SUMMARY AND ANALYSIS OF THE INVENTORY OF THE NATIONAL ESTATE: *2020*

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- Archaeology, Palaeontology and Meteorites
- Maritime and Underwater Cultural Heritage
- Heritage Objects
- Burial Grounds and Graves
- Built Environment
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1. Introduction

SAHRA is mandated with the compilation and maintenance of an inventory of the national estate as per section 39 of the National Heritage Resources Act, Act 25 of 1999 (NHRA). Part of this mandate includes the regular publication of a summary and analysis of the national estate inventory. This report provides a summarised view of the current content of heritage resources within the inventory.

With each iteration of this report, SAHRA endeavours to present up to date data about the content of the inventory of the national estate, as well as to showcase ways in which this data is operationalised.

2. Heritage Inventories

The importance of heritage inventories is a well ingrained concept within the overall framework of heritage management practise. This importance is further emphasised within most international examples of heritage legislation, international conventions and heavily emphasised within the NHRA. This importance is predicated on the concept of "you cannot protect what you do not know about", thus heritage inventories form the very basis from which all heritage management practise follows.

Inventories, as a general concept, is an ongoing record for the identification and description of heritage resources which can be used for a variety of purposes, such as;

a) Management
b) Protection
c) Public appreciation

3. Reporting Period

This report makes use of cumulative data recorded on the South African Heritage Resources Information System (SAHRIS) as at the end of the 2020 calendar year. As such, this report is representative of all data on SAHRIS up to and including 31 December 2020.

4. Data Sources and Limitations

The database used to populate this summary can be accessed directly on the South African Heritage Resources Information System (SAHRIS) via: https://sahris.sahra.org.za.

The heritage resources recorded in the inventory of the national estate is extracted from a variety of sources, such as surveys, archival documents, heritage impact assessments, permit applications, and other relevant databases within the custodianship of SAHRA or otherwise provided to SAHRA. Each year SAHRA undertakes numerous projects to increase the amount and quality of data included in the inventory of the national estate, thus with each year's publication, some data may change as new information comes to light.

Annually, in preparation for this report, each Provincial Heritage Resources Authority (PHRA) is requested to verify the datasets of formally protected resources recorded within each province, and specifically the database of Provincial Heritage Sites. The purpose of this verification is to ensure the accuracy of data, and to ensure that any additional declarations and other changes that may have occurred during the reporting period are accordingly reported to SAHRA.

At the time of finalisation of this report, only Heritage Western Cape had responded to the call for verification of the dataset.

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5. Recorded Resources
5.1. Immovable Resources

Whilst the phrase "immovable heritage resource" is not defined within the NHRA, we are utilising this term as a method to subsume the definitions of "Place", "Site", "Structure", and "Heritage Site", inclusive of any place, site, structure, or heritage site covered by water, as defined in section 2 of the NHRA.

Each immovable heritage resource, or site, recorded on SAHRIS, and therefore the inventory of the national estate, is designated by a specific site type, however for the purposes of summarisation and analysis the expanded site type taxonomy has been compressed to their principal term. For example, all rock art sites have been given the designation "Archaeological", similarly all transport infrastructure has been designated "Structures". The below shows the expanded taxonomy with the principal terms;

- **Archaeological**
  -Artefacts
  -Rock Art
  -Deposit
  -Shell Midden
  -Ruin > 100 years
  -Stone walling
  -Settlement
- **Living Heritage/Sacred sites**
- **Battlefield**
- **Burial Grounds & Graves**
- **Conservation Area**
- **Cultural Landscape**
- **Geological**
- **Meteorites**

- **Monuments & Memorials**
- **Natural**
- **Palaeontological**
- **Place**
- **Structures**
  -Bridge
  -Building
  -Transport infrastructure
- **Underwater**
  -Shipwreck
  -Submerged
  --Intertidal
  --Partially submerged
  --Fully submerged

It is important to note that many sites are multi component and are therefore characterised by features of many of the site types listed above. For the purposes of this summary, only the principal type used during recording was retained. Further to this, as additional information becomes available about specific resources these types are refined or corrected to better characterise the resource.

As of 31/12/2020, the National Estate has **49 787** recorded sites across all categories (figure 1). This is a decrease from the 50 735 sites reported in the 2019 summary and analysis of the National Estate report. The variance is due to the unpublishing of 3 525 sites on the request of the KwaZulu-Natal Amafa and Research Institute, bringing the total – at the time of the request – to 47 210 sites. This request was due to the sites in question being incorrectly captured within the inventory of the national estate and contained errors such as incorrect location information. These sites will be reincorporated into the inventory once a full review has been conducted.

However, since the exclusion, 2 577 sites were newly included into the National Estate resulting in the total as of 31/12/2020.

