NDMC

SEASONAL HAZARD PROFILE

Spring 2023

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CONTENTS

LIST OF FIGURES

1. SUMMARY STATEMENT

The NDMC seasonal hazard profile is intended to guide and inform disaster management stakeholders at all spheres of government in terms of a medium term (3 month) forecast as it pertains to various hazards throughout South Africa.

Each seasonal hazard profile will aim to highlight, at a national level, a spatial pattern related to hazards for the given timeframe. Indicative hazard profiles have been conceived for the most prevalent hazards in South Africa and include fires, floods, drought, windstorms and snow. Recent partnerships with strategic entities with intrinsic hazard and risk knowledge has resulted in NDMC producing a more scientific and relevant national product.

Many hazards in South Africa are weather related and it is important to note that viewing the hazard profiles should be done in conjunction with the included 3 month weather forecasts (Sourced and consulted on with the South African Weather Services (SAWS)) as conditions may directly impact the prevalence of the hazard (the seasonal hazard profile is static and does not include dynamic weather variability).

The envisioned audience for the seasonal profile include all national, provincial, district and municipal disaster management stakeholders involved with medium term planning and disaster operations.

The release dates for this product will be aligned with the South African seasonal calendar with the following time frames:

a) End November for Summer (December, January and February)
b) End February for Autumn (March, April, May)
c) End May for Winter (June, July, August)
d) End August for Spring (September, October, November)

Cautionary Note: *It is important to note that the product primarily illustrates a national view and should not be used to obtain what may be perceived to be "exact" parameter values at very specific localities. Often when spatial detail is presented on a map, values are derived by means of simulation models and often smoothing of local effects and dampening of outlier values occur. Values at a specific point should thus be viewed in relative rather than absolute terms.*

2. SEASONAL HAZARD PROFILE – SPRING 2023

The specific goals of the seasonal profiles are to:

(a) Provide insights into the spatial and temporal nature of hazards throughout South Africa
(b) Create awareness around potential and current conditions (situational awareness) in order to augment short –term early warning systems.
(c) Guide medium term operational and tactical planning in order to mitigate identified risk.
(d) Assist in identifying possible areas where disaster risk reduction (DRR) initiatives, to minimize risk, may be targeted.

2.1 Hazard Profiles

2.1.1 Fire

Fires are one of South Africa's most devastating hazards that cause loss of lives and incur billions of rands in damage to agriculture and infrastructure. Fires in South Africa have a strong seasonal nature with the summer fire season in the western parts of the country generally moving towards the eastern provinces in winter and spring.

The indicative hazard profile in South Africa takes into account the historical spatial distribution of fire observations, burn scars, fire danger ratings, the veldfire ecology, and recorded fire related deaths. These outline the characteristics of the hazard as it relates to the hazard components of likelihood, frequency, predictability and magnitude.

Following winter, the spring fire hazard profile, represented in Figure 1, indicates an elevated fire hazard towards the eastern parts of South Africa. Areas include western parts of KwaZulu-Natal (Amajuba, Zululand, Umgungundlovu, Uthukela, and Harry Gwala), Mpumalanga (Nkangala, Gert Sibande, and Ehlanzeni), northern parts of the Eastern Cape (Alfred Nzo, Chris Hani, and Joe Gqabi), north eastern parts of the Free State (Thabo Mafutsanyane) and significant areas in North West (Bojanala) and Limpopo (Waterberg and Sekhukhune).

Favourable rainfall conditions during the 2022/23 summer, contributing to an above normal amount of biomass over the summer rainfall areas, combined with a higher likelihood of above normal temperatures (Figure 9) and elevated wind hazard ratings (Figure 3) may contribute to an enhanced fire hazard pending the first widespread rains.

