# NDMC

# SEASONAL HAZARD PROFILE

## Spring 2022

**Prepared by:**

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***September 2022***

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Date:

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# 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 relavant 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) 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 calender 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 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 2022

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, burnscars, 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.

The fire hazard profile for spring is shown in Figure 1. Eastern Parts of South Africa illustrate high (Red) and medium to high (Orange) fire hazard scores.

These areas include western parts of KwaZulu-Natal (Amajuba, Harry Gwala, Umgungundlovu, Umzinyathi, Uthukela, and Zululand), Mpumalanga (Ehlanzeni, Gert Sibande, and Nkangala), .northern parts of the Eastern Cape (Alfred Nzo, Chris Hani, and Joe Gqabi), far eastern areas of the Free State (Thabo Mafutsanyane) and significant areas in North West (Bojanala) and Limpopo (Waterberg and Sekhukhune).

Given the favourable rainfall conditions during the 2020/21 & 21/22 summers, the amount of biomass over the summer rainfall region may be above normal. These conditions 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 awaiting the first widespread rains.

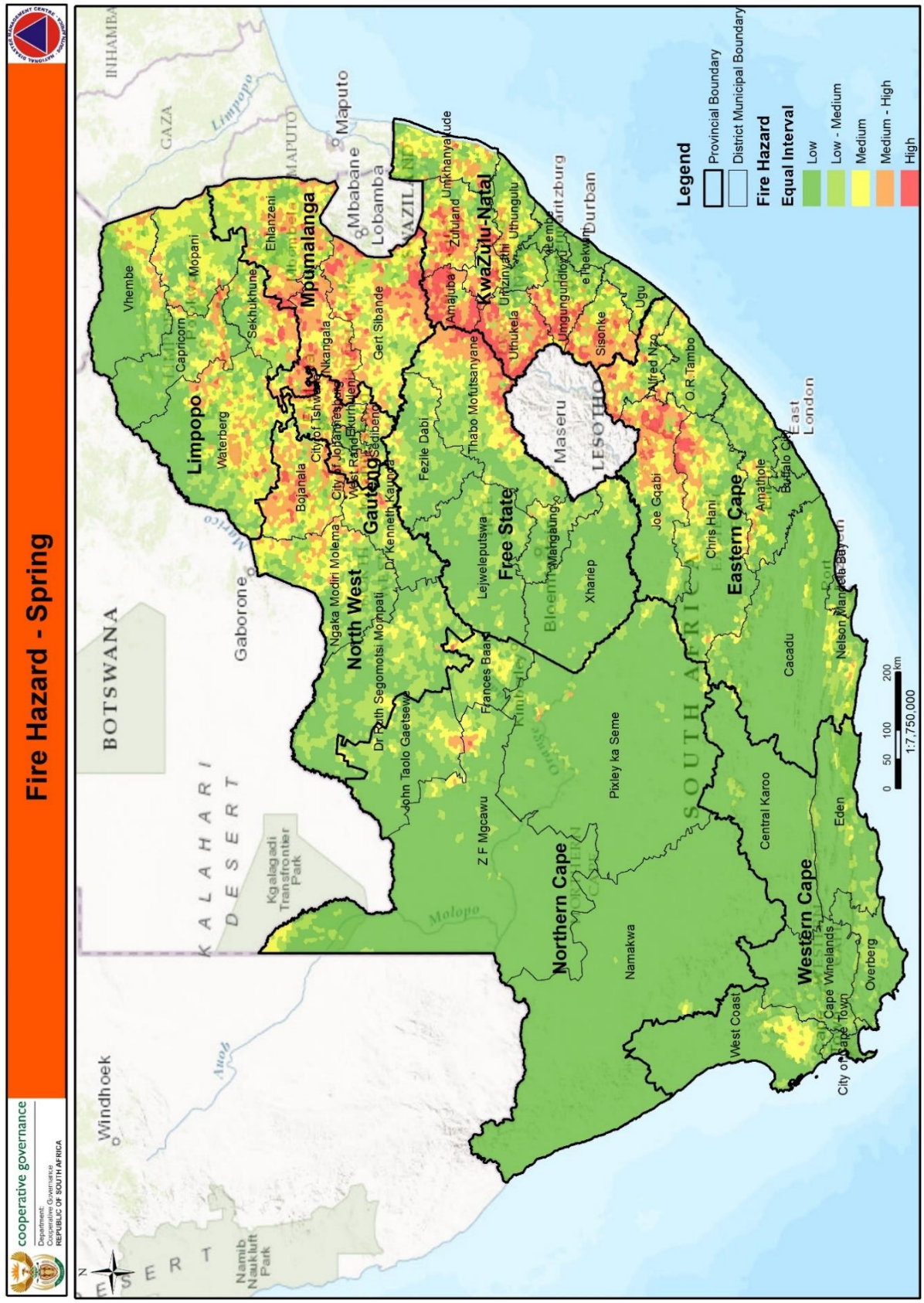


**Figure 1:** Fire hazard map – spring

### 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 fooding 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 (Landcapability by ARC:2002, South African Atlas of Agrohydrology and Climatology by UKZN: 2001) and datasources (historical events) in a weighted scoring model.

