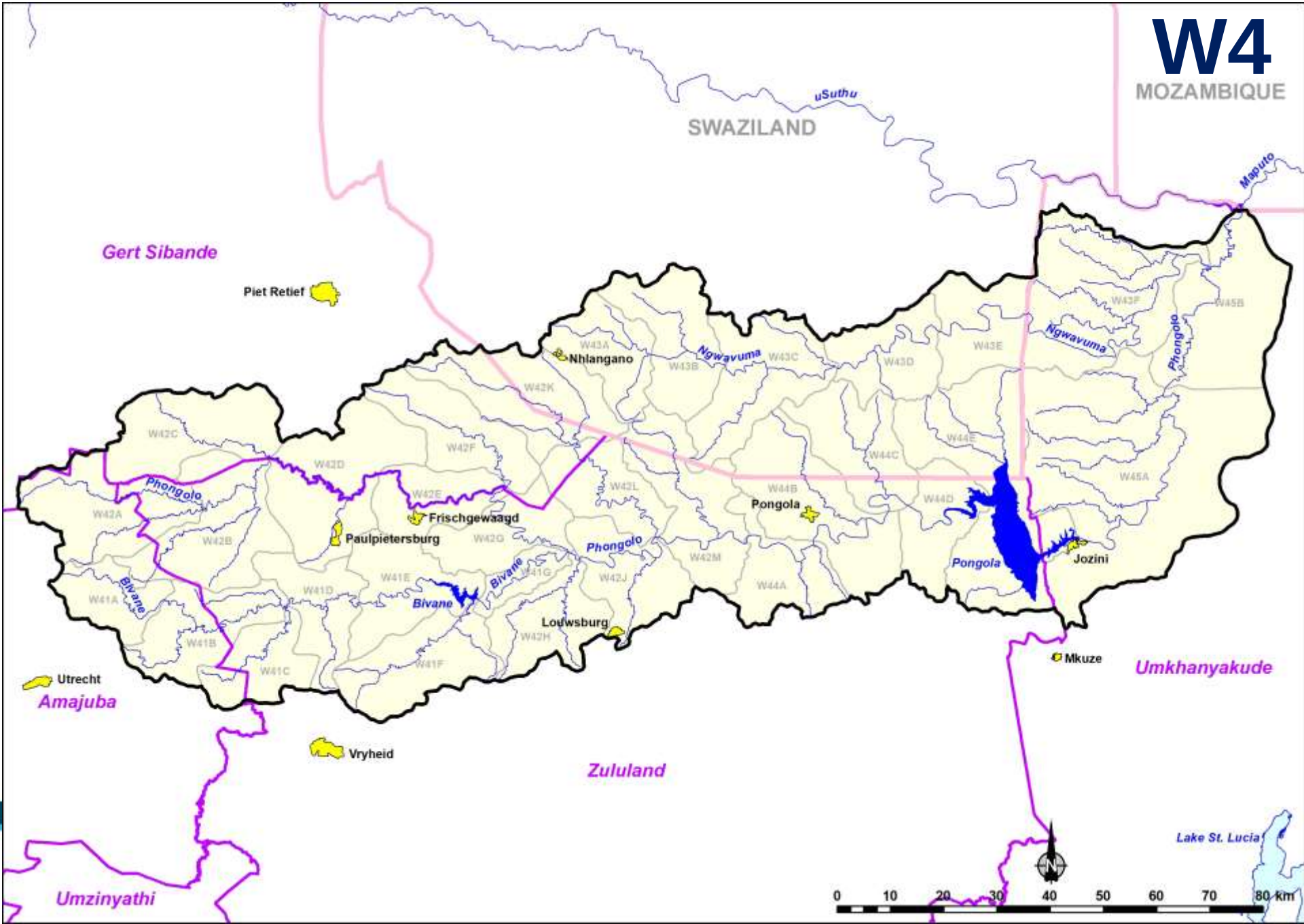
# W1



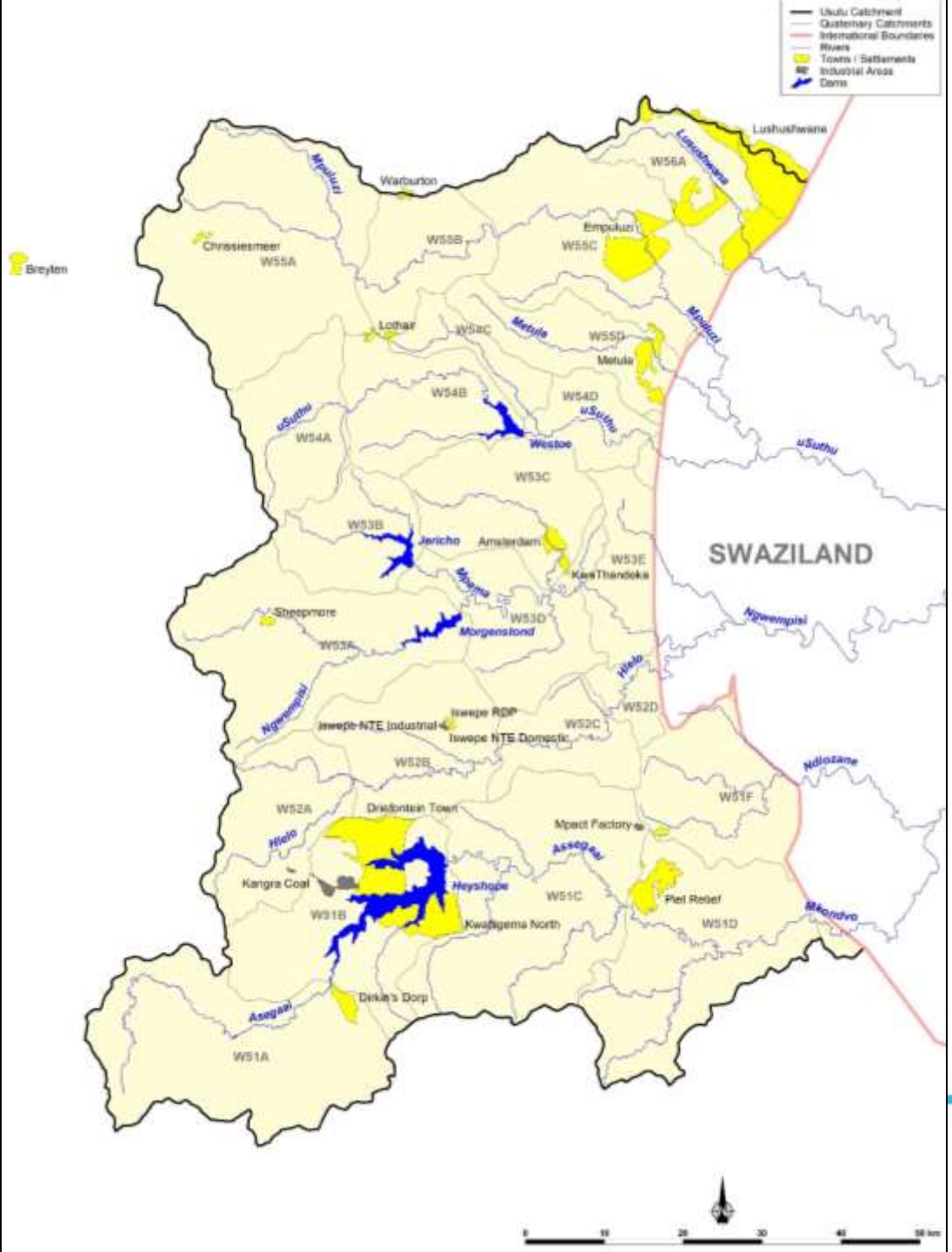
Ulundi
Babanango
St. Lucia
Mtubatuba
W12A
W12B
W12C
W12D
W12E
W12F
W12G
W12H
W12J
W13A
W13B
W11A
W11B
W11C
Melmoth
KwaMbonambi
Nseleni
City of uMhlathuze
Empangeni
Arboretum
Richards Bay
Eelixton
eSikhawini
Mtunzini
Eshowe
Amatikulu
Gingindlovu
Sundumbili
Mandini
Goedertrouw Dam
Eshowe Dam
Ratledge Dam
Lake Nhlabane
Lake Mzingazi
Lake Nsezi
Lake Mpangeni
Lake Sigwenyani
Lake Nlwe
Lake Cubhu
Lake Mangeza
Mhlatuze
Mfule
Nseleni
Okula
Kwamazuka
Umvuzane
Mhlatuzana
Mlalazi
Matigulu
INDIAN OCEAN
Study Area
Secondary Catchments
Quarternary Catchments
Rivers
Roads
Towns
Major Dams and Lakes
STUDY AREA
0
10
20
30
40
50 km