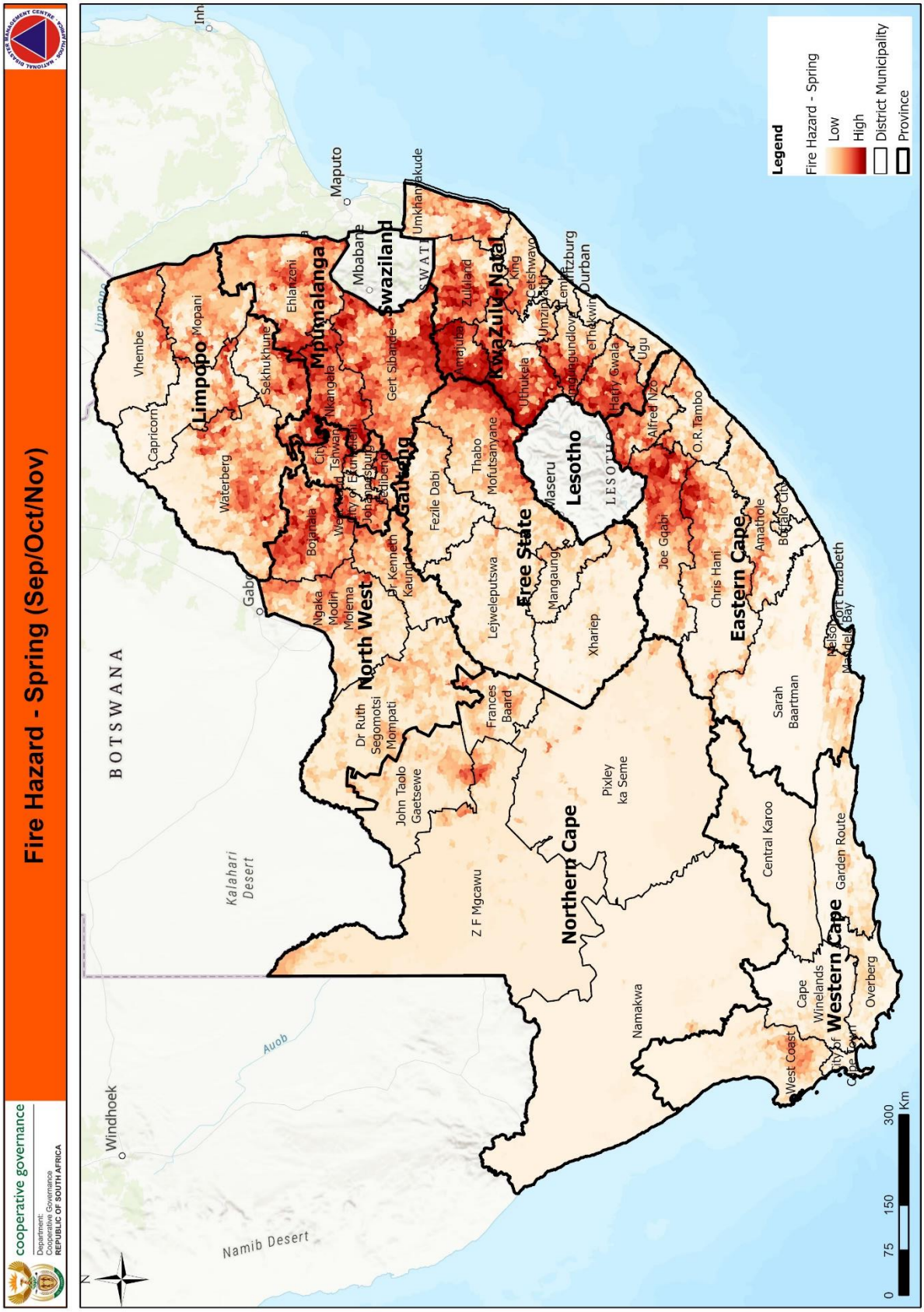

Figure 1: Fire hazard map – spring

2.1.2 Flood

The historical hazard profile for South Africa derived from the EMDAT, CAELUM (SAWS database) and situation reports submitted to the NDMC, rates flooding events the highest in terms of frequency in South Africa. Flooding in South Africa consists of riverine and flash flooding events. The desktop analysis from the indicative risk profile outlines various hazard parameters related to likelihood, frequency, magnitude and predictability using various studies (Land capability by ARC:2002, South African Atlas of Agro hydrology and Climatology by UKZN: 2001) and data sources (historical events) in a weighted scoring model.

Findings of the spring flood hazard profile are represented in Figure 2. High (Dark Blue) and medium to high (Blue) flood hazard scores are observed in northern and coastal KwaZulu-Natal (eThekwini, Umkhanyakude, King Cetshwayo, iLembe as well as in Uthukela district municipality in the west). Similar prominent values are also observed in smaller regions of the Eastern Cape (Buffalo City Metro, Amathole) and in the Western Cape (Cape Winelands).

Additionally, a significant amount of historical flooding events are observed over north eastern parts of the country coinciding with the advent of summer rainfall. Escalation of convective storms during late spring being a contributing factor.

The seasonal forecast from SAWS (Figure 7) indicates a higher likelihood of above normal precipitation for most of South Africa in the coming months. This may lead to hazard escalation and prospects of localized flooding in areas.

Stakeholders are encouraged to take cognisance of the above findings and continuously monitor short-term forecasts and related early warnings.