Figure 2 represents findings from the spring seasonal Flood Hazard Profile. High (Red) and medium to high (Orange) 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 elevated values are also observed in .smaller regions of the Eastern Cape (Buffalo City Metro, Amathole) and in the Western Cape (Cape Winelands).

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

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

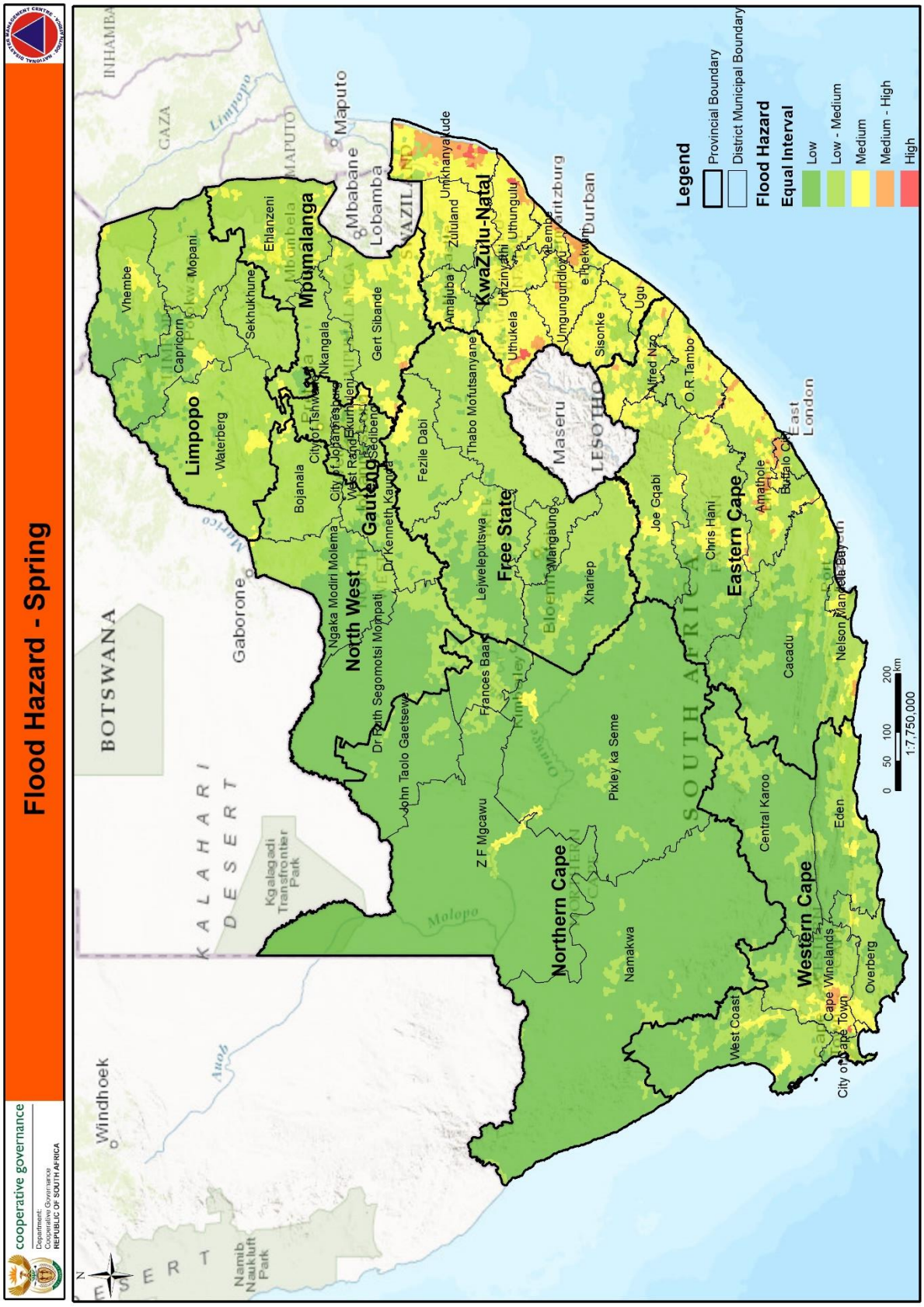


**Figure 2:** Flood hazard map - spring

### 2.1.3 Windstorm

Wind related hazards rates third on the historical data obtained by the NDMC in terms of frequency of 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 drought.