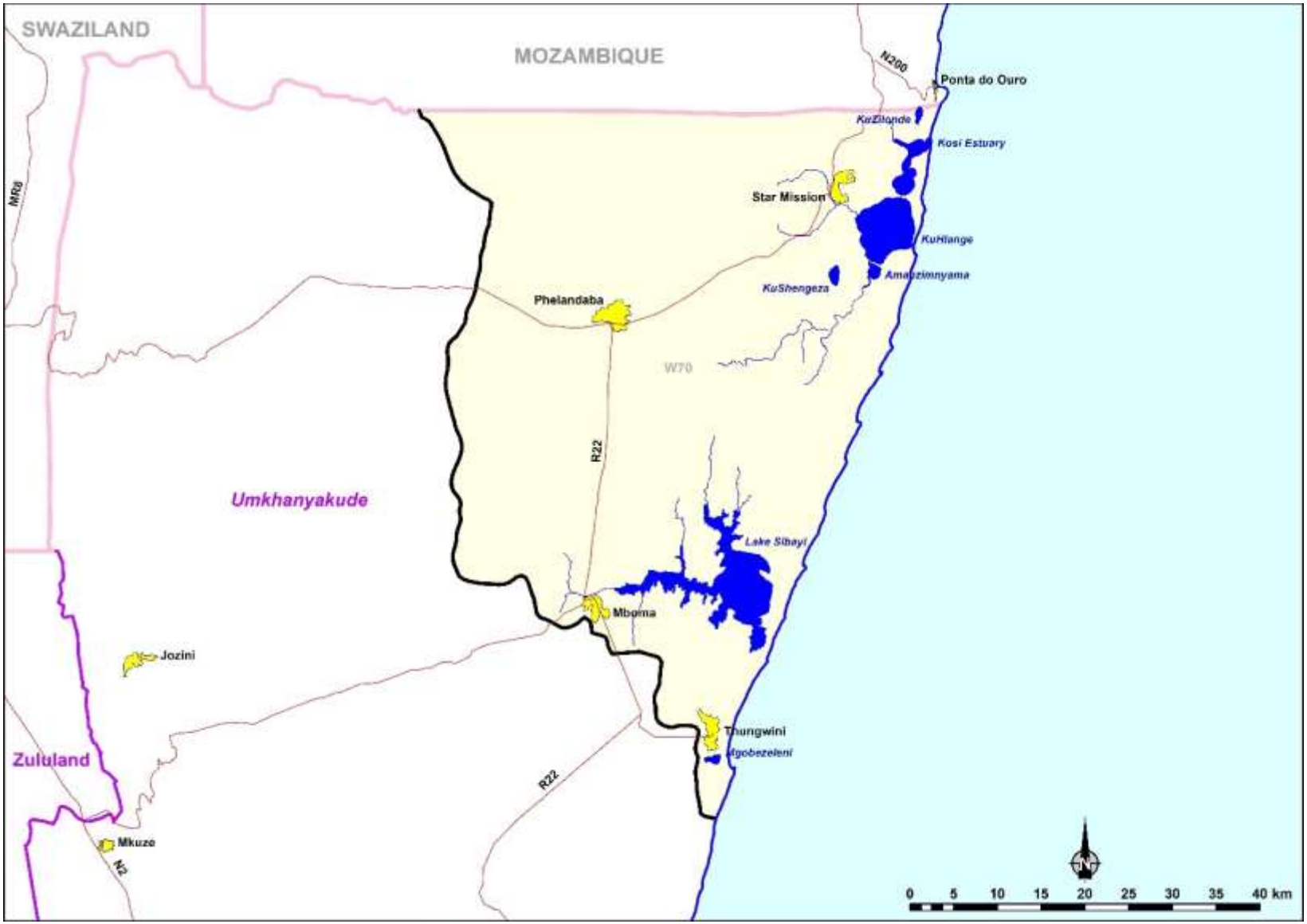

W2
Louwsburg
Amajuba
Zululand
Umkhanyakude
Umzinyathi
Uthungulu
Vryheid
Klipfontein
Mondlo
Nongoma
Ulundi
Melmoth
Hluhluwe
St Lucia
Mtubatuba
Richard's Bay
Lake St. Lucia
Mvunyana
Mvunyane
Nondweni
White Mfolozi
Black Mfolozi
Mpembeni
iThaka
Mbhekamuzi
Sikwebezi
Vuna
Mona
Msundizi
Mfolozi
W21A
W21B
W21C
W21D
W21E
W21F
W21G
W21H
W21J
W21K
W21L
W22A
W22B
W22C
W22D
W22E
W22F
W22G
W22H
W22J
W22K
W22L
W23A
W23B
W23C
W23D
0 10 20 30 40 50 60 70 80 km


W3
SWAZILAND
Gert Sibande
Pongola
Jozini
Louwsburg
Thukuzele
Vaalbank
Boulder
Vaalbank
Ngobolwana
Mkuze
Mtikini
Mkuze
Mkuze
Nkunzana
Nongoma
Zululand
Msunduzi
Umkhanyakude
Fafolweni
Mduna
Tom Smith
Mzinene
Mkuze
Mzinene
Silversands
Lake St. Lucia
Hluhluwe
Hluhluwe
Hluhluwe
Nyalazi
St Lucia
Mtubatuba
Uthungulu
W31A
W31B
W31C
W31D
W31E
W31F
W31G
W31H
W31J
W31K
W31L
W32A
W32B
W32C
W32D
W32E
W32F
W32G
W32H
0 10 20 30 40 50 60 km


W4
MOZAMBIQUE
SWAZILAND
uSuthu
Maputo
Gert Sibande
Piet Retief
Nhlangano
Ngwavuma
Phongolo
Frischgewaagd
Paulpietersburg
Pongola
Jozini
Bivane
Louwsburg
Mkuze
Umkhanyakude
Utrecht
Amajuba
Vryheid
Zululand
Lake St. Lucia
Umzinyathi
W42A
W42B
W42C
W42D
W42E
W42F
W42G
W42H
W42J
W42K
W42L
W42M
W43A
W43B
W43C
W43D
W43E
W43F
W44A
W44B
W44C
W44D
W44E
W45A
W45B
W41A
W41B
W41C
W41D
W41E
W41F
W41G
0 10 20 30 40 50 60 70 80 km