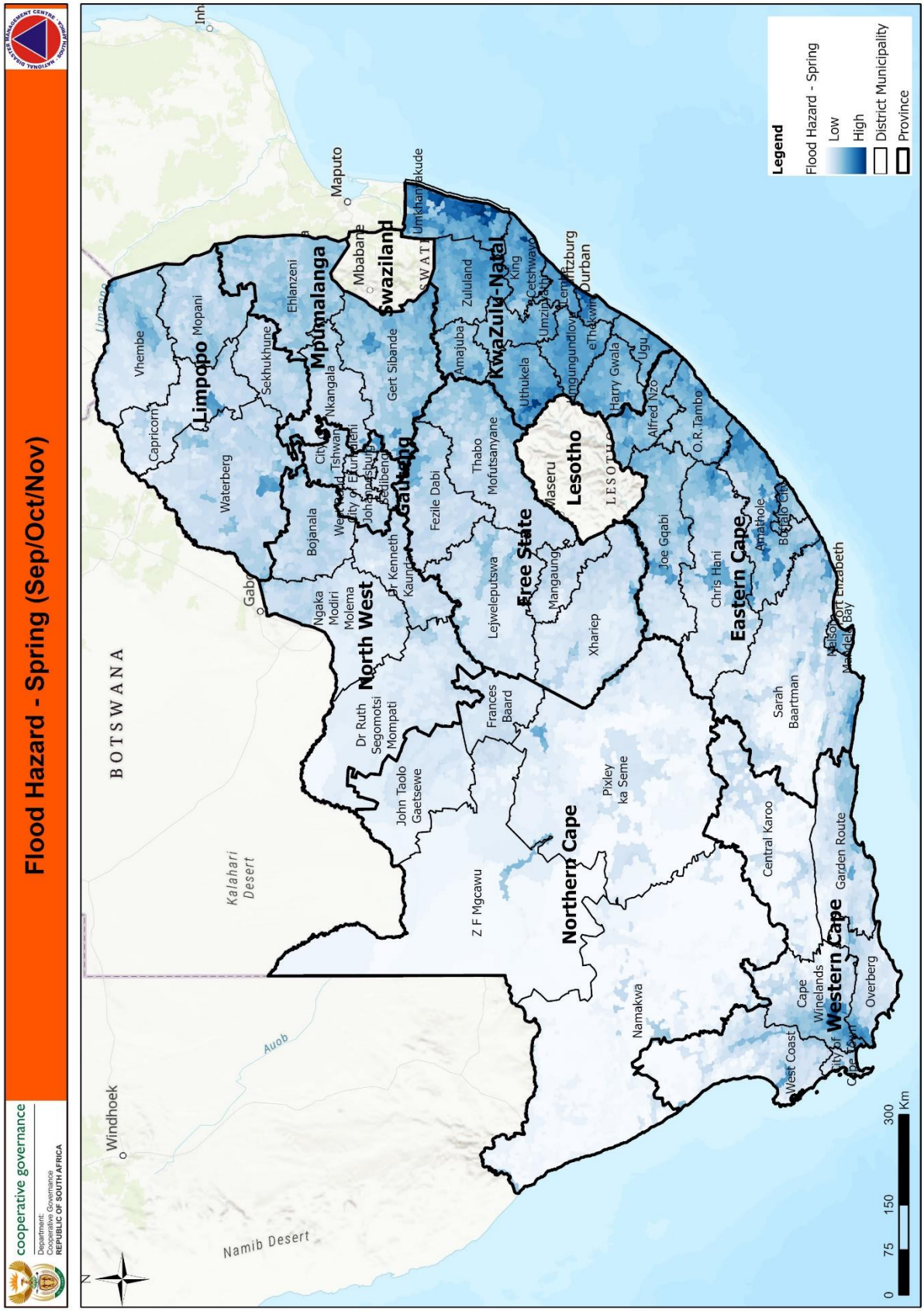

Figure 2: Flood hazard map - spring

2.1.3 Windstorm

Wind related hazards rates third on the historical data obtained by the NDMC in terms of frequency of weather related events. Wind hazards are defined in terms of the wind speed or the origin of the strong wind, e.g. tornadoes, tropical cyclones and thunderstorms. In terms of wind speed, the definition or threshold of a wind hazard is dependent of the socio-economic sector it relates to (SAWS: 2013).

The windstorm hazard relates to parameters such as likelihood, frequency, magnitude and predictability using similar methodology outlined (weighted scoring GIS modelling) in previous hazard assessments related to fire, flood and snow.

High (Dark Green) and medium to high (Blue Green) windstorm hazard values dominate across South Africa for the spring period (Figure 3). Significant areas illustrate high values in the Western Cape (City of Cape Town, Cape Winelands, Central Karoo, and Overberg), Eastern Cape (Nelson Mandela Bay Metro, Buffalo City Metro, Sarah Baartman, Amathole, Chris Hani, and O.R. Tambo) and the Northern Cape (Pixley Ka Seme).

Correspondingly, all districts of the Free State express either high or medium to high wind hazard scores during this period. Western parts of KwaZulu-Natal (Amajuba, uThukela, uMgungundlovu) and southern Mpumalanga (Gert Sibande) also display higher hazard values. Historically, the number of strong wind related events tend to escalate in north eastern parts of South Africa during spring.

Finally, it should also be noted, that historically, particularly the eastern parts of the country, elevated tornado activity in mid to late spring is observed.