High (Red) and medium to high (Orange) windstorm hazard values dominate across South Africa for the spring period (Figure 3). Significant areas illustrate high vaues 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).

Similarly, all districts of the Free State express either high (Red) or medium to high (Orange) hazard scores during this period. Western parts of KwaZulu-Natal (Amajuba, uThukela, uMgungundlovu) and southern Mpumalanga (Gert Sibande) also display higher hazard values.

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

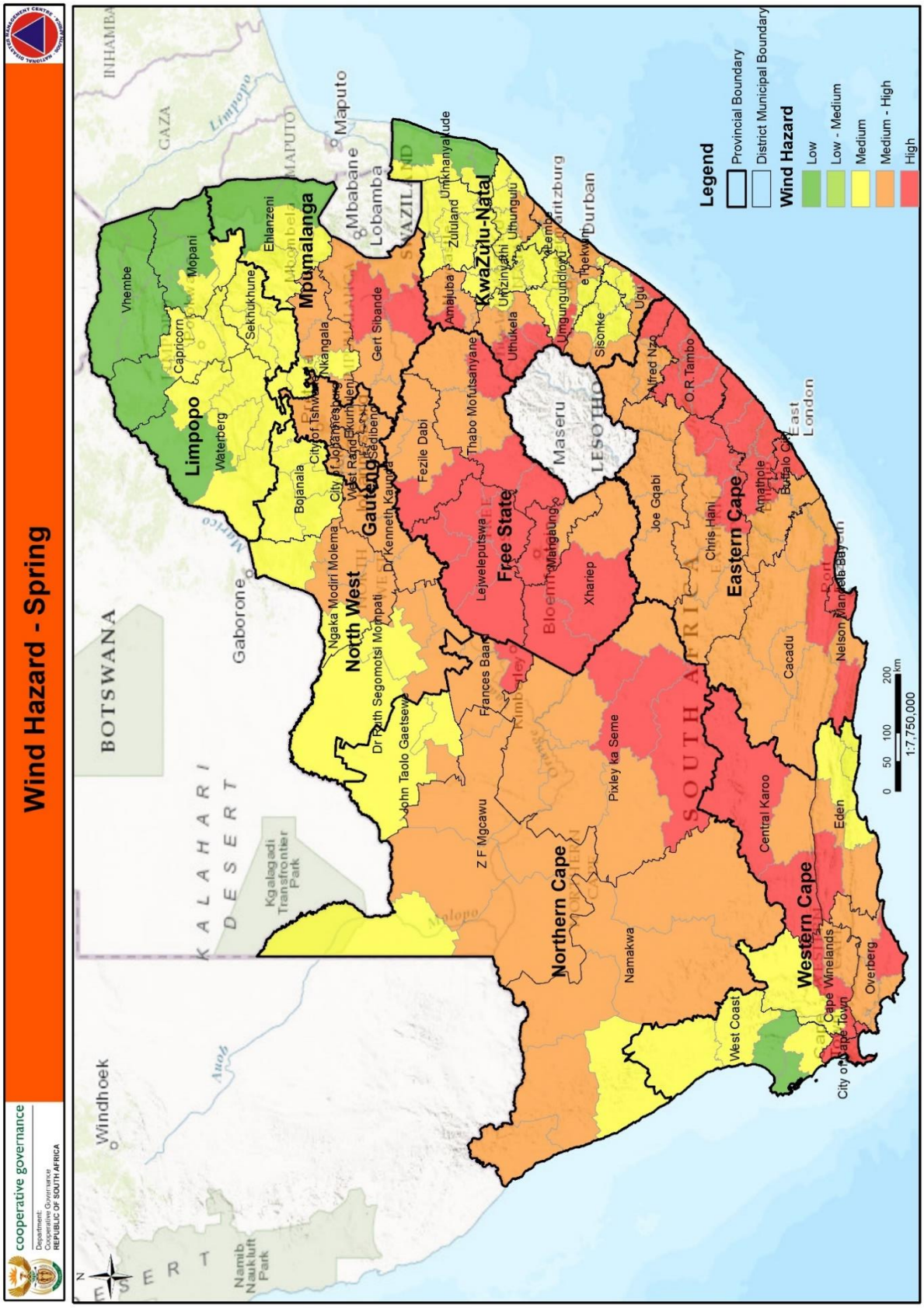


**Figure 3:** Windstorm hazard map – spring

### 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.

Figure 4 indicates minor areas in western parts of KwaZulu-Natal (uThukela, uMgungundlovu, Harry Gwala), bordering Lesotho express 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.