As with previous reports, the majority of immovable resources within the inventory is categorised as archaeological (59%) followed by Structures (20%), and Burial Grounds & Graves (9%). New to this report is the inclusion of a category labelled "Under Review", these are resources currently recorded in the inventory, however they are not currently assigned a category and will require review prior to

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assignment. It was decided to include this category to better represent the breakdown of site types within the inventory.
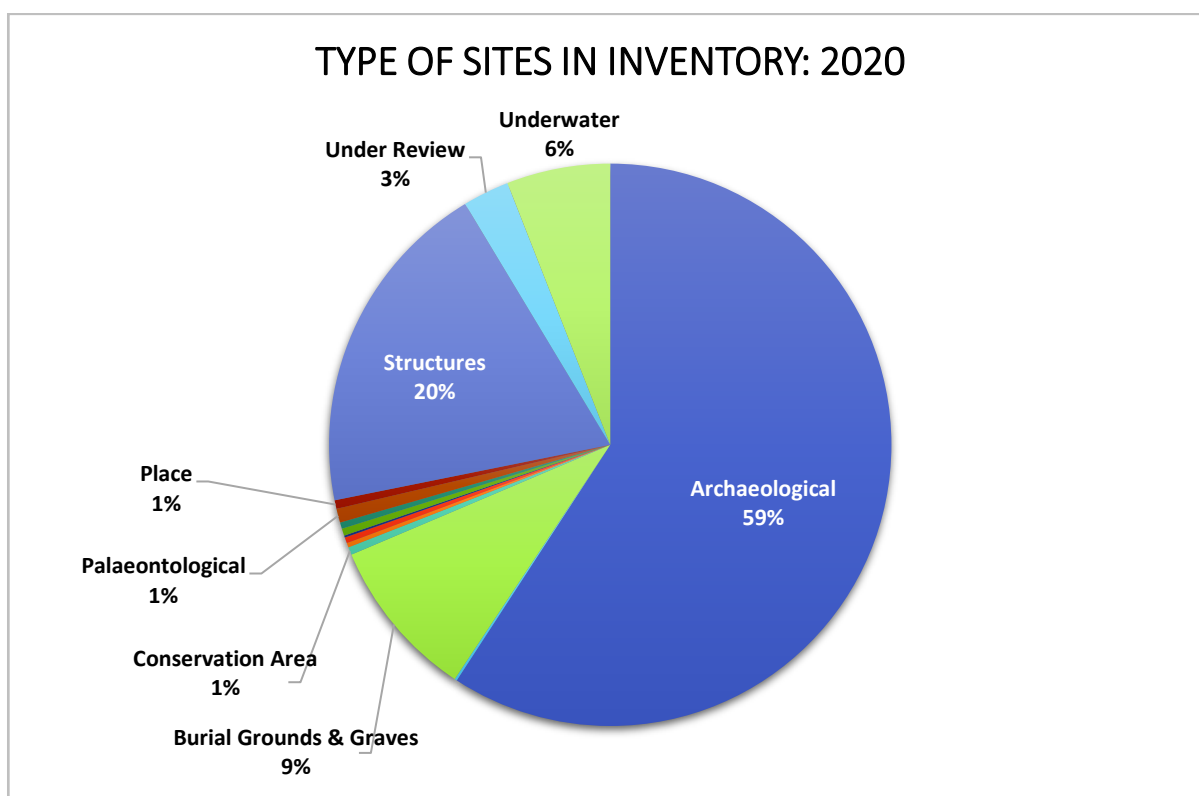

Figure 1: Breakdown of types of sites within the inventory of the national estate

5.1.1. Shipwrecks and Maritime Heritage Resources

Unlike former years, where SAHRA's development focus for the Maritime and Underwater Cultural Heritage (MUCH) Geographical Information System (GIS) was to add new coordinates for shipwrecks and other types of MUCH sites, the 2020/21 operational year provided an opportunity to further test the existing system and identify areas for development.

Given the accessibility issues presented by the ongoing COVID-19 pandemic and resulting travel restrictions and lockdowns across South Africa and much of the world, a key focus this year was planning and limited initial roll-out of a qualitative audit of shipwrecks named the "Cape Shipwreck Survey Project". This geographically limited project is intended as a pilot to identify sites (at this stage primarily shipwrecks) that would be viable candidates for three-dimensional recording using photogrammetry (see figure 2 for an example of this). If successful, the project could result in the production of accurate, high-resolution models for remote consumption in instances where it is not possible to physically visit sites. The value of such models as a means of enhancing access to heritage sites is already well-established (e.g. Costa, 2019). The MUCH Unit further hopes to investigate their utility as important site monitoring tools which can allow direct and detailed comparisons between past and present data to provide insight into the state of conservation and rate of deterioration of targeted sites to assist in their management.