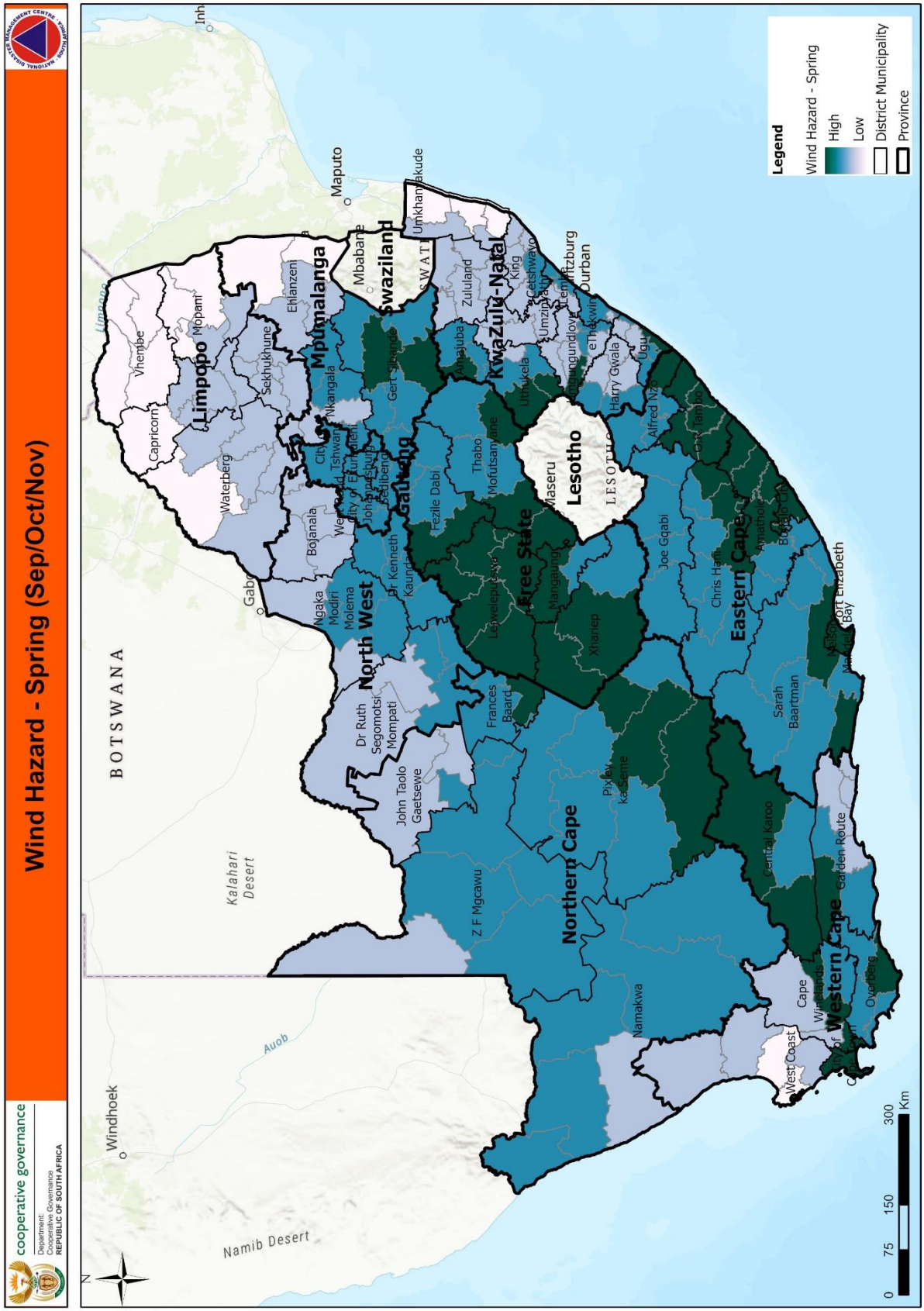

Figure 3: Windstorm hazard map – spring

2.1.4 Snow

In 2015/16, snow hazard calculations were done as a joint partnership between the NDMC and the Council for Scientific and Industrial Research (CSIR). Parameters quantified for this hazard included: likelihood, frequency, magnitude and predictability using a weighted scoring GIS model with a seasonal component. Historical datasets obtained from SAWS and optical remote sensing techniques were applied in the process.

Snow hazard values generally lower as temperatures rise after the winter months of June, July and August. However, historical records still indicate the possibility of snow, particularly in early spring (September).

Figure 4 indicates minor areas in western parts of KwaZulu-Natal (uThukela, uMgungundlovu, Harry Gwala), bordering Lesotho, expressing and medium (yellow) and medium to high (Orange) snow hazard scores. Similarly, medium hazard scores are still observable over parts of the Western Cape (City of Cape Town, West Coast, and Cape Winelands) over this period.

The South African Weather Service predicts a higher likelihood of above normal temperatures in September, October and November, both for minimum (figure 8) and maximum (Figure 9) temperatures, over most of the country. This may influence snow hazard manifestation.

