

## Malaria vector surveillance in the endemic areas in South Africa over a 5 year period- a retrospective study

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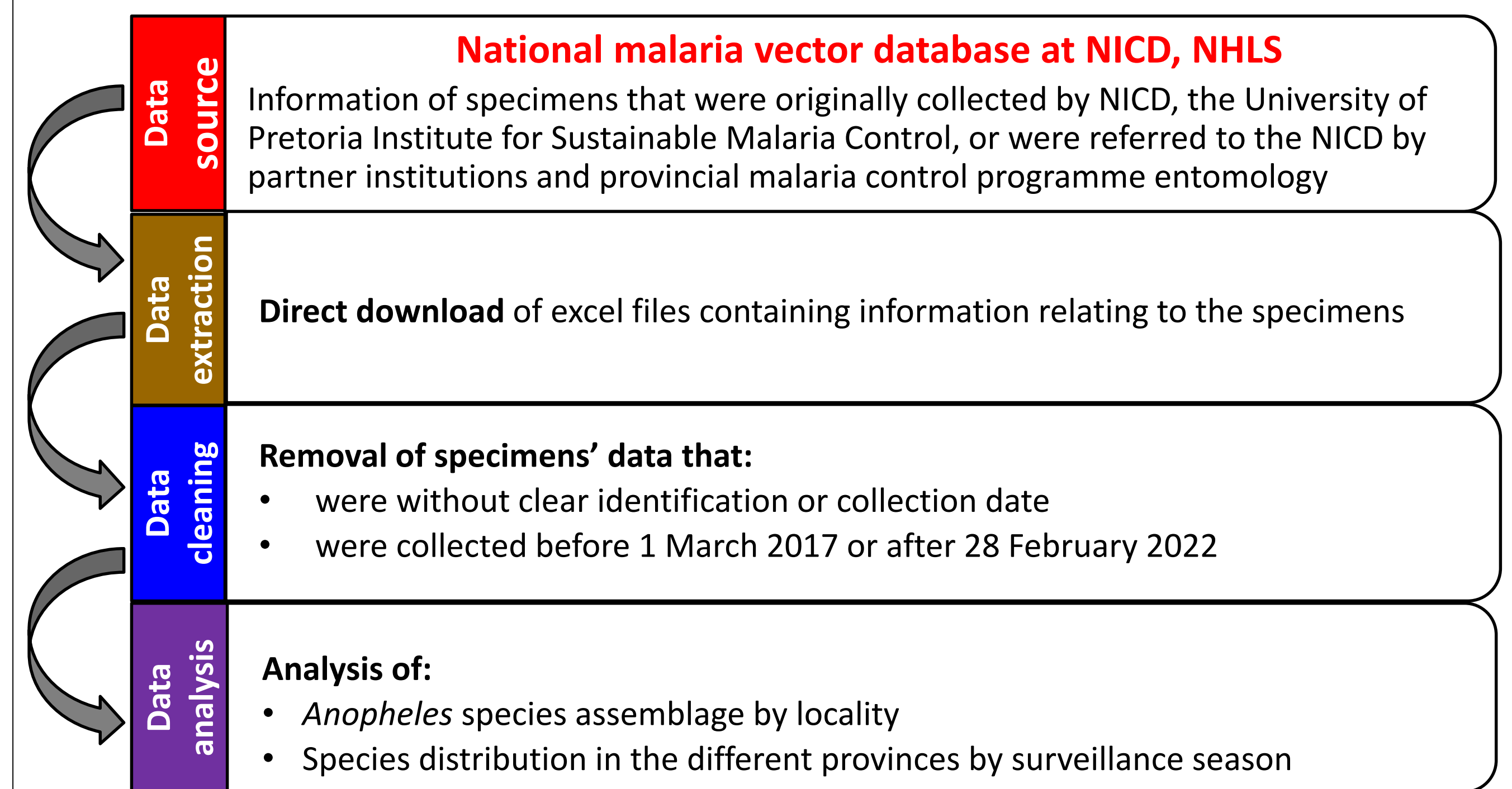
### INTRODUCTION & AIM

- Malaria** is the deadliest vector borne disease caused by *Plasmodium* parasites transmitted by female *Anopheles* vector species.
- In South Africa:**
  - Malaria** is seasonal and confined to the North-Eastern border regions of Limpopo, Mpumalanga and KwaZulu-Natal provinces.
  - More than 14 *Anopheles* species** (major and potential vector) that occur in South Africa → responsible in varying degrees to the ongoing residual malaria transmission
- As South Africa moves towards malaria elimination by 2028** → enhanced vector surveillance information is necessary for targeted control interventions.
- The national malaria vector database**
  - Managed and hosted** by the Centre for Emerging Zoonotic & Parasitic Diseases, National Institute for Communicable Diseases, (NICD), a division of the National Health Laboratory Service (NHLS)
  - An important repository for studying entomological trends and guide vector control strategy**
- Information from the database** → is necessary to predict malaria risk and receptivity going forward.
- Aim of this study:** To assess local *Anopheles* species assemblages stratified by location (endemic province) and season, for five malaria seasons in South Africa.