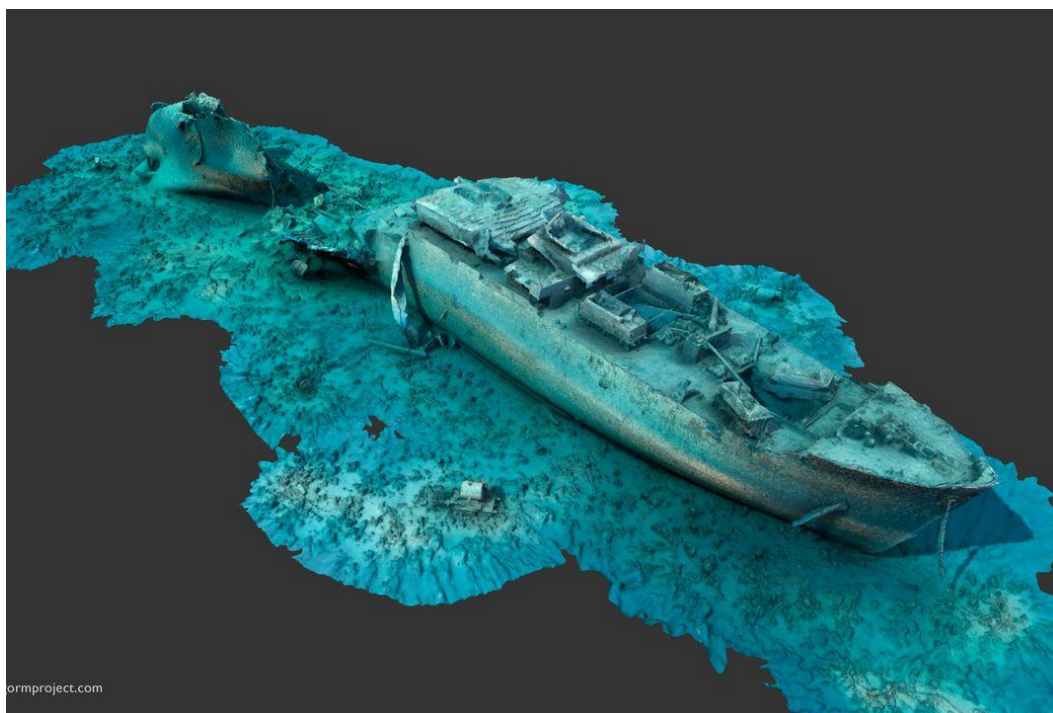- Archaeology, Palaeontology and Meteorites
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Figure 2: Example of a three-dimensional model of a MUCH site (source: https://bit.ly/369EtOu)

In June 2020, SAHRA hosted its third undergraduate MUCH field school through the University of Cape Town's (UCT) Archaeology Department. As in other years, the field school was focused on the Still Bay Fish Traps National Heritage Site. The challenge during 2020 was to adapt the field school for online learning as a response to the restrictions imposed by the COVID-19 pandemic. Although the students were not given the opportunity to conduct a physical survey of the site, they were able to make use of historical maps and imagery and modern aerial photography to draw useful comparisons on the configuration of the fish traps over time. This project was successful in demonstrating the considerable usefulness of georeferenced aerial surveys (e.g. collected with the use of a drone or satellite) of the utility of aerial surveys and photography (e.g. collected by a drone or satellite) in monitoring the site and making recommendations for its management based on empirical data.

Planning for a joint project with the Iziko South African Museum and the City of Cape Town commenced during 2020/21. The project aims to create a spatial database of reported wrecks and wreckage, including flotsam and jetsam which washes up or is exposed on the beaches of Cape Town (usually following extreme winter storms). This database will be the first of its kind in South Africa and will serve as a useful tool for modelling the risk of hazards caused by such events, as well as areas frequently affected due to the presence of potentially unmapped shipwrecks in the inshore zone.

SAHRA's Facebook page on MUCH has become a vital social media platform enabling the public to stay in contact. As necessity has driven more people to become media savvy due to social distancing measures including lockdown, the use of digital platforms has increased and, as a result, enhanced SAHRA's reach and relevance.

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5.2. Movable Resources

The data present in the inventory of the national estate on heritage objects is still developing as agreements are entered into with institutions for the use of SAHRIS to manage or report their collections, as well as objects loaded onto the system for the purposes of permitting.

As at the end of 2020 there are **56 455** objects recorded in the inventory of the national estate, which is an increase of **912** recorded objects when compared to year end 2019.

Whilst the continued growth of the inventory is positive, this figure does present a decrease in the rate of growth of the objects inventory when compared to the preceding years. This can be attributed to two primary factors;

1. The limitations imposed by the Covid-19 pandemic which necessitated a realignment of stakeholder engagement.
2. SAHRA not undertaking any projects during the 2020 calendar year for the inventorisation of collections. Rather the year was focused on the consolidation and review of works undertaken in previous years.

As noted in previous reports, there is currently no mandated nomenclature through which objects are required to be classified. The Gazetted List of Types (LoT) does provide this framework, however the integration of this and the assignment of recorded objects within this nomenclature will only be completed over subsequent reporting periods.

Having noted the above, SAHRIS does integrate the Chenhall System of classification which does allow for the voluntary classification of objects within that schema, however, of the **56 455** objects recorded, only **8 158** (14%) are categorised within this framework. Whilst we have provided a breakdown of the classified objects, it should not be interpreted as representative of the types of objects present within the wider inventory as it is only presented here for informational purposes.