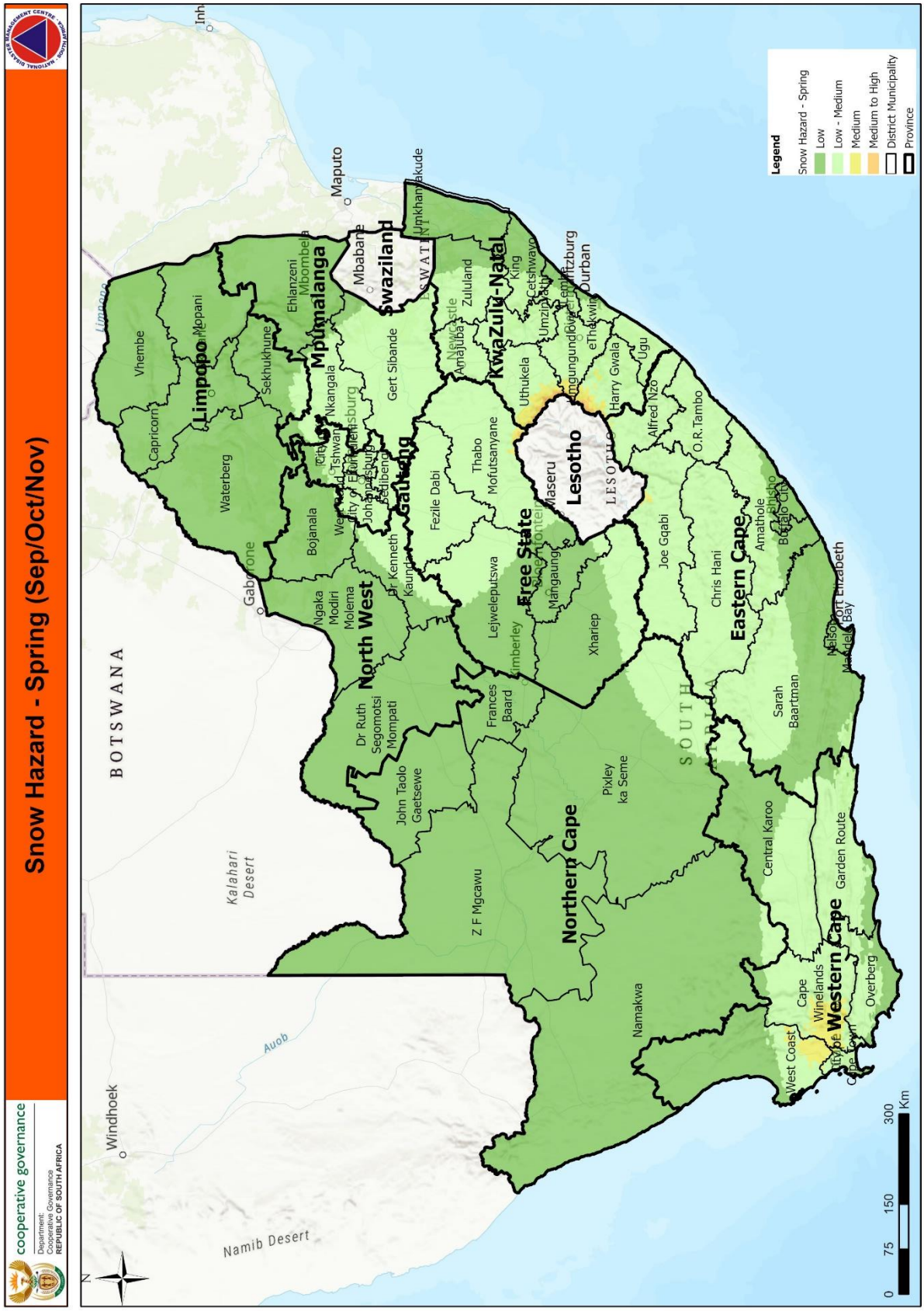

Figure 4: Snow hazard map – spring

2.1.5 Current Drought Status

A drought is usually identified when a shortage of water (surface/underground) over a long period (in excess of 24 months) results in a negative impact. Drought can be detected and characterized using the Standard Precipitation Index (SPI – McKee et al., 1993). The SPI was developed to monitor the occurrence of drought from rainfall data. The index quantifies precipitation deficits on different time scales and therefore also drought severity. The ARC-ISCW calculates the SPI at various time scales per quaternary catchment. (Malherbe et al. 2016).

Drought extent until the end of July 2023, as depicted in Figure 5, remains very limited, with only isolated areas of drought still visible over the southern and western parts (Cape Provinces). Latest observations indicated the there are no expanding areas of drought across the country.

Late-summer months were relatively dry over the northern to north western parts of the summer rainfall region, with moderate to severe drought present exclusively at shorter time scales over the central to north-north western parts of the Northern Cape. Large parts of the central to south-eastern interior still experience extremely wet conditions at the longer time scales according to the SPI.

The precipitation forecast, in Figure 7 for the coming months, indicate a higher likelihood of above normal precipitation over the entire country. These conditions may benefit areas with lingering drought signals, particularly in the summer rainfall areas.