# W5


Usutu Catchment
Quaternary Catchments
International Boundaries
Rivers
Towns / Settlements
Industrial Areas
Dams
Lushushwane
Warburton
Breyten
Chrissiesmeer
Empuluzi
Lothar
Metula
Westoe
Jericho
Amsterdam
KwaThandeka
Shepmore
Morgenstond
Iswepe RDP
Iswepe NTE Industrial
Iswepe NTE Domestic
Driefontein Town
Mpact Factory
Kangra Coal
Heyshope
Piet Retief
Kwaligema North
Dirkie's Dorp
W55A
W55B
W55C
W56A
W54A
W54B
W54C
W54D
W55D
W53A
W53B
W53C
W53D
W53E
W52A
W52B
W52C
W52D
W51A
W51B
W51C
W51D
W51F
SWAZILAND
Mpumalanga
ESWATINI
MOZAMBIQUE
KwaZulu-Natal
INDIAN OCEAN
W1
W2
W3
W4
W5
W7




# W7



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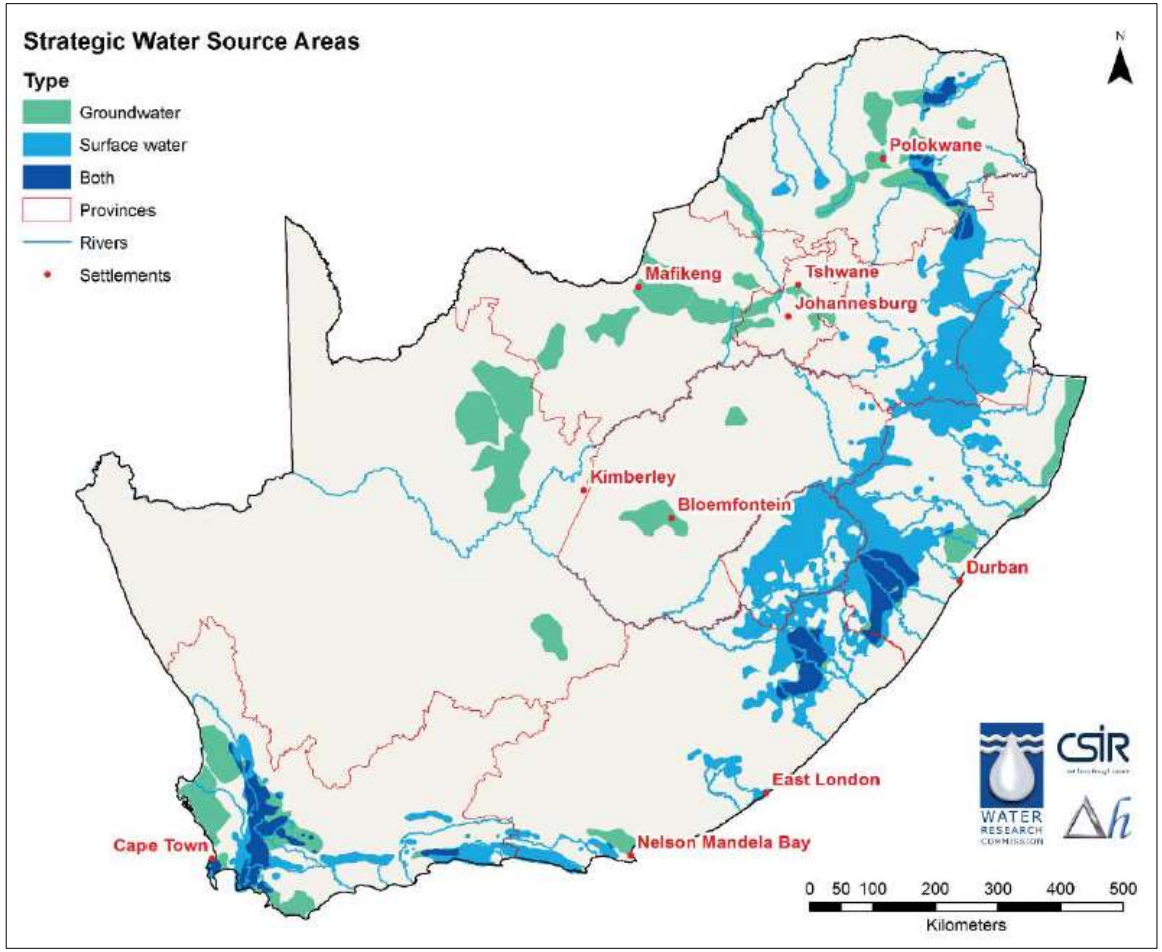
# SUMMARY

| Secondary catchment | Area ($km^2$) | MAR (million $m^3/a$) | Dam capacity (million $m^3$) | Domestic & Industrial use (million $m^3$/annum) | Afforest-ation area (ha) | Irrigation use (million $m^3$/annum) | Transfers in | Transfers out |
|---|---|---|---|---|---|---|---|---|
| W1 | 5 661 | 816 | 314 | 107 | 64 072 | 140 | From Thukela From Umfolozi | - |
| W2 | 10 008 | 825 | 35 | 30 | 57 846 | 53 | - | To Mhlathuze |
| W3 | 9 545 | 578 | 48 | 4 | 38 042 | 85 | From Pongola | - |
| W4 | 11 714 | 1104 | 2571 | 26 | 75 610 | 275 | - | To Mkuze |
| W5* | 7 627 | 949 | 695 | 11 | 226 510 | 12 | - | To Vaal & Olifants |
| W7 | 2 589 | 143 | 0 | 3 | 24 591 | 0 | - | - |