The Chenhall system of classification is a multi-tiered nomenclature, as such the below chart has been produced using only the first-tier classifications for ease of digestion and visualisation.
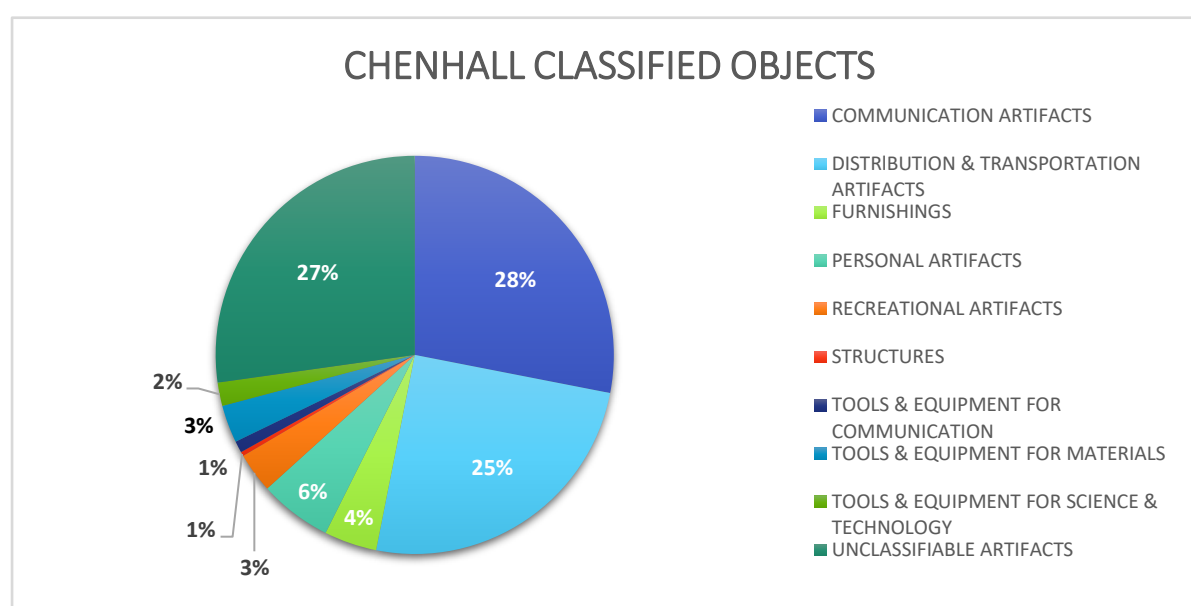
Figure 3: Breakdown of objects classified according to the Chenhall nomenclature

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Moffat Press – Specifically Declared Heritage Object

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6. Declared Resources

SAHRA, a PHRA, or any member of the public can identify places or objects with special significance to the nation, province or community and nominate them for declaration. The process of declaration is to provide recognition and ongoing protection of the values and qualities that provides this significance.

6.1. National Heritage Sites

SAHRA is tasked with the identification of places with qualities so exceptional that they are of special significance to the nation. Declaring these places as National Heritage Sites is a formal mechanism to recognise and protect the authenticity and integrity of nationally, and often universally, significant cultural heritage resources.

The below graph (figure 4) charts the declaration of National Heritage Sites since the first declaration under the NHRA in 2002. Like the discussion on the overall content of immovable heritage resources recorded in the inventory, the National Heritage Sites have been categorised and summarised according to the standard taxonomy employed within the inventory. It is important to note, that decisions regarding the accounting of the number of National Heritage Sites represented in this report are based on principals of locality rather than colloquial groupings. For example, the Barberton Makhonjwa Mountains National Heritage Site comprises of 51 individual sites, however these are centred around 4 key localities, thus in the charts below represent the inclusion of the 4 localities rather than the 51 individual sites.

Within the 2019 summary and analysis report, the Bo-Kaap as treated as a single item, however within this report the Bo-Kaap has separated into the 19 component sites to align with figures presented within SAHRA's 2019/2020 annual report.

Noting the above discussion, the population of National Heritage Sites represented here is **101**.
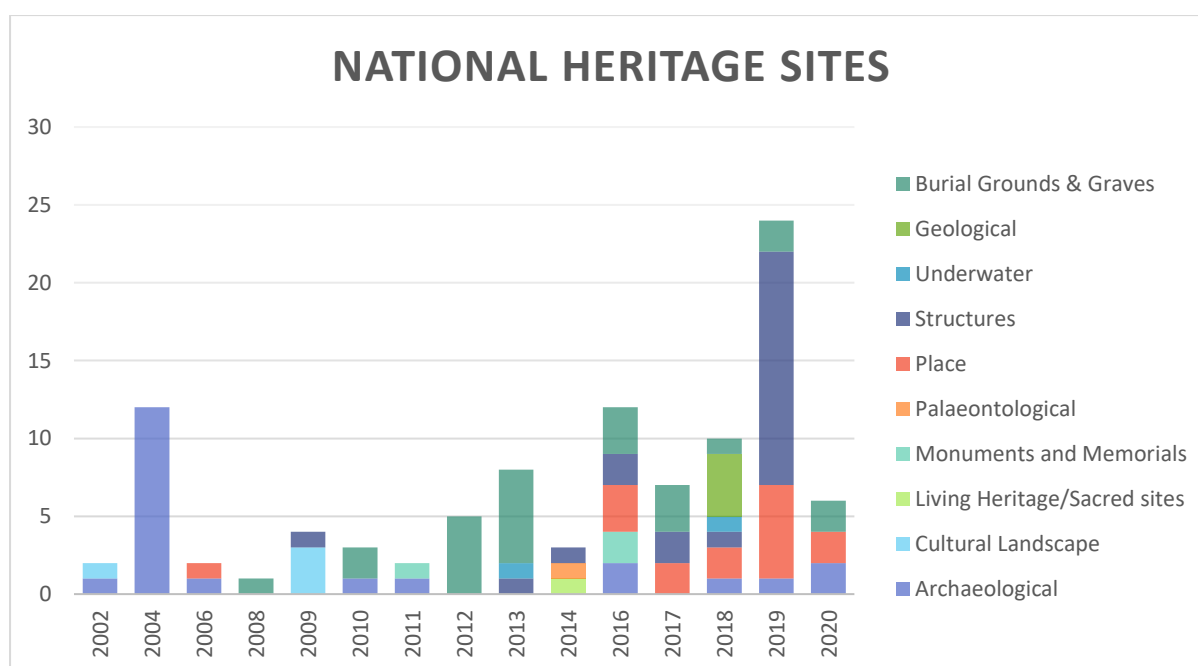
Figure 4: National Heritage Sites declared per year