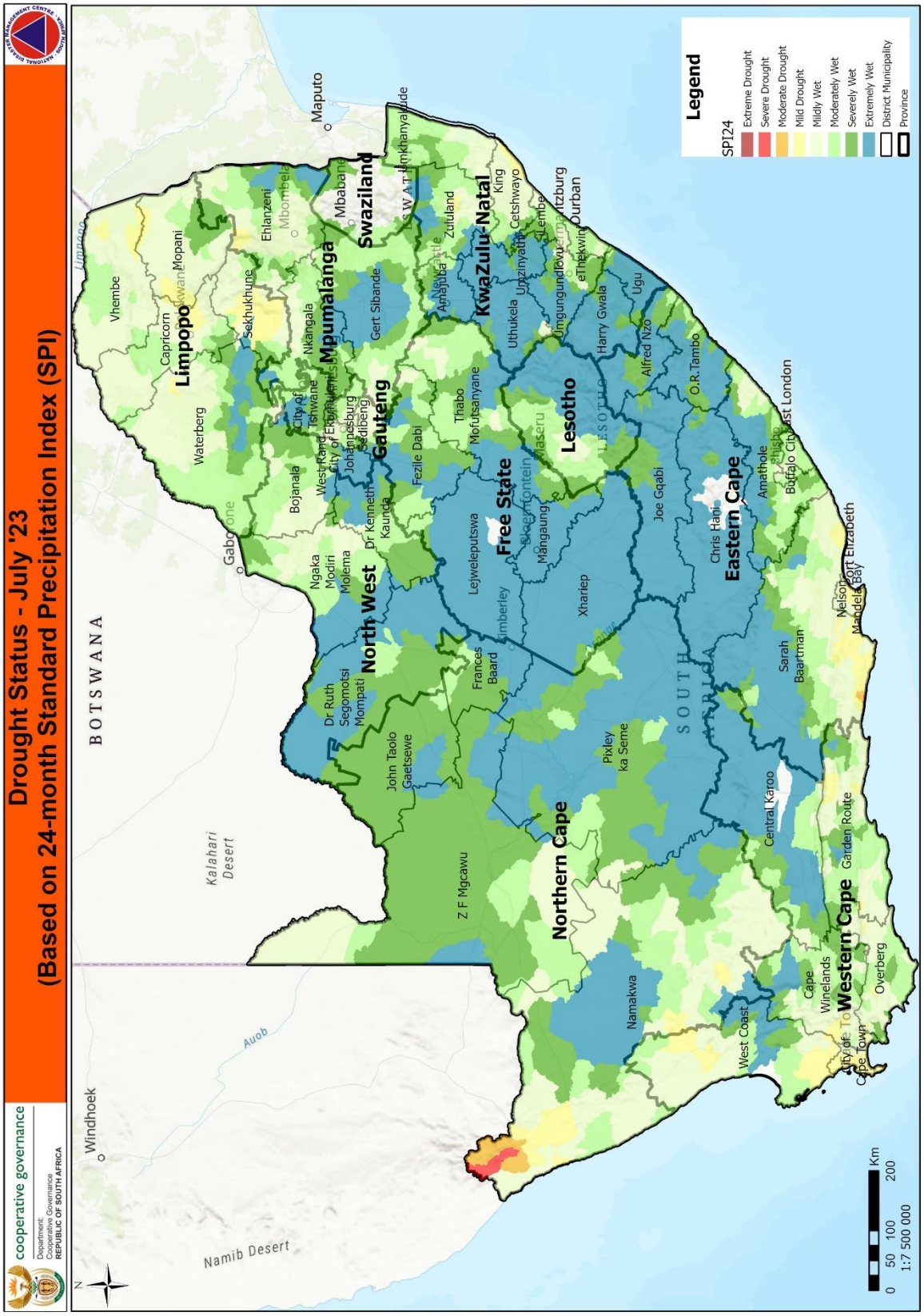

Figure 5: Drought Status Map – July 2023

The Percentage of Average Seasonal Greenness (PASG) (Figure 6) demonstrates deviations from the long-term average vegetation activity over a given timeframe. From the legend provided vegetation activity is categorized from presenting well above average (in green) to areas showing potential drought (orange) and drought conditions (red).