A higher likelihood of above normal temperatures, forecasted for both minimum (figure 8) and maximum (Figure 9) temperatures, over most of these areas in question, are predicted by SAWS. This may influence snow hazard manifestation.

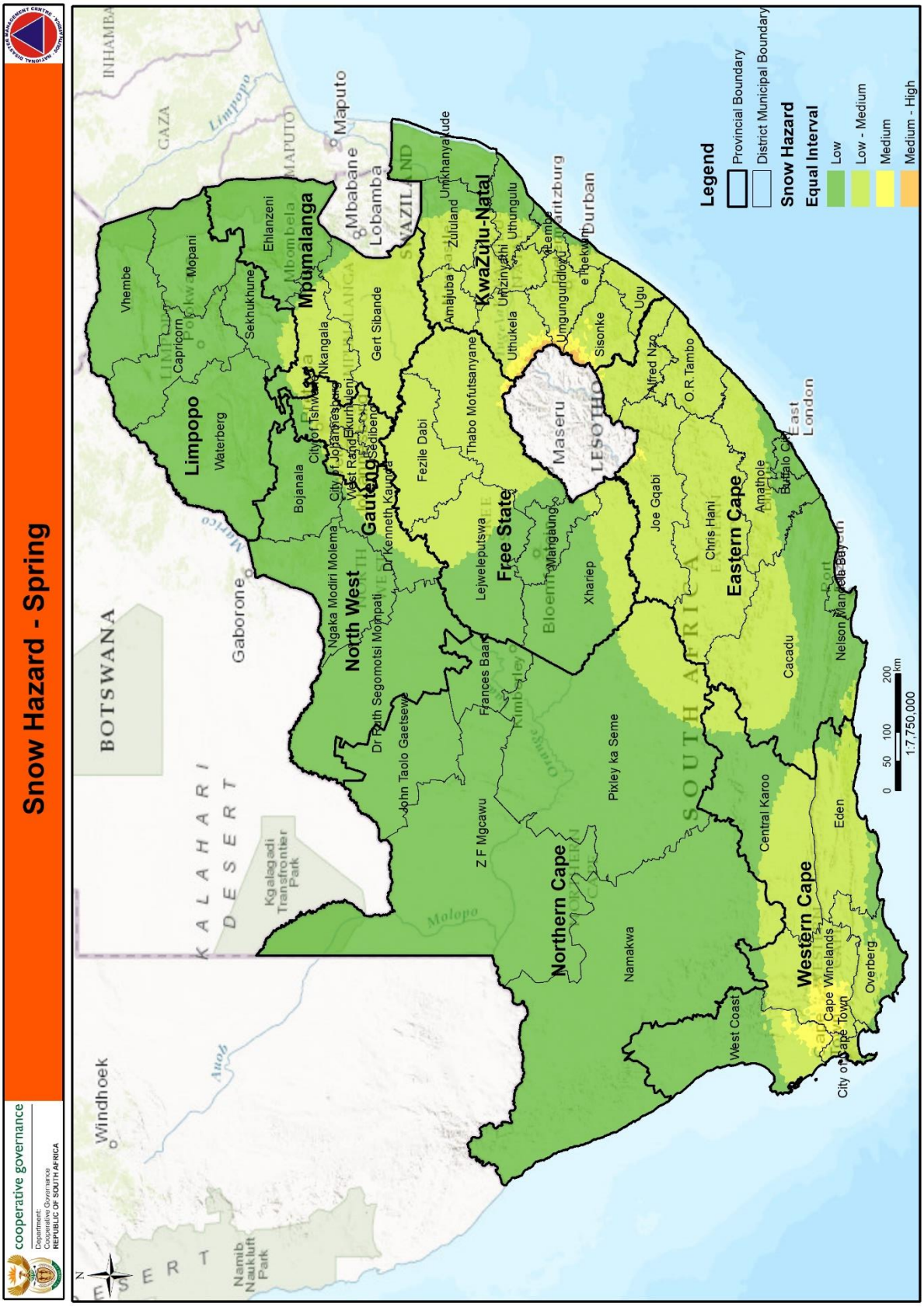


**Figure 4:** Snow hazard map – spring

### 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 occurance 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).

The latest drought observations are presented in Figure 5. Drought occurrence is currently very limited following two wet summers over large parts of the interior.

Most of the central to northern interior remain extremely wet (Blue). The far north-eastern parts of the country together with much of the southern to western coastal belt and adjacent interior haven't experienced similar extremely wet conditions during the past summer as most of the rest of the interior.