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TYPES OF NATIONAL HERITAGE SITES

- Archaeological 26%
- Cultural Landscape 6%
- Living Heritage/Sacred sites 1%
- Monuments and Memorials 4%
- Palaeontological 1%
- Place 15%
- Structures 11%
- Underwater 2%
- Geological 5%
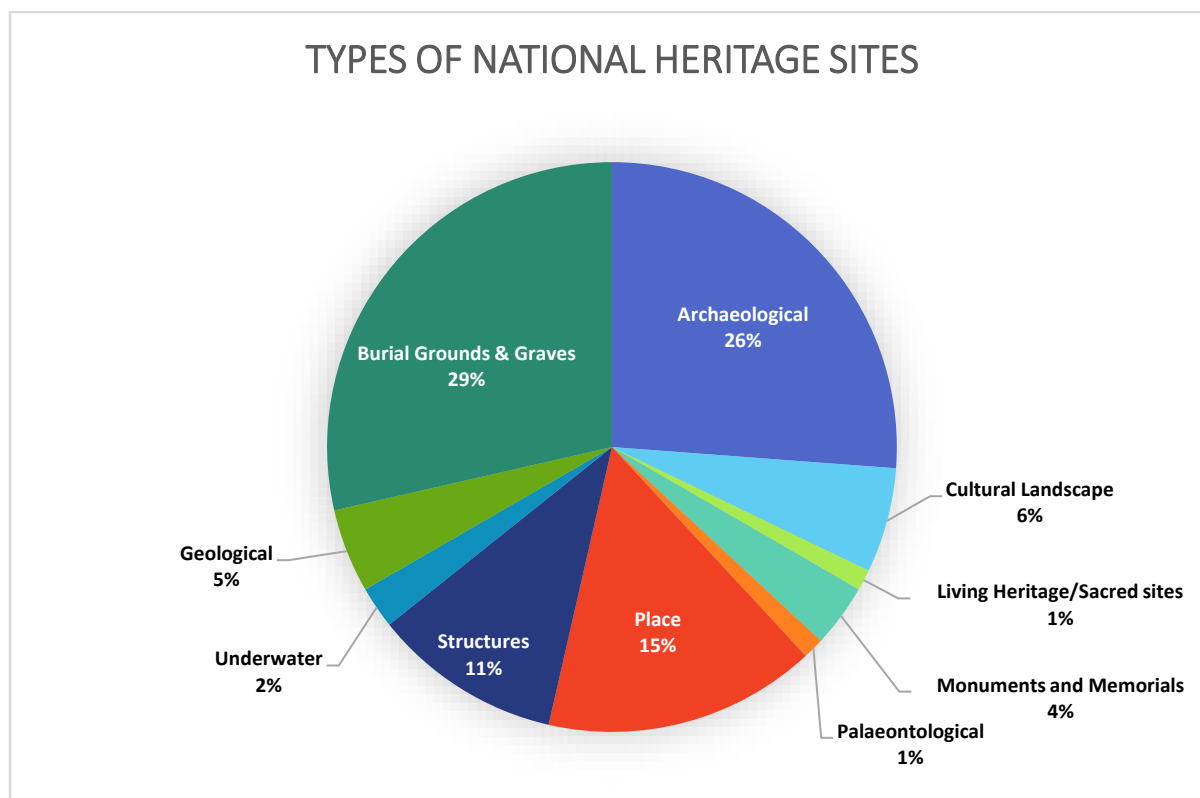- Burial Grounds & Graves 29%

Figure 5: Types of National Heritage Sites

6.2. Specifically Declared Objects/Collections

Certain types of heritage objects or collections of heritage objects which are special, unique or endangered may be Specifically Declared. Any member of the public may nominate an object or collection for declaration; however, this declaration can only be carried out by SAHRA and cannot be performed at a provincial level.

Under the National Monuments Act (Act no. 28 of 1969) objects and collections could be declared as National Monuments and cultural treasures. In terms of the NHRA, all previously declared movable National Monuments and Cultural Treasures are heritage objects.