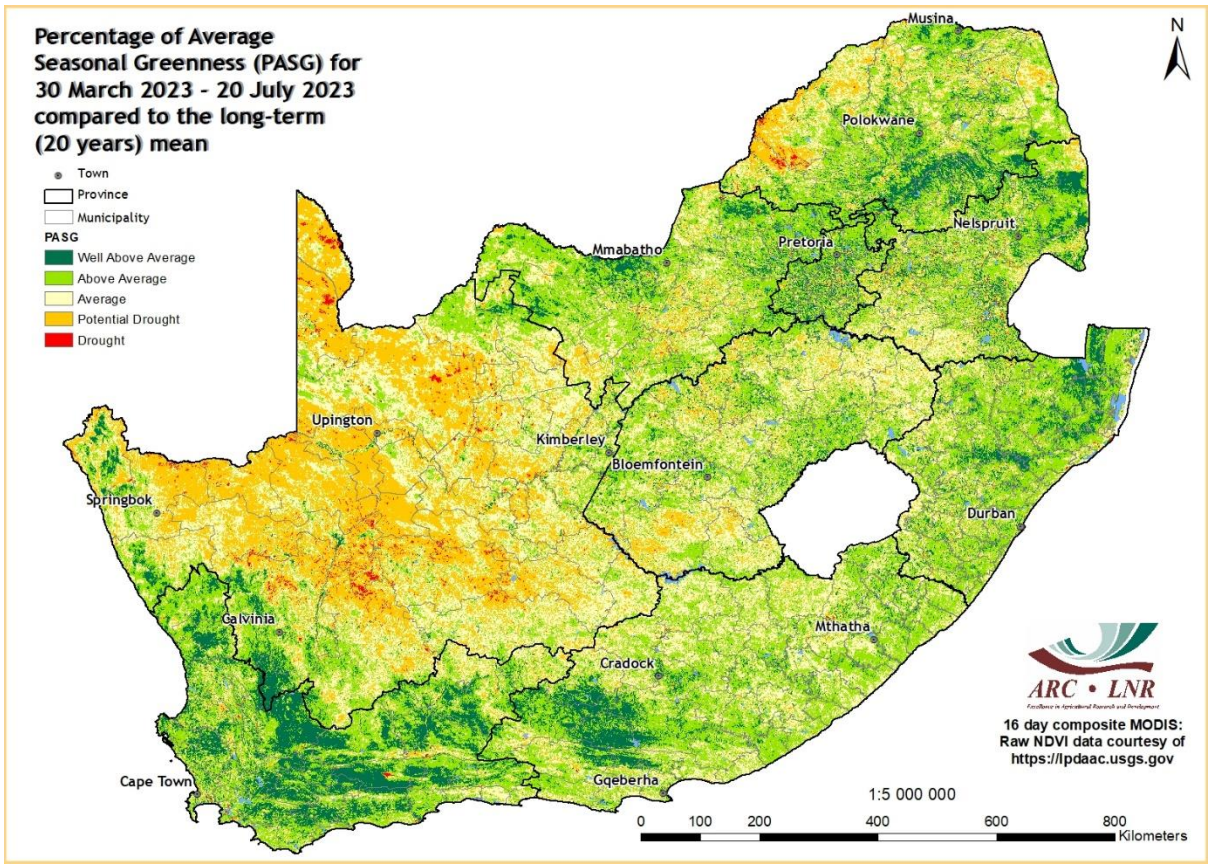

Figure 6: Percentage of Average Greenness (PASG) – 30 March – 20 July '2023

Most parts of the country has experienced above-normal seasonal cumulative vegetation activity, apart from most of the Northern Cape, far western parts of Limpopo, and few other areas that experienced potential drought.

2.2 Seasonal Weather Forecasts

The seasonal forecasts are sourced from the South African Weather Services (SAWS) and aim to add greater context to the hazard profiles already discussed. For more information around the Seasonal Climate Watch product and services please contact:

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2.2.1 Overview

“The El Niño-Southern Oscillation (ENSO) is currently in an El Niño state and according to the latest predictions is expected to persist through most of the summer months. ENSO’s typical impact on Southern Africa is in favour for generally drier and warmer conditions during the summer seasons from October to March. Current global forecasts indicate a great deal of uncertainty for the typical drier conditions that South Africa experiences during an El Niño.”

“The multi-model rainfall forecast indicates above-normal rainfall for most of the country during mid-spring (Sep-Oct-Nov) and late-spring (Oct-Nov-Dec). The early-summer (Nov-Dec-Jan) however, indicates below-normal rainfall over the central parts of the country and above-normal rainfall for the north-east.”

“Minimum and maximum temperatures are expected to be mostly above-normal countrywide for the forecast period.” (Seasonal Climate Watch, SAWS: August 2023)

2.2.3 Rainfall

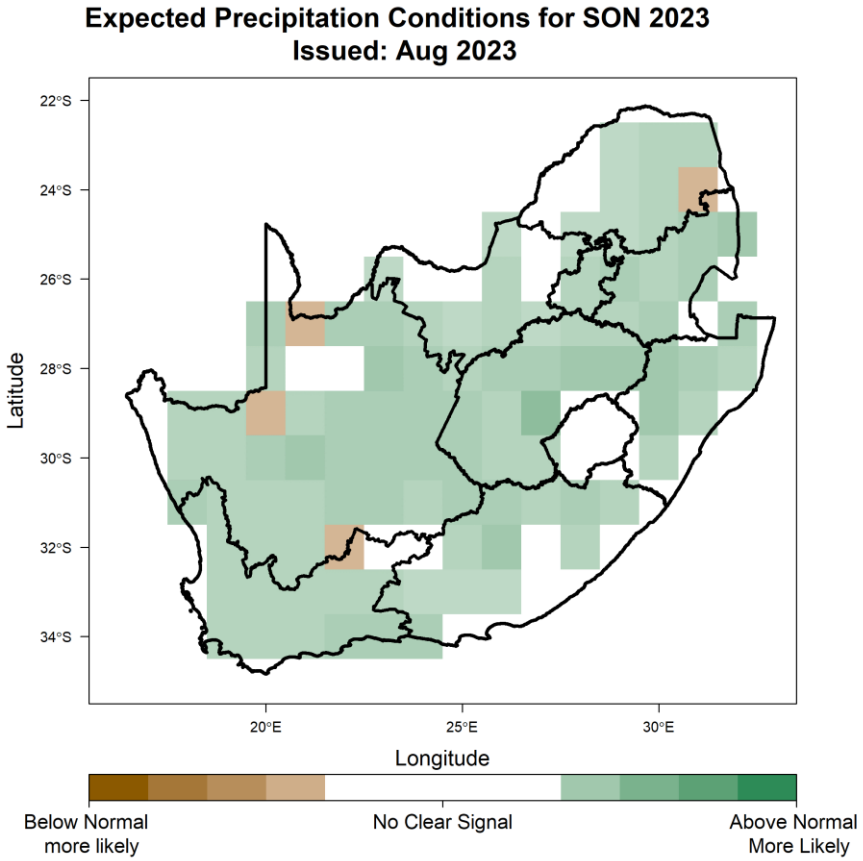

Figure 7: Rainfall - spring 2023 (September / October / November (SON)).