Short- to medium term SPI data and vegetation activity indicate existing and developing drought conditions over the southern to western coastal areas and adjacent interior. Over the winter rainfall region in particular, parts of the main grain production area experience moderate to severe drought at the shorter time scales, related to a delayed onset of winter rainfall together with below-normal rainfall during July.

Parts of the Eastern Cape (parts of Sarah Baartman and Nelson Mandela Bay) and the northern parts of the western escarpment still experience severe (Red) to extreme (Maroon) drought conditions at longer time scales. Smaller areas along the border between Limpopo and Mpumalanga are still at risk for drought conditions if the onset of the coming summer rainy season is delayed. Parts of this area still experience moderate drought at the longer time scales.

The precipitation forecast for the coming months indicated a generally higher likelihood of above normal precipitation over central, southern and eastern parts of the country (Figure 7). This may assist in alleviating drought conditions over the indicated areas (central Eastern Cape & Limpopo).

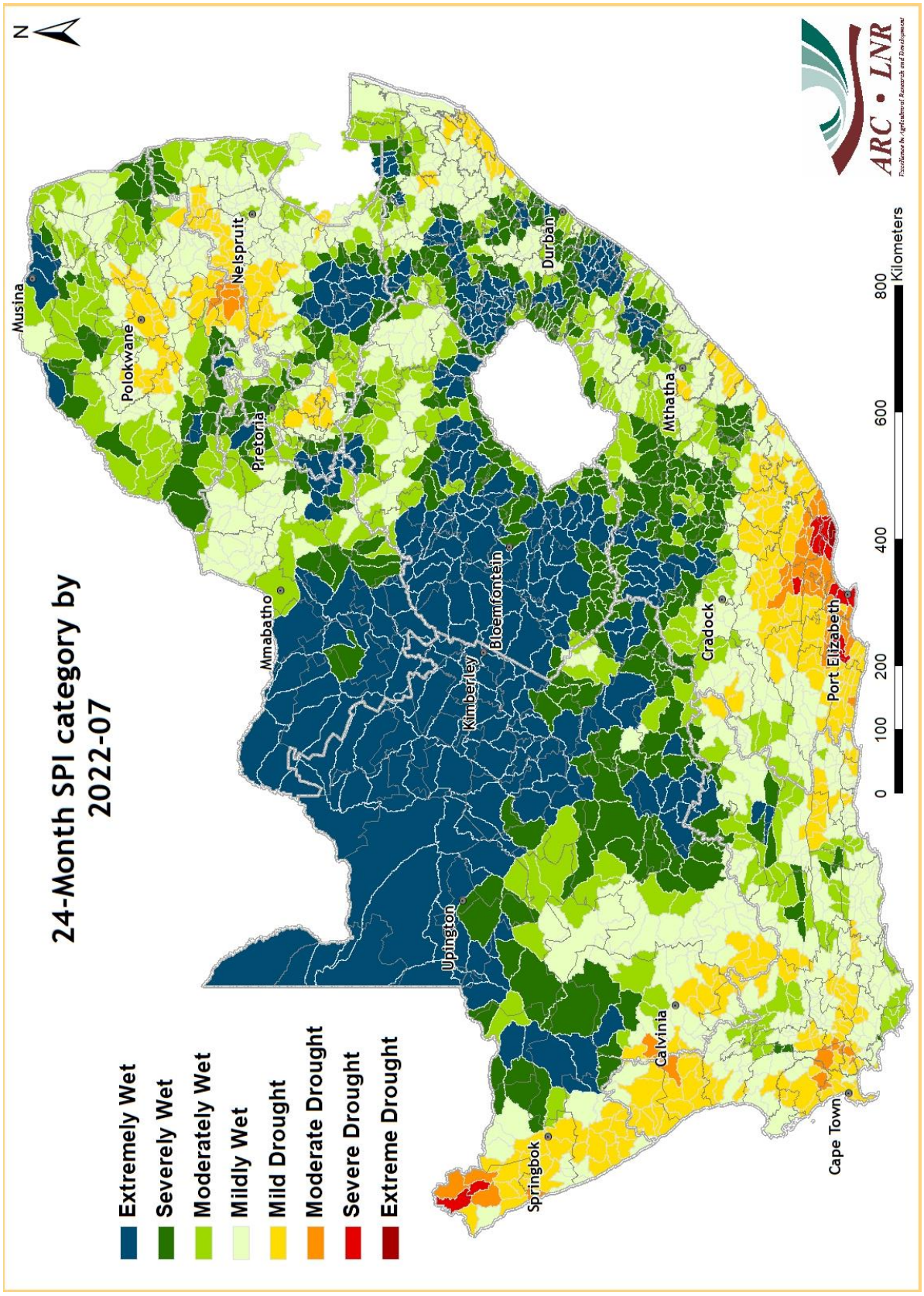


**Figure 5:** Drought Status Map – July 2022

The Percentage of Average Seasonal Greenness (PASG) 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).