### METHOD

This study analysed retrospective data of *Anopheles* specimens that were collected from sentinel sites in the KwaZulu-Natal, Mpumalanga and Limpopo provinces, South Africa, during the period 1 March 2017 to 28 February 2022.

#### A flowchart of the data processing



### RESULTS & DISCUSSION

- During the period under analysis:** the highest collection of *Anopheles* specimens was from KwaZulu-Natal (76%, n=25,359), followed by Limpopo (14%, n=4,764) and Mpumalanga (10%, n=3,307) (Table 1)
- Analysis of the collected *Anopheles* specimens:** 73.8% have been incriminated as vectors in South Africa (*Anopheles arabiensis* (58.3%), *An. parensis* (6.6%), *An. vaneedeni* (2.1%)) and closely surrounding countries (*An. merus* (6.7%)) (Table 1)
- The *Anopheles* specimens collection:** included species implicated as potential vectors in other countries (12.1%) as well as species from the *An. coustani* and *An. marshallii* groups (6.1%), which also contain several potential vector species (Table 1)
- An. gambiae* complex major (*An. arabiensis*) and potential (*An. merus*) vector specimens:** majority were collected from KwaZulu-Natal (n=19,296), followed by 2,333 from Mpumalanga (n=2,333) and Limpopo (n=120) (Table 1)
- Anopheles funestus* group specimens that are potential vectors (*An. lesoni*, *An. parensis*, *An. rivulorum* and *An. vaneedeni*):** were predominantly collected from KwaZulu-Natal (n=3,459), followed by Limpopo (n=802) and Mpumalanga (n=179) (Table 1)
- Miscellaneous *Anopheles* specimens potential secondary vectors (*An. demeilloni*, *An. longipalpis*, *An. pharoensis*, *An. pretoriensis*, *An. rufipes*, *An. squamosus* and *An. theileri*)** as well as species within the *An. coustani* and *An. marshallii* groups: primarily collected from KwaZulu-Natal (n=2,388) and Limpopo (n=1,932) followed by Mpumalanga (n=215) (Table 1)
- Location of major vector and potential vector species as well as *An. coustani* and *An. marshallii* group specimens:** primarily located in the Jozini municipality of the uMkhanyakude District of northern KwaZulu-Natal (n = 24,659); Musina Municipality of the Vhembe District (n=2,759), Limpopo and Nkomazi Local Municipality of the Ehlanzeni District (n=2,115) (Figure 1)
- Collection of *Anopheles* vector (major and potential) specimens per season:** collection was highest in KwaZulu-Natal followed by Mpumalanga in autumn, winter and summer and Limpopo in spring (Figure 2).
- Anopheles arabiensis* (major vector)** was collected from all the endemic provinces in each season (Figure 2).

Table 1. Numbers of *Anopheles* specimens collected by species and province, South Africa, 01 March 2017 to 28 February 2022

Anopheles species		KwaZulu-Natal	Limpopo	Mpumalanga
<i>An. gambiae</i> complex	<i>An. arabiensis</i>	18,554	107	857
	<i>An. merus</i>	742	13	1,476
	<i>An. quadriannulatus</i>	175	978	531
<i>An. funestus</i> group	<i>An. lesoni</i>	304	346	18
	<i>An. parensis</i>	2,206	2	1
	<i>An. rivulorum</i>	351	391	107
	<i>An. rivulorum-like</i>	0	81	0
Other <i>Anopheles</i> species	<i>An. vaneedeni</i>	598	63	53
	<i>An. coustani</i> group	320	184	24
	<i>An. demeilloni</i>	39	126	3
	<i>An. listeria</i>	0	735	23
	<i>An. longipalpis</i>	0	0	3
	<i>An. maculipalpis</i>	40	0	26
	<i>An. marshallii</i> group	1,353	142	2
	<i>An. natalensis</i>	0	2	0
	<i>An. pharoensis</i>	115	2	0
	<i>An. pretoriensis</i>	127	870	90
	<i>An. rhodesiensis</i>	0	104	0
<i>An. rufipes</i>	334	617	91	
<i>An. schwetzi</i>	1	0	0	
<i>An. squamosus</i>	100	0	2	
<i>An. theileri</i>	0	1	0	