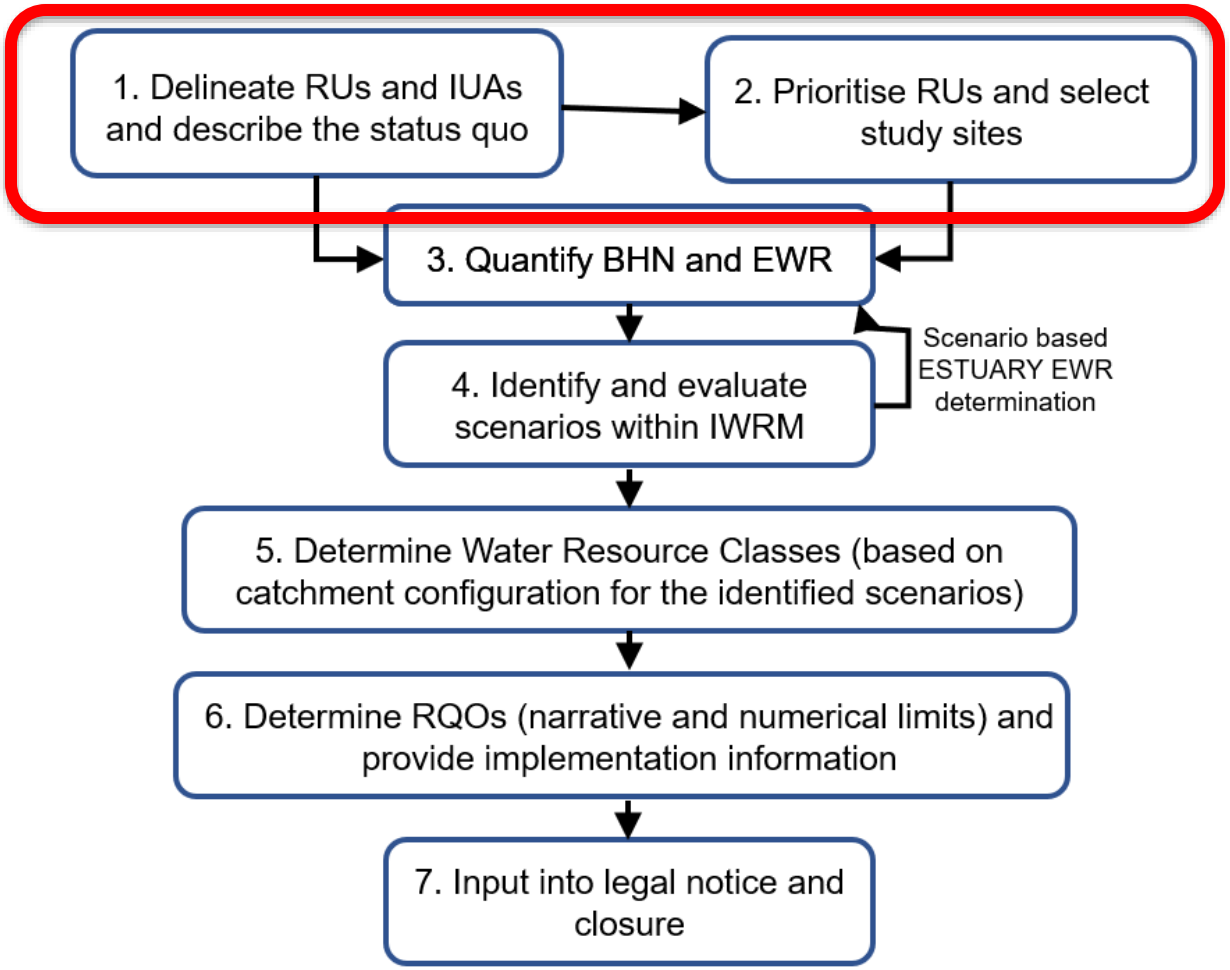
# STRATEGIC WATER SOURCE AREAS

**Water Source Areas (WSAs) are *natural* places or areas, such as water catchments, which produce disproportionately greater volumes of water per unit area than other areas.**

**This information feeds into the prioritisation task.**



# 4.4 STUDY PROGRESS




We are CURRENTLY working on these tasks

# 4.4 STUDY PROGRESS

- **Working on the status quo, compiling all the information, summarising for reports and creating maps.**
- **Use this information to delineate study area in manageable units.**
- **Prioritise the areas.**

**The preliminary delineation into Integrated Units of Analysis has been done and this will be provided in the next slides as well as some explanatory background on the terminology used in Classification.**

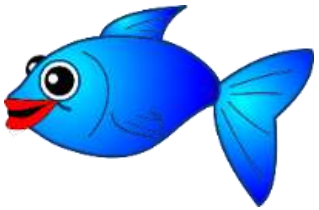
# 4.5 DELINEATION AND PRELIMINARY INTEGRATED UNITS OF ANALYSIS

**To understand what IUAs are and why delineation is required, i.e., the context, we need to remind ourselves of the basics.**

## What is Classification?

**Balance between**

Protection (Ecology)



Expressed as Ecological state

&

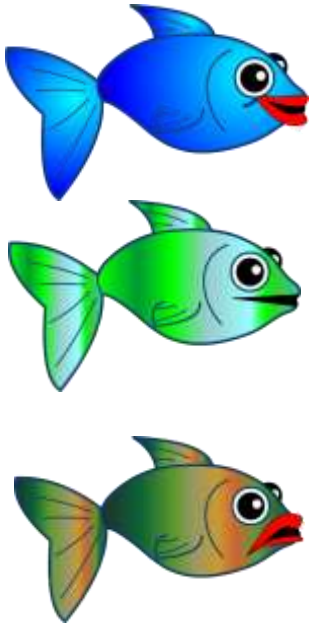
Use

includes Water balance, quality, socio-economics

# 4.5 DELINEATION AND PRELIMINARY INTEGRATED UNITS OF ANALYSIS (cont.)

## How is Classification described as?

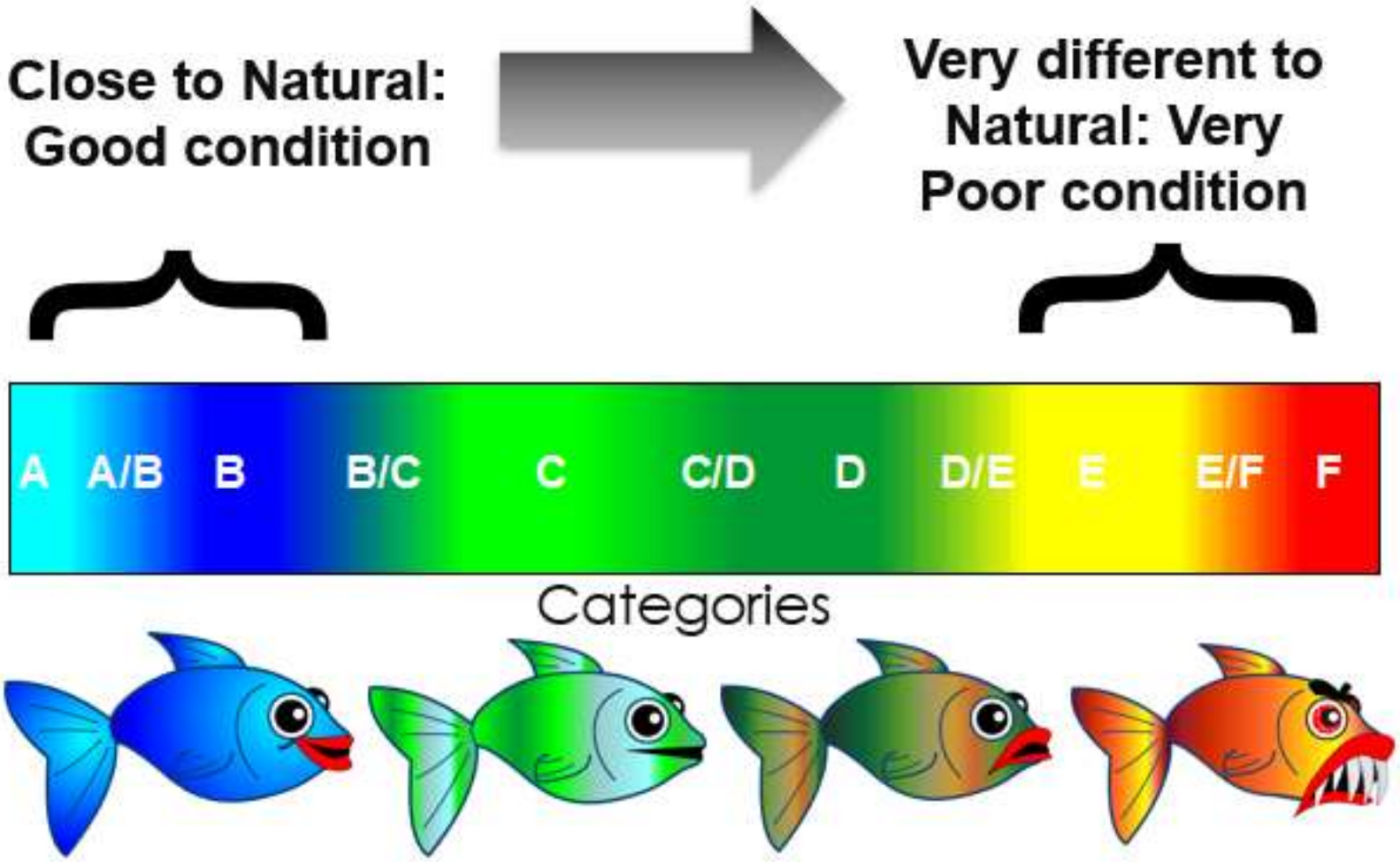
Ecology



| CLASSES | DESCRIPTION |
|---|---|
| I | Ecology: Mostly in good condition<br>Use: Minimal |
| II | Ecology: Mostly in moderate condition<br>Use: Medium |
| III | Ecology: Mostly in poor condition<br>Use: High – work horse river. |

Use

# 4.5 DELINEATION AND PRELIMINARY INTEGRATED UNITS OF ANALYSIS (cont.)



# 4.5 DELINEATION AND PRELIMINARY INTEGRATED UNITS OF ANALYSIS (cont.)

## What scale do we classify at?

- Classify every Integrated Unit of Analysis. Units are similar ito land use &/or ecological state. Very simply put, an IUA consist of many river reaches, wetlands and/or estuaries.