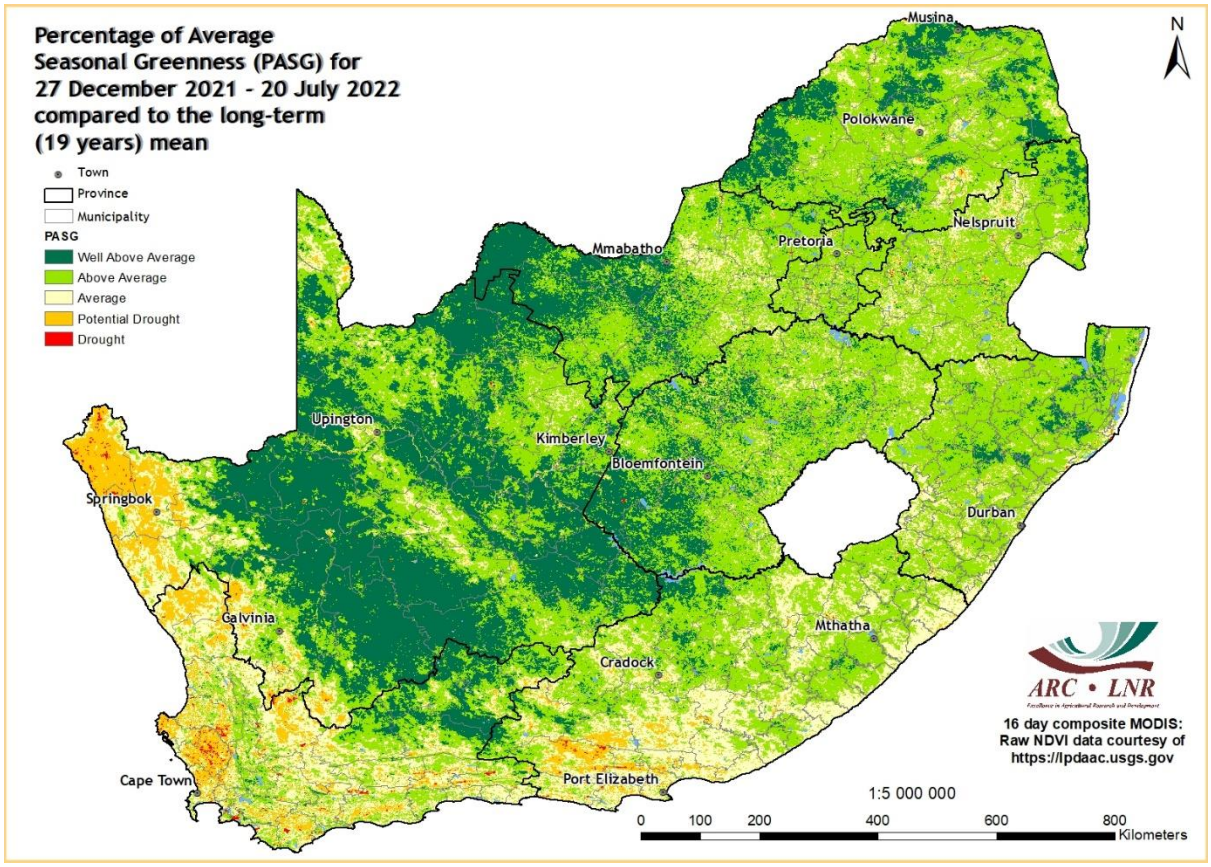


**Figure 6:** Percentage of Average Greenness (PASG) – Dec ‘21 – July ‘22

The PASG indicates well-above-average cumulative vegetation activity over most of the interior, reaching a maximum over the northern to central and western interior.

The south-western half of the Eastern Cape as well as large parts of the winter rainfall region, especially the grain-production areas (Swartland and Ruens), experience below-average cumulative vegetation activity, associated with lower rainfall as shown in the SPI maps and also indicating potential drought (Orange) and drought (Red) signals.

The dry conditions over the south-western winter rainfall region and further up the West Coast are related to a delayed start to the rainy season as well as below-normal

rainfall during July. Further north, around the Richtersveld, drought conditions have been present for a longer timeframe.

## 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 a weak La Niña state, and forecasts indicate that it will likely remain in this state during the remainder of 2022, with an ENSO neutral state most likely early 2023. The presence of a La Niña event usually has its strongest impact on rainfall during the mid-summer months. Therefore, its evaluation into the start of the summer months is important to take note off.