Figure 6 shows the number of objects/collections declared between 1936 and 2017. Noting that no heritage objects have been declared within the 2020 calendar year, the population of specifically declared heritage objects/collections is **45**.
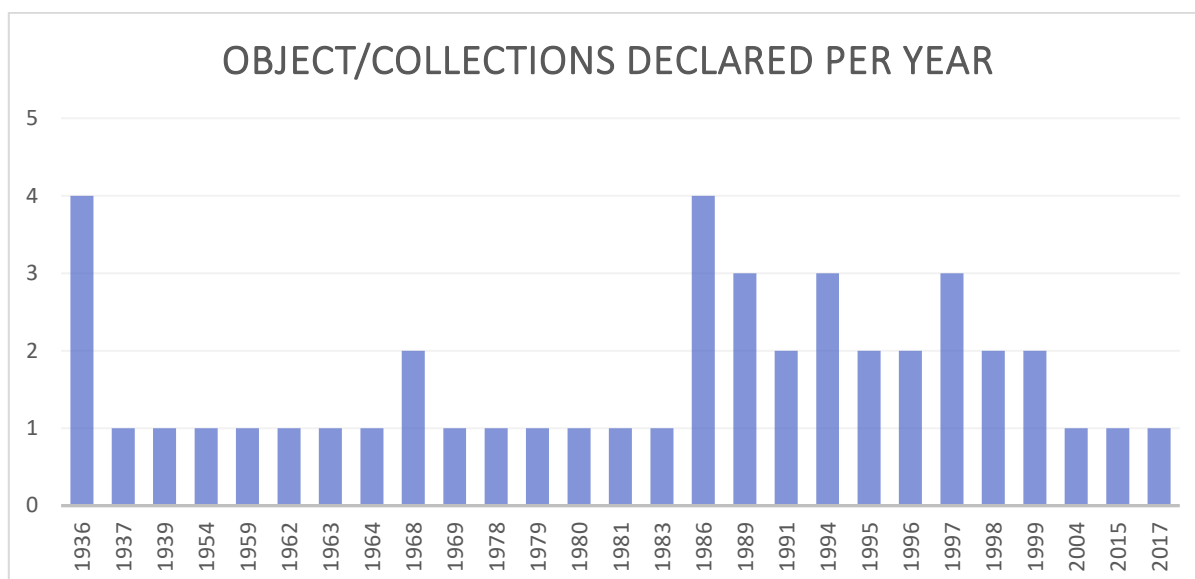
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Figure 6: Objects/Collections declared per year

6.3. Provincial Heritage Sites

Prior to compilation of this report, all Provincial Heritage Authorities were requested to verify the datasets present within the inventory of the national estate to ensure accuracy of data as well as the inclusion of any new sites declared within the 2020 calendar year that were not already reported to SAHRA.

Many of the provincial authorities did not respond to the call for verification of the 2020 dataset or were unable to verify the datasets supplied to them. To mitigate this, the National Inventory Unit at SAHRA has been undertaking a mapping and verification exercise to address this shortcoming. The project has already yielded results in the form of corrections to localities, reassignment of categories and corrections to declaration status.

Variations within the data may occur year on year due to several factors such as corrections established through the verifications, ongoing moderation projects and the declaring of Provincial Heritage Sites as National Heritage Sites.

Despite the interventions provided by SAHRA in terms of additional verification, it remains problematic that many of the PHRA's do not engage in a process of verifying the provided datasets. Through the current year under review, it has been noted that some provinces have previously engaged in declaration activity, however this was not provided for in previous reports due to the lack of verification by PHRAs. As is expressed in the NHRA, it is incumbent on PHRAs to ensure that data is submitted to SAHRA in a timely manner to ensure accuracy of the inventory of the national estate.

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6.3.1. Western Cape

Heritage Western Cape have provided verification on the dataset of Provincial Heritage Sites within the Western Cape.

Figure 7 (below) presents the types of sites declared per year since the earliest phase of formal protections imparted in 1936 through to present day, providing a total of **1 288** Provincial Heritage Sites, the largest sum of PHS's in the country.
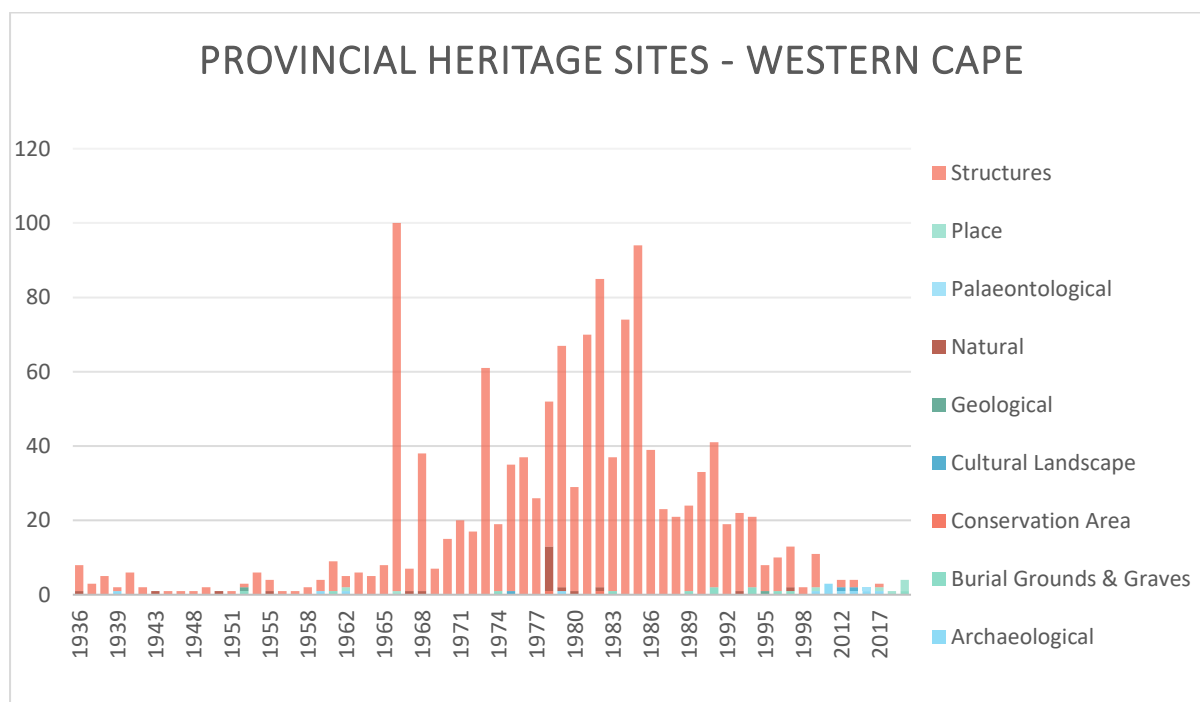

Figure 7: PHS's in the Western Cape by year and type

As Heritage Western Cape has been actively engaged in a process of assessment and declaration, the sites declared post formation of the authority are more diverse than that of the years preceding the promulgation of the NHRA. Figure 8 more clearly shows the focus on sites within the built environment prior to the NHRA and the formation of Heritage Western Cape. Figure 9 shows the diversity of declarations that have occurred since the authority began formally declaring sites.