- Provide the Catchment Configuration for every IUA. (Provide the ecological state for each of the river reaches and estuaries, (described as Resource Units(RU) that are within the IUA.

# 4.5 DELINEATION AND PRELIMINARY INTEGRATED UNITS OF ANALYSIS (cont.)

- **IUA represents a catchment or a linear stretch of river.**
- **Nested in an IUA are Resource Units.**
- **Each RU is comprised of a group of similar Sub-Quaternary Reaches (short reaches of rivers for which a PES database exist).**
- **Each RU represented by a biophysical node – a point for which an Ecological Category is set and EWRs estimated if required.**

# 4.5 DELINEATION AND PRELIMINARY INTEGRATED UNITS OF ANALYSIS (cont.)

## IUA and catchment configuration definitions.

- **IUA**: Homogenous area that can be managed as an entity.
- **RESOURCE UNITS:** RUs require different EWRS (due to different flow patterns, reaction of habitat and biota to stress, management and operational structures). Although indicated as a catchment on the maps, the RUs are assessed according to the resource (rivers eg) and therefore represent linear sections of rivers for which the Present Ecological State is provided (for the instream and riparian section only
- **BIOPHYSICAL NODES:** A point in the river which can be a survey site or a hypothetical point ('site'). These are points which are used to assess the Ecological Water Requirements (EWRs).
- **NODES, RUS, IUAS – REPRESENT A CATCHMENT CONFIGURATION WHICH WILL DEFINE OR UNPACK THE CLASS FOR A SPECIFIC IUA**

# PRELIMINARY IUAs FOR W PRIMARY CATCHMENT (cont.)

**IUAs are preliminary delineations and are still being finalised. The process undertaken for delineation is as follows:**

- **Review the ecological state for all the SQRs.**
- **According to similar ecological state, and land use (impacts), group the SQRs into RUs.**
- **Assign a PES to the RUs.**
- **Group the RUs into IUAs to ensure that it represents a homogenous area that can be managed as an entity.**

**Next follows the maps illustrating the PRELIMINARY IUAS**

# PRELIMINARY IUAs FOR W PRIMARY CATCHMENT (cont.)

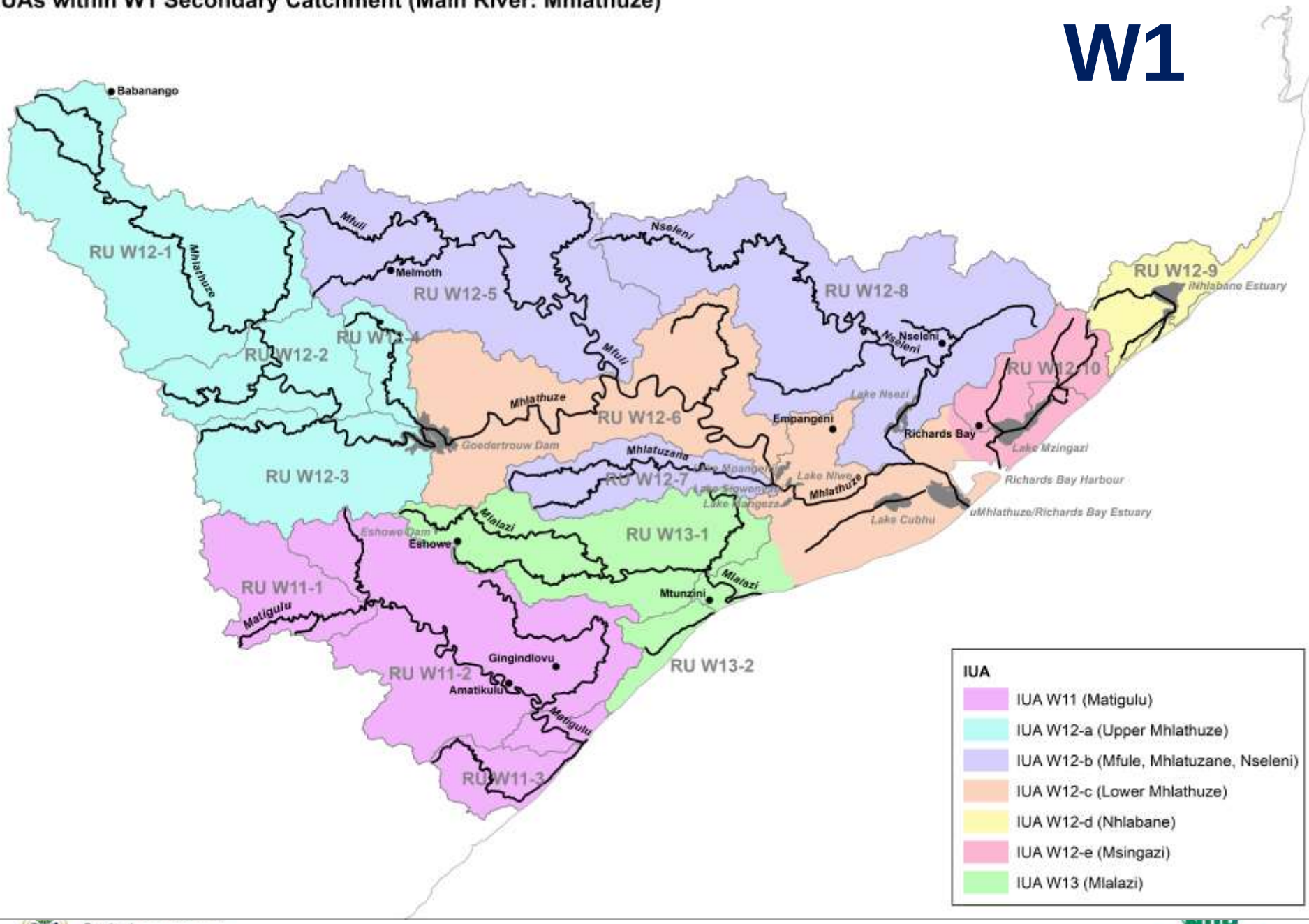
| Secondary | IUA No | IUA Descriptive Name |
|---|---|---|
| **W1** | W11 | Matigulu |
| | W12-a | Upper Mhlathuze |
| | W12-b | Mfule, Mhlatuzane, Nseleni |
| | W12-c | Lower Mhlathuze |
| | W12-d | Lake Nhlabane |
| | W12-e | Lake Msingazi |
| | W13 | Mlalazi |
| **W2** | W21 | Upper and Middle White Umfolozi |
| | W22 | Upper Black Umfolozi |
| | W23 | Umfolozi-Hluhluwe Game |
| **W3** | W31-a | Upper Mkuze |
| | W31-b | Lower Mkuze |
| | W32-a | Upper Hluhluwe |
| | W32-b | Nyalazi and Mzinene Tributaries |