2.2.4 Minimum and Maximum Temperatures

2.2.4.1 Minimum Temperatures

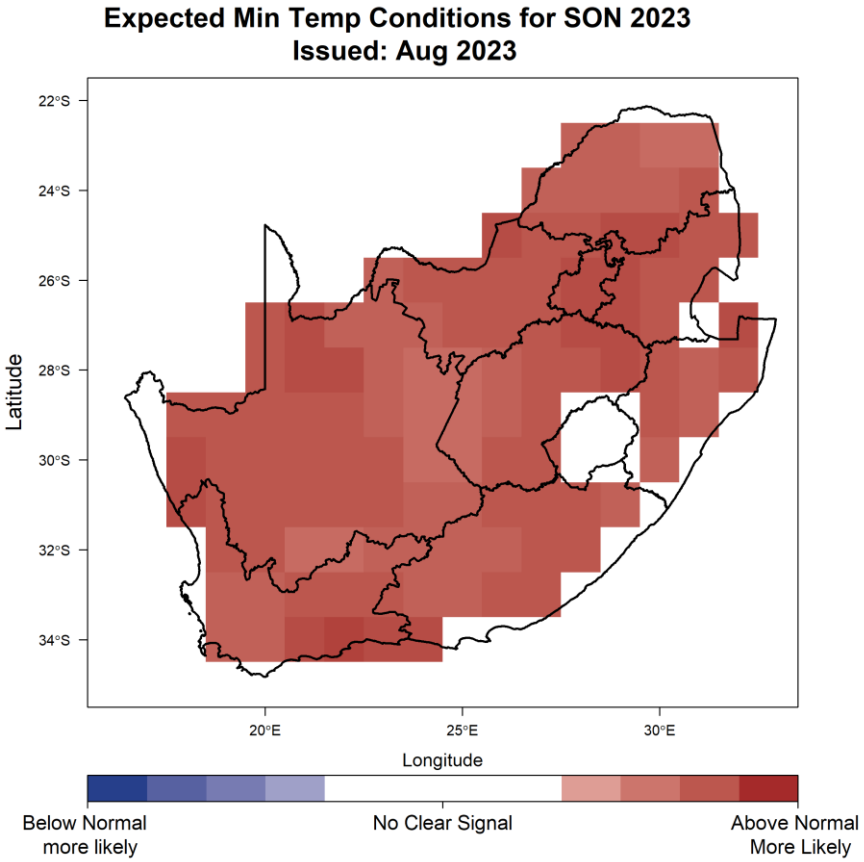

Figure 8: Minimum Temperatures - spring 2023 (September / October / November (SON)).

2.2.4.2 Maximum Temperatures

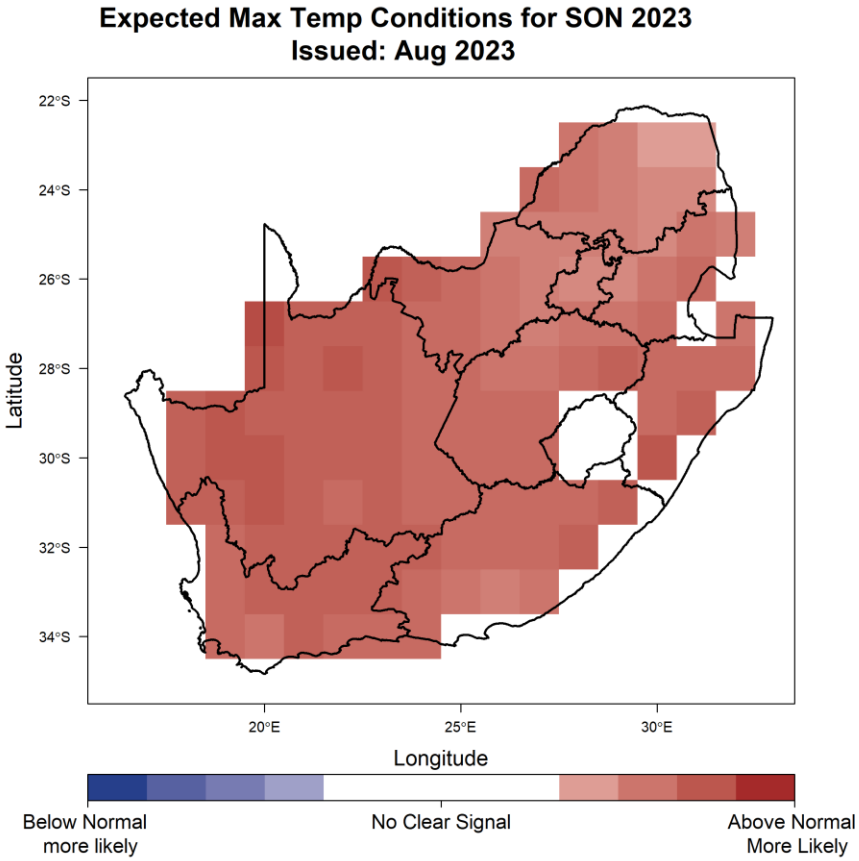

Figure 9: Maximum Temperatures - spring 2023 (September / October / November (SON)).

3. RECOMMENDATIONS

It is recommended that Disaster Management entities and stakeholders note the content of the seasonal hazard profile for spring 2023 and note the commentary made by the SA Weather Services and contributing stakeholders.

4. APPENDICES

None

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