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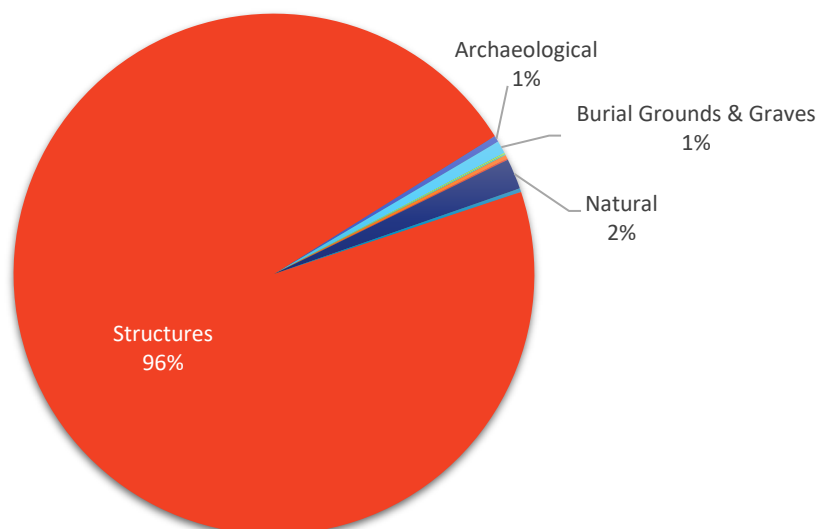
TYPES OF SITES DECLARED BETWEEN 1936 & 1999

Figure 8: PHS site types declared prior to the National Heritage Resources Act

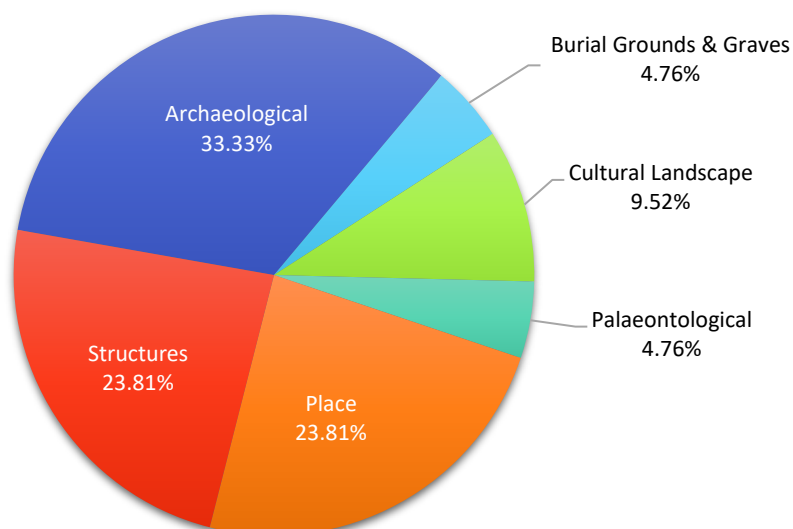## DECLARED SITE TYPES UNDER HERITAGE WESTERN CAPE

Figure 9: PHS site types declared post promulgation of the National Heritage Resources Act

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6.3.2. Free State

Heritage Free State did not provide a verification of the dataset as at end 2020, however the authority has provided verification in previous years. As such, without notification of additional declaration in the province, it is taken that no further declaration activity has occurred.

During the 2020 calendar year, work continued within SAHRA to conduct secondary desktop verifications using archival sources. Through this process an additional Provincial Heritage Site was added to the dataset. The site was declared in 1998 but not previously recorded in the provincial or national database. This omission has now been rectified.