# PRELIMINARY IUAs FOR W PRIMARY CATCHMENT (cont.)

| Secondary | IUA No | IUA Descriptive Name |
|---|---|---|
| **W4** | W41 | Bivane River |
| | W42-a | Upper Pongola |
| | W42-b | Middle Pongola (Ithala) |
| | W44 | Middle Pongola (Grootdraai) |
| | W45 | Lower Pongola (Floodplain) |
| **W5** | W51 | W5 Upstream major dams |
| | W52 | W5 Downstream major dams & |
| | W55 | Mpuluzi & Lusushwana River |
| | W57 | Lower Usutu River |
| **W7** | W70-a | Kosi Bay |
| | W70-b | Sibaya |
| **W2 & W3** | IUA St Lucia | St Lucia |

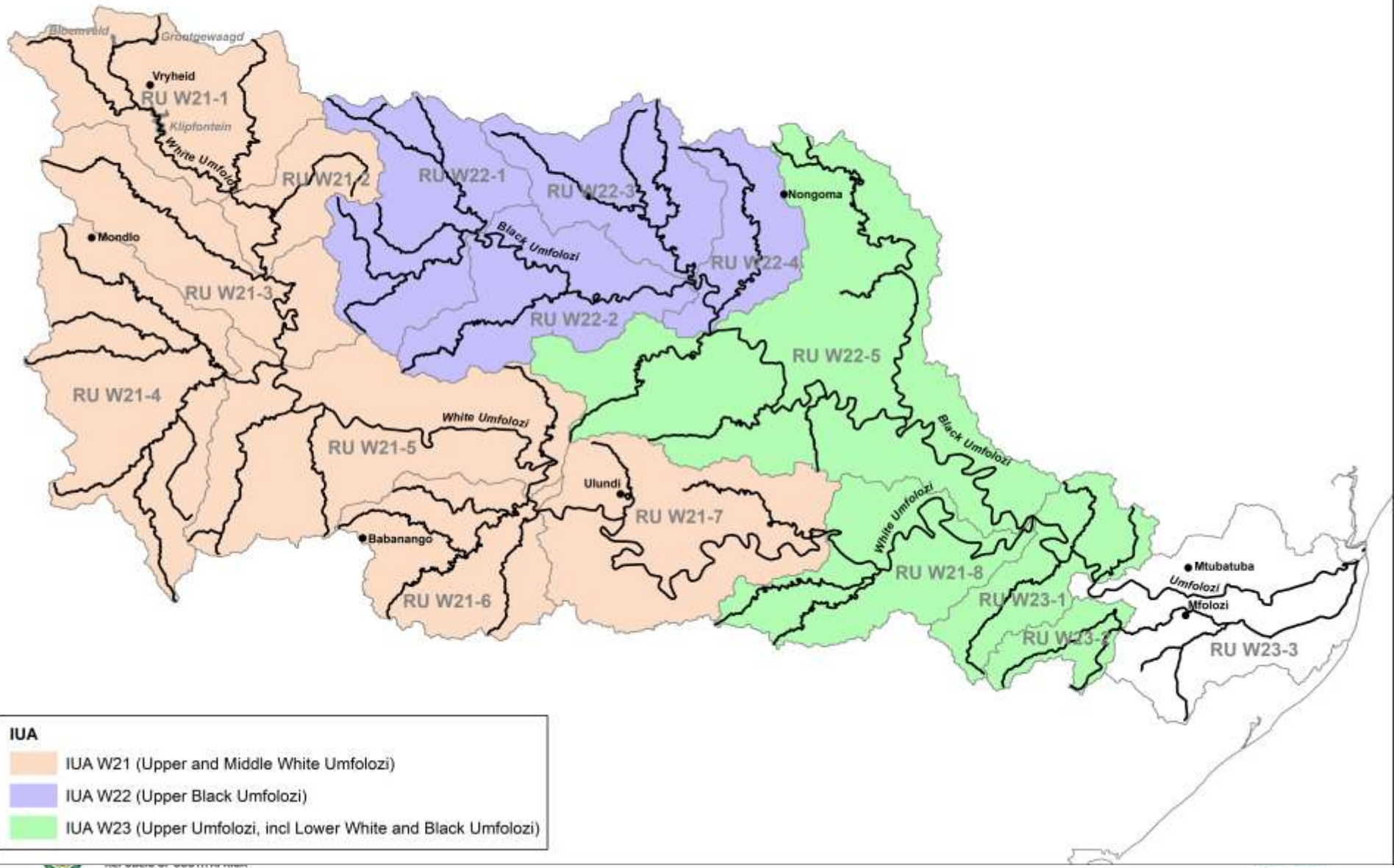
# IUAs within W1 Secondary Catchment (Main River: Mhlathuze)