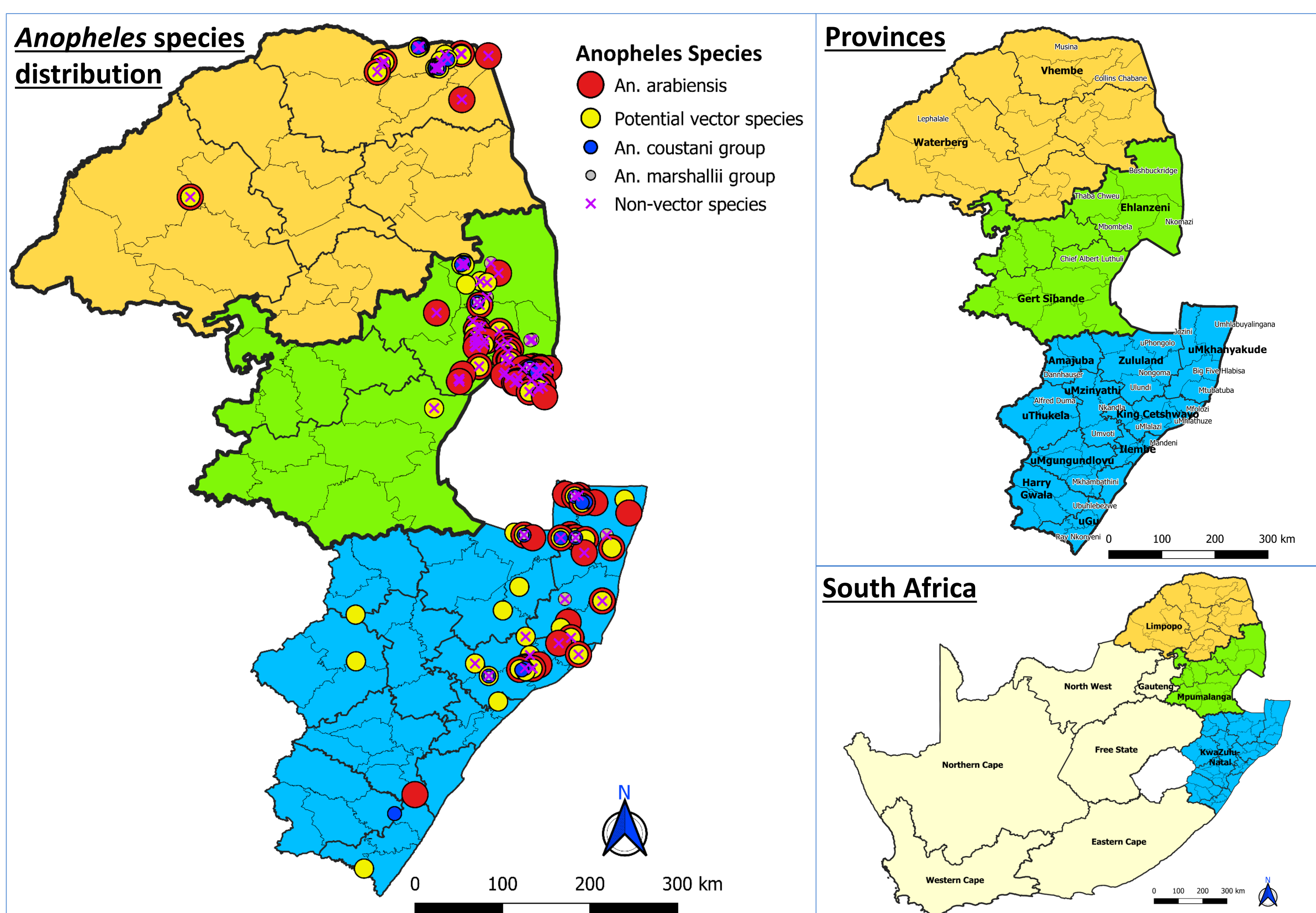


Figure 1. Distribution of *Anopheles* specimens collected per province from 01 March 2017 to 28 February 2022. Maps were created using the QGIS (<http://qgis.org>)