The multi-model rainfall forecast indicates below-normal rainfall for the western parts of the country during spring (Sep-Oct-Nov), with above-normal rainfall expected over most of the remainder of the country. Rainfall conditions are predicted to improve further during the early-summer (Oct-Nov-Dec) into the start of the mid-summer months (Nov-Dec-Jan). Both maximum and minimum temperatures are expected to be above-normal for most of the country.

The South African Weather Service (SAWS) will continue to monitor the weather and climatic conditions and provide updates on any future assessments that may provide more clarity on the current expectations for the coming season.” (Seasonal Climate Watch, SAWS: August 2022)

### 2.2.3 Rainfall

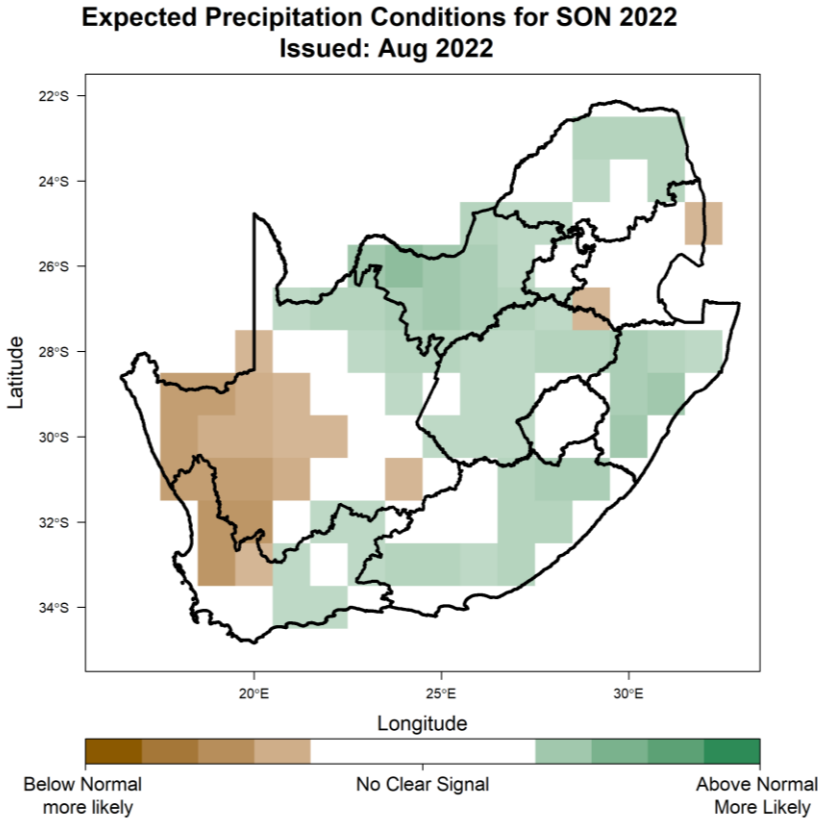


**Figure 7:** Rainfall - spring 2022 (September / October / November (SON)).

### 2.2.4 Minimum and Maximum Temperatures

#### 2.2.4.1 Minimum Temperatures

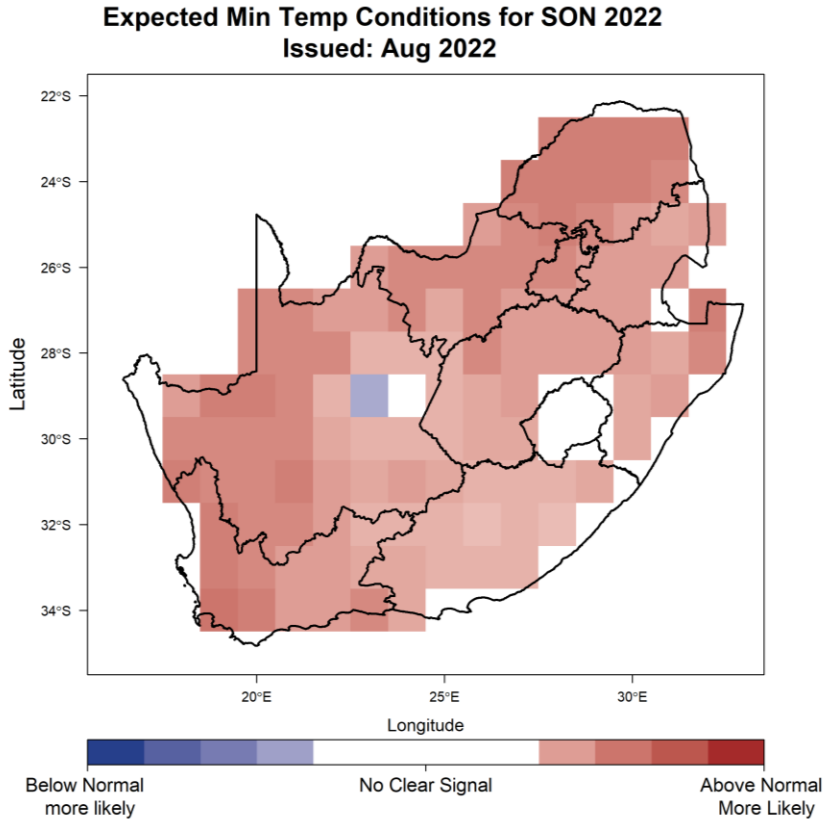


**Figure 8:** Minimum temperatures – spring 2022 (September / October / November (SON))

### 2.2.4.2 Maximum Temperatures

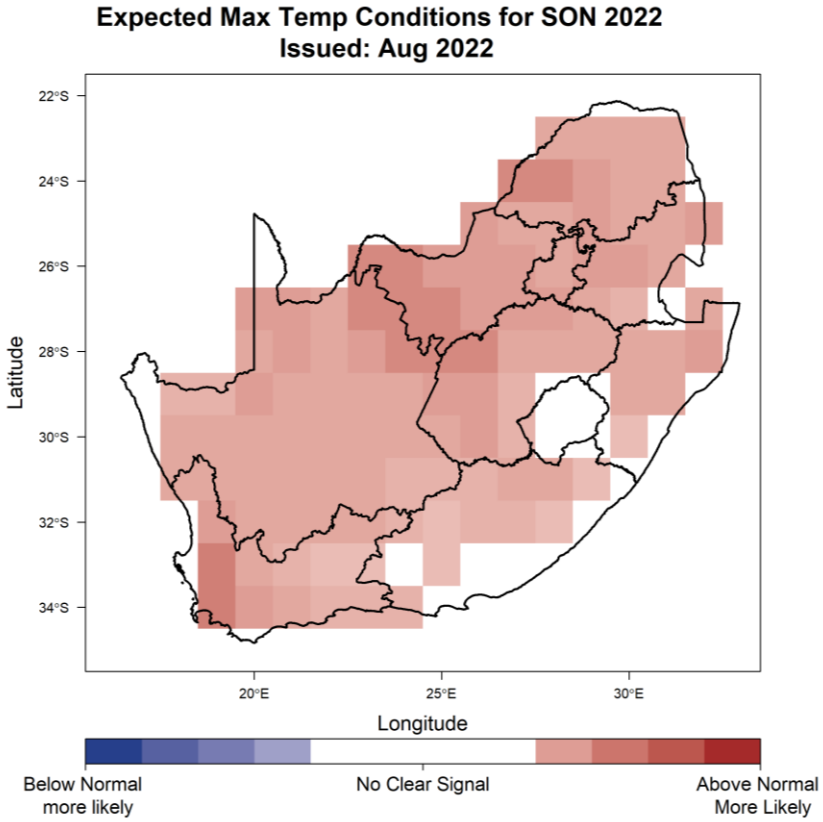


**Figure 9:** Maximum temperatures – spring 2022 (September / October / November (SON))

## 3. RECOMMENDATIONS

It is recommended that Disaster Management entities and stakeholders note the content of the seasonal hazard profile for spring 2022 and note the commentary made by the SA Weather Services and contributing stakeholders.

## 4. APPENDICES

None

## 5. References

1. ARC. (2022). Umlindi Monthly
2. CSIR. (2015). Hazard Quantification – Snowfall: Project Report
3. Dzanibe S. 2015. Early snowfall on the Drakensberg. Daily News. Available from: http://www.iol.co.za/news/south-africa/kwazulu-natal/early-snowfall-on-the-drakensberg-1.1813338. [February 2015]
4. Malherbe, J and Maluleke, P. (2013). Assessment of historical drought events over South Africa
5. National Disaster Management Centre (2016). Indicative Risk Profile for Snow: Desktop GIS Analysis: Project Report
6. National Disaster Management Centre (2015). Indicative Risk Profile for Windstorms: Desktop GIS Analysis: Project Report
7. National Disaster Management Centre (2014). Indicative Risk Profile for Drought: Desktop GIS Analysis: Project Report
8. National Disaster Management Centre (2013). Indicative Risk Profile for Flood
9. National Disaster Management Centre (2012). Indicative Risk Profile for Fire
10. SAWS. (2022). Seasonal Climate Watch Monthly
11. SnowReport.co.za. 2014.Snow Report- Report Sightings. Available from: http://snowreport.co.za. [December 2014]


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