**W1**

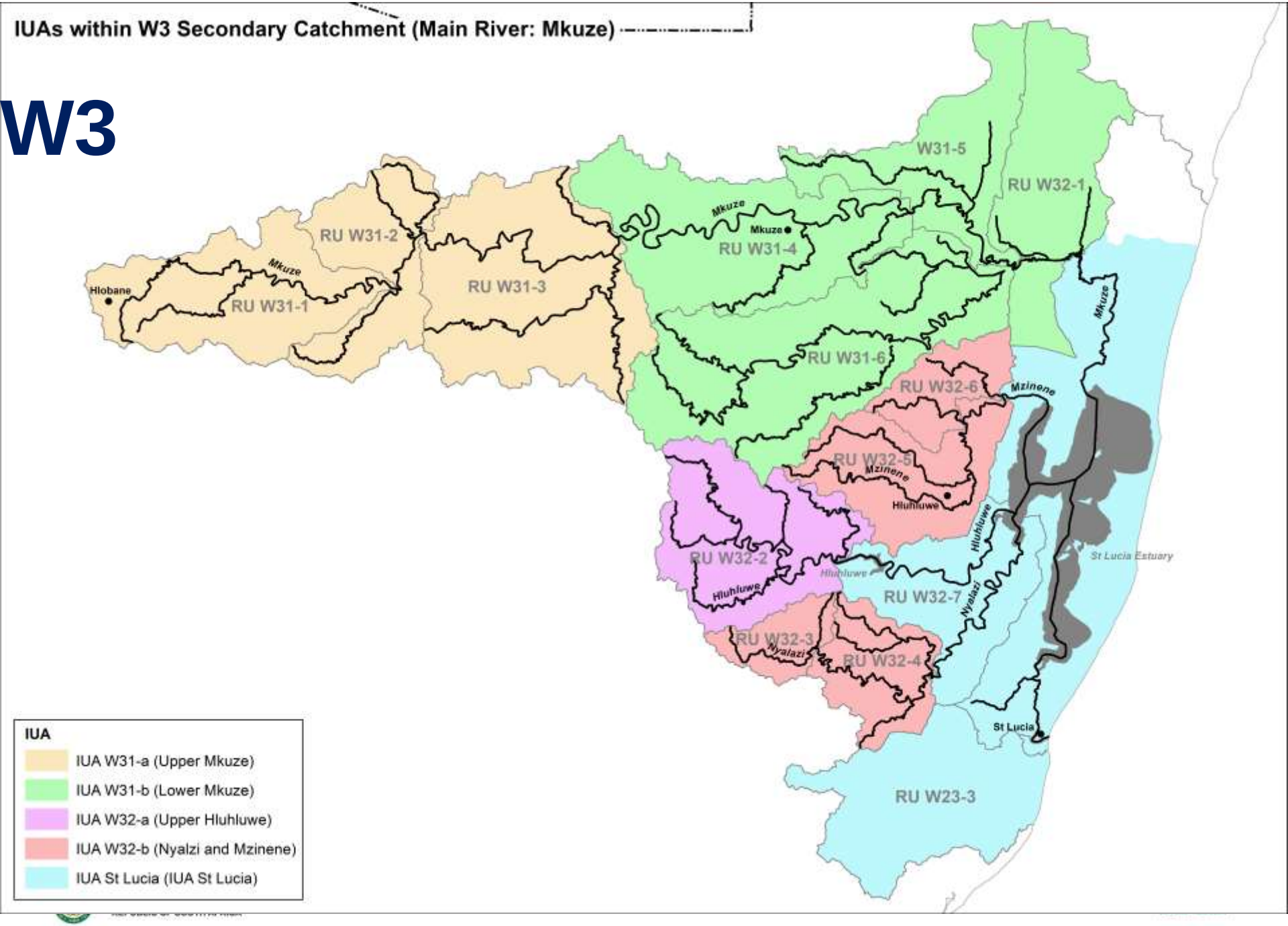


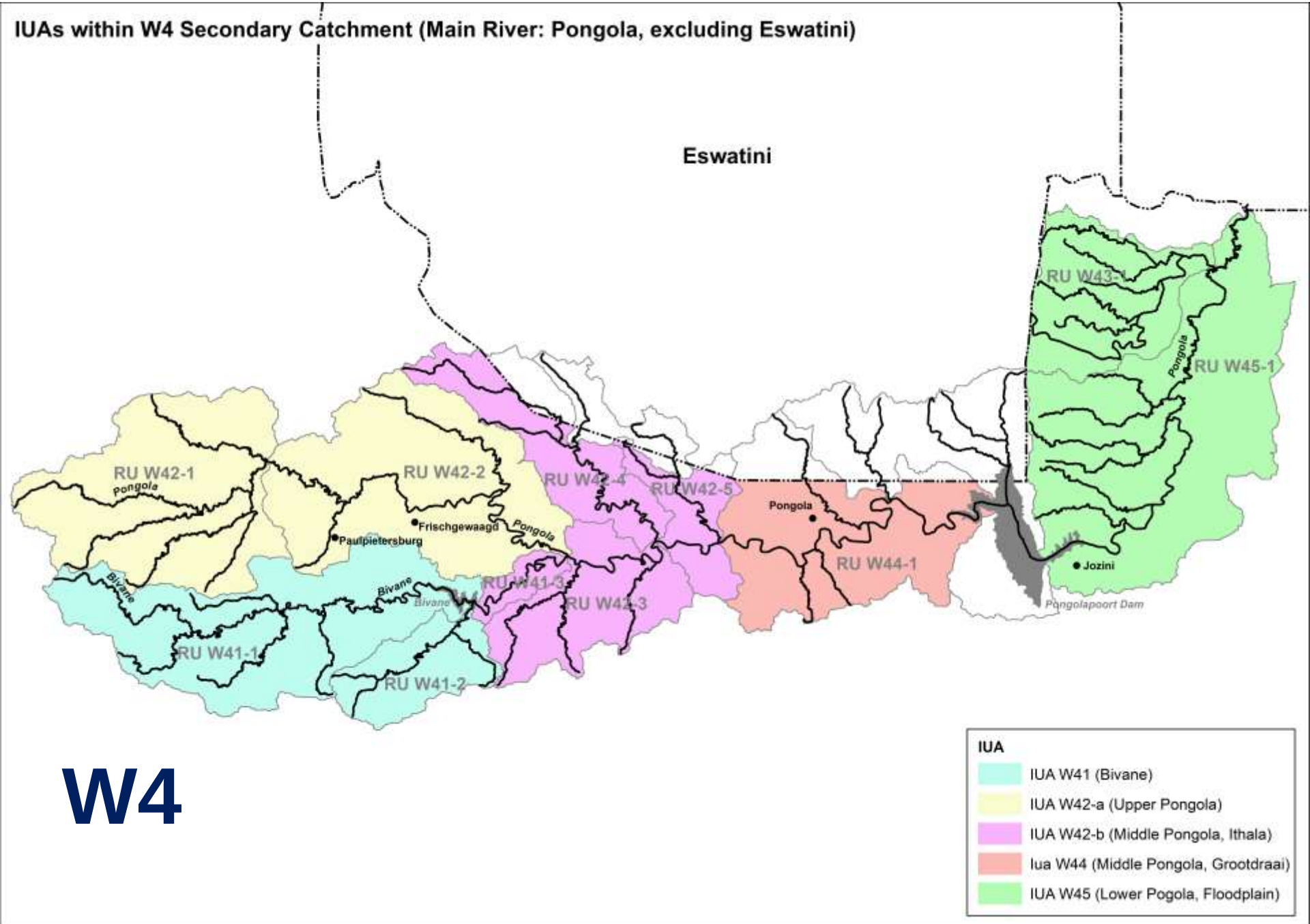
# IUAs within W2 Secondary Catchment (Main River: Umfolozi)