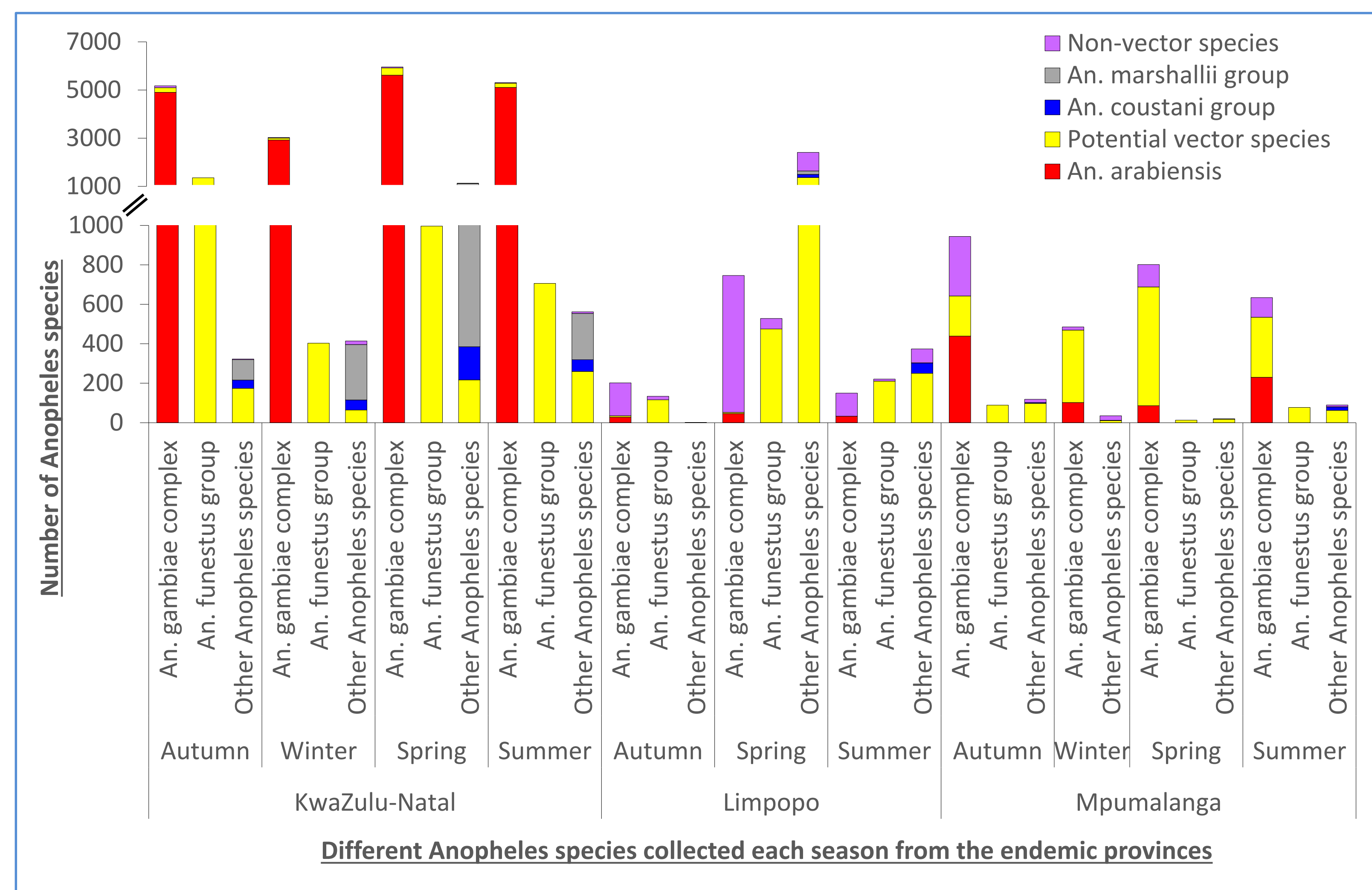


Figure 2. Numbers of specimens collected by species and season by province, South Africa, 01 March 2017 to 28 February 2022.

### CONCLUSION AND FUTURE WORK

The occurrence of major and potential malaria vector species in all malaria endemic districts under vector surveillance: shows that these regions remain receptive to malaria transmission, but to varying degrees at different seasons.

Ongoing malaria case and vector surveillance is necessary: for identifying pockets of local transmission and variation in vector species assemblages between provinces → important for implementing and define the vector control strategy while also strengthening early-warning systems and outbreak response measures

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