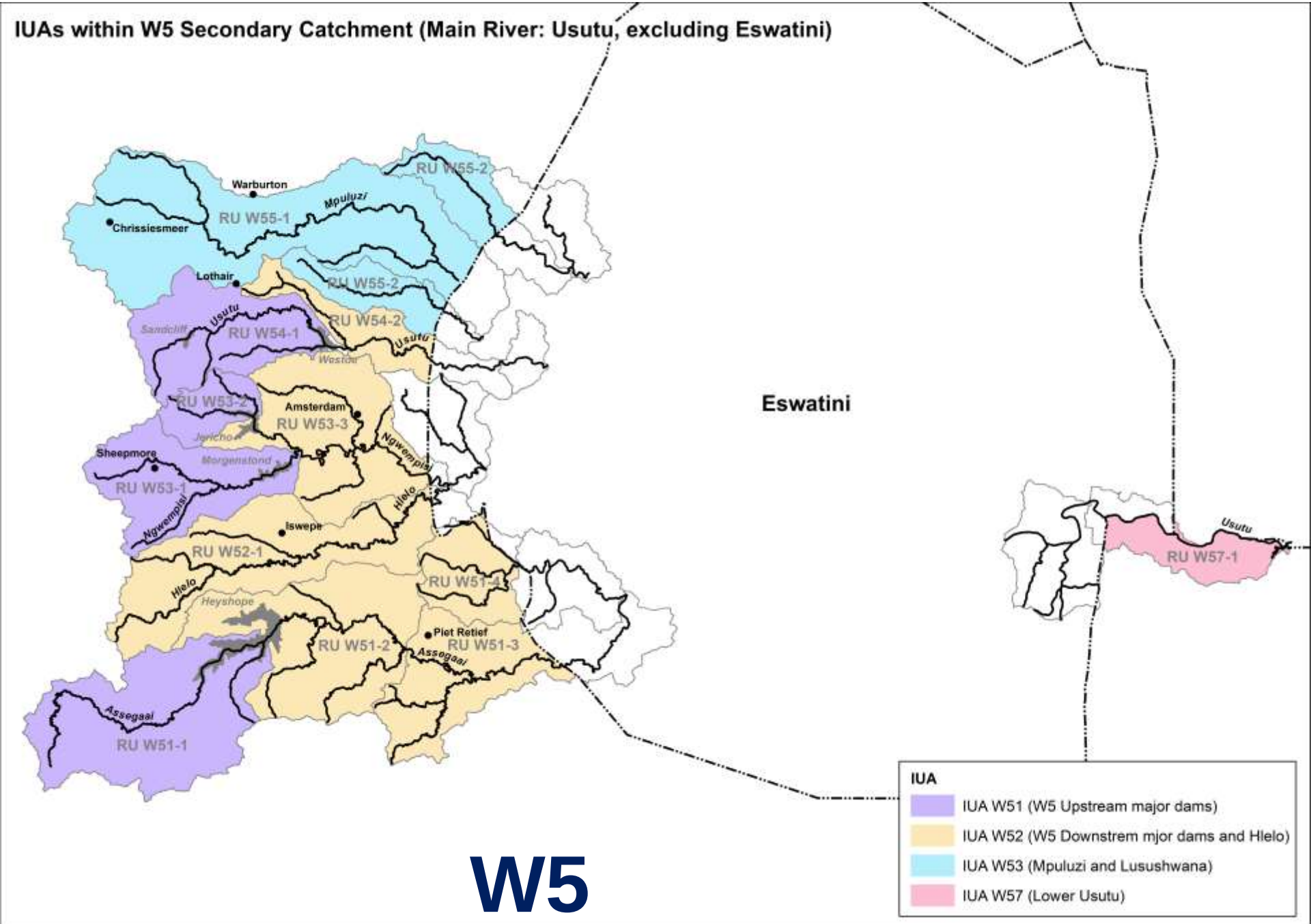
**W2**

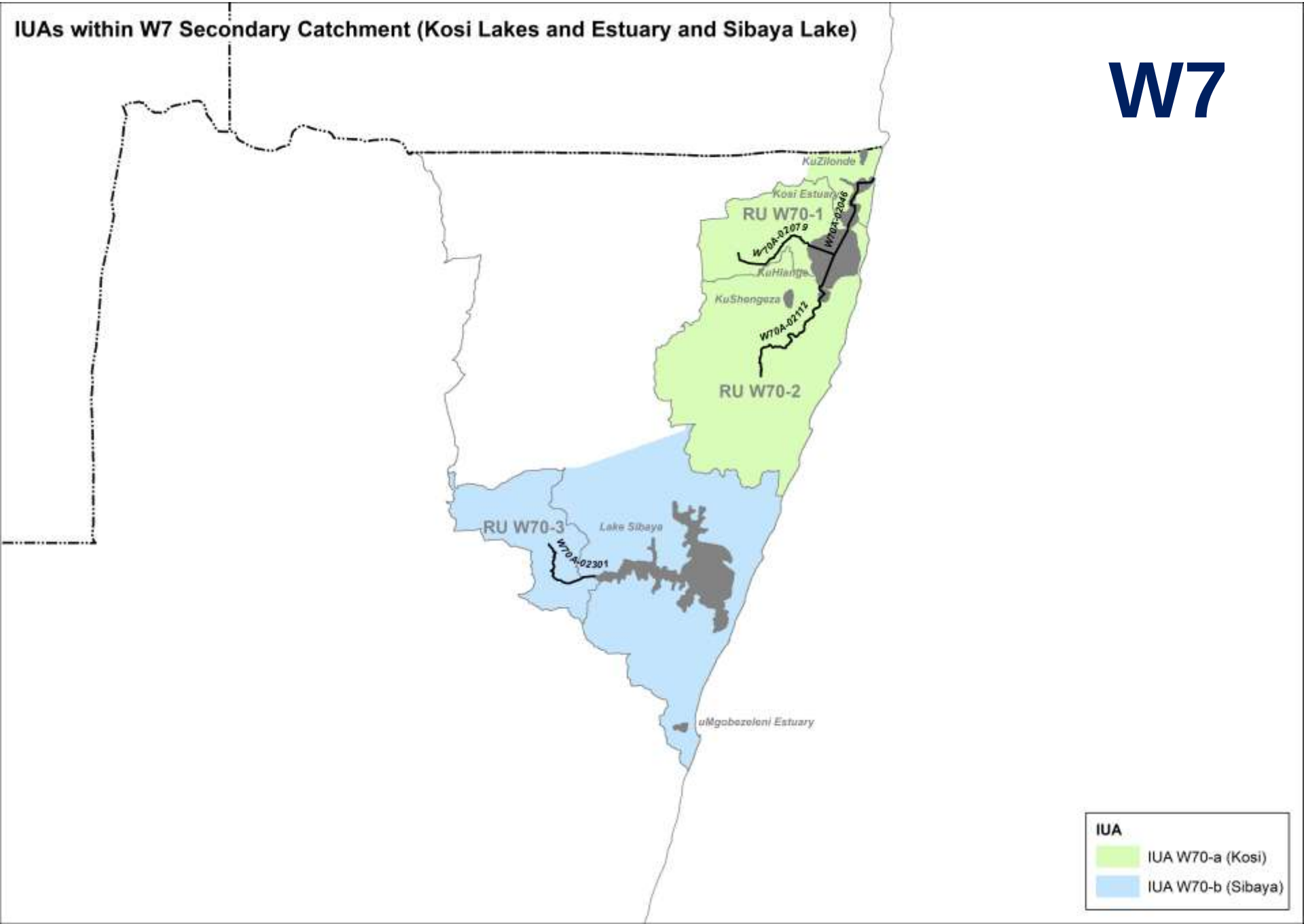


# W3


IUAs within W3 Secondary Catchment (Main River: Mkuze)
W31-5
RU W32-1
Mkuze
Mkuze
RU W31-4
RU W31-2
Hlobane
Mkuze
RU W31-1
RU W31-3
RU W31-6
RU W32-6
Mzinene
RU W32-5
Mzinene
Hluhluwe
Hluhluwe
RU W32-2
Hluhluwe
Hluhluwe
St Lucia Estuary
RU W32-7
Nyalazi
RU W32-3
Nyalazi
RU W32-4
St Lucia
RU W23-3
IUA
IUA W31-a (Upper Mkuze)
IUA W31-b (Lower Mkuze)
IUA W32-a (Upper Hluhluwe)
IUA W32-b (Nyalzi and Mzinene)
IUA St Lucia (IUA St Lucia)


IUAs within W4 Secondary Catchment (Main River: Pongola, excluding Eswatini)
Eswatini
RU W42-1
Pongola
RU W42-2
RU W42-4
RU W42-5
Frischgewaagd
Pongola
Paulpietersburg
Pongola
RU W44-1
Jozini
RU W45-1
Pongola
Pongolapoort Dam
Bivane
Bivane
Bivane
RU W41-3
RU W42-3
RU W41-1
RU W41-2
W4
IUA
IUA W41 (Bivane)
IUA W42-a (Upper Pongola)
IUA W42-b (Middle Pongola, Ithala)
Iua W44 (Middle Pongola, Grootdraai)
IUA W45 (Lower Pogola, Floodplain)


IUAs within W5 Secondary Catchment (Main River: Usutu, excluding Eswatini)
Warburton
Chrissiesmeer
Lothair
Sandcliff
Amsterdam
Jericho
Sheepmore
Morgenstond
Iswepe
Heyshope
Piet Retief
Assegaai
Mpuluzi
Usutu
Ngwempisi
Hlelo
RU W55-1
RU W55-2
RU W54-1
RU W54-2
RU W53-1
RU W53-2
RU W53-3
RU W52-1
RU W51-1
RU W51-2
RU W51-3
RU W51-4
RU W57-1
Eswatini
IUA
IUA W51 (W5 Upstream major dams)
IUA W52 (W5 Downstrem mjor dams and Hlelo)
IUA W53 (Mpuluzi and Lusushwana)
IUA W57 (Lower Usutu)
W5


IUAs within W7 Secondary Catchment (Kosi Lakes and Estuary and Sibaya Lake)
W7
KuZilonde
Kosi Estuary
RU W70-1
W70A-02079
W70A-02046
KuHlange
KuShongeza
W70A-02112
RU W70-2
RU W70-3
Lake Sibaya
W70A-02301
uMgobezeleni Estuary
IUA
IUA W70-a (Kosi)
IUA W70-b (Sibaya)