The chart below shows the breakdown of all **159** Provincial Heritage Sites in the Free State, inclusive of those declared under previous legislation.
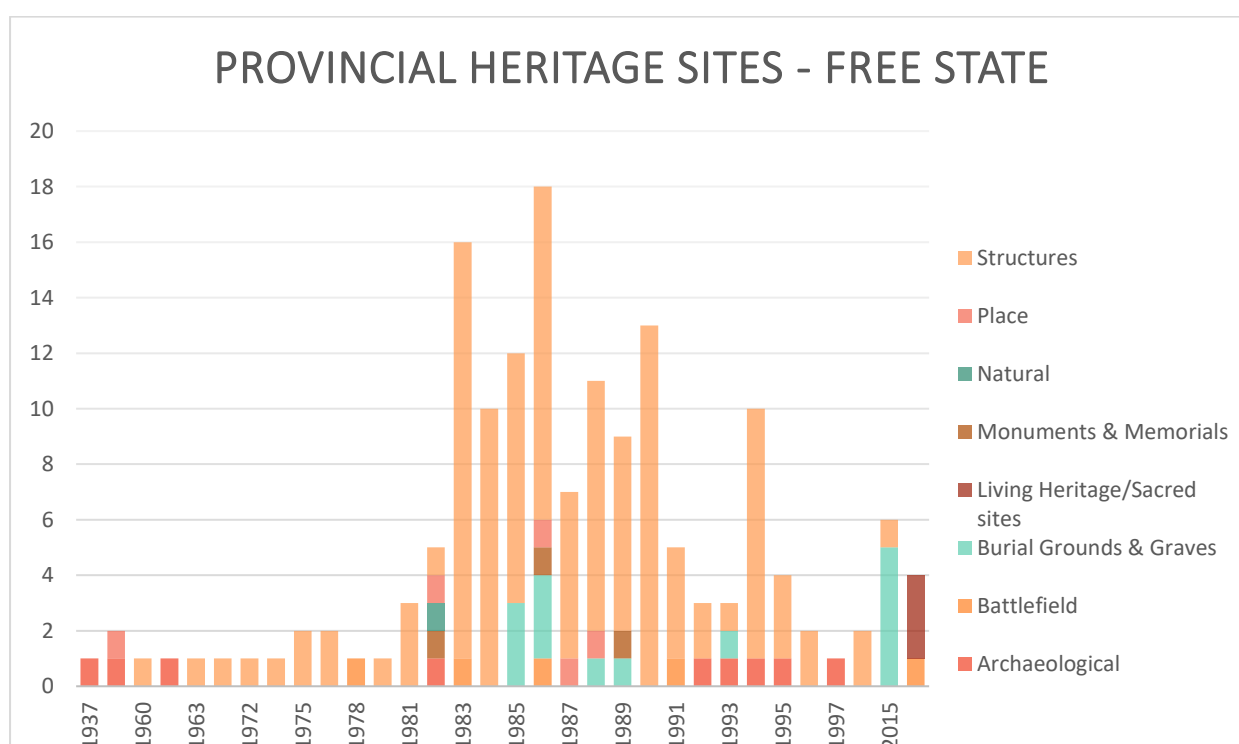

Figure 10: PHS's in Free State by year and type

As Heritage Free State has actively engaged in a process of declaration under the NHRA, a breakdown of declared site types has been provided to illustrate the shift of site types declared under the National Monuments Council and its predecessors (Figure 11), and those declared under Heritage Free State (Figure 12). From these figures, a distinct shift in terms of diversity of sites can be seen through the shift in focus from structures to burial grounds and sites relating to living heritage/sacred sites.

- Archaeology, Palaeontology and Meteorites
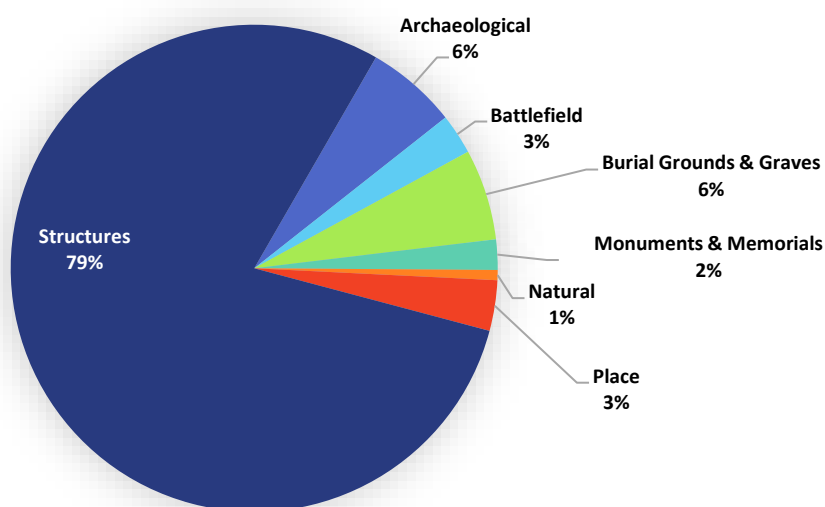- Maritime and Underwater Cultural Heritage
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Figure 11: PHS site types declared prior to the National Heritage Resources Act in the Free State

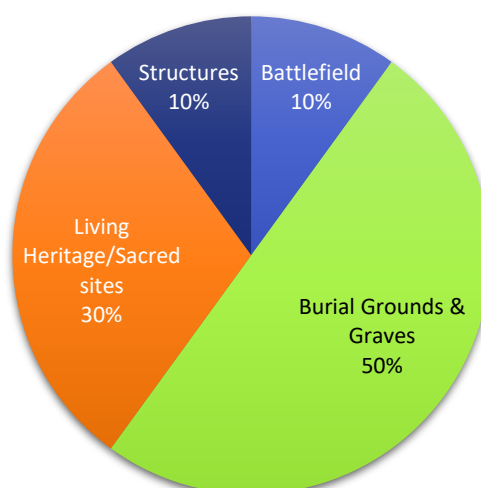*Figure 12: PHS site types declared post promulgation of the National Heritage Resources Act in the Free State*

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6.3.3. Limpopo

The Limpopo Heritage Resources Authority (LIHRA) did not provide verification of the data sets provided to them. Despite the lack of verification, new data has come to light. Through a review of Provincial Gazettes from the Limpopo Province, it was discovered that LIHRA did in fact declare four sites in 2007. With the new data included, we are pleased to present an updated view of heritage sites declared in the Limpopo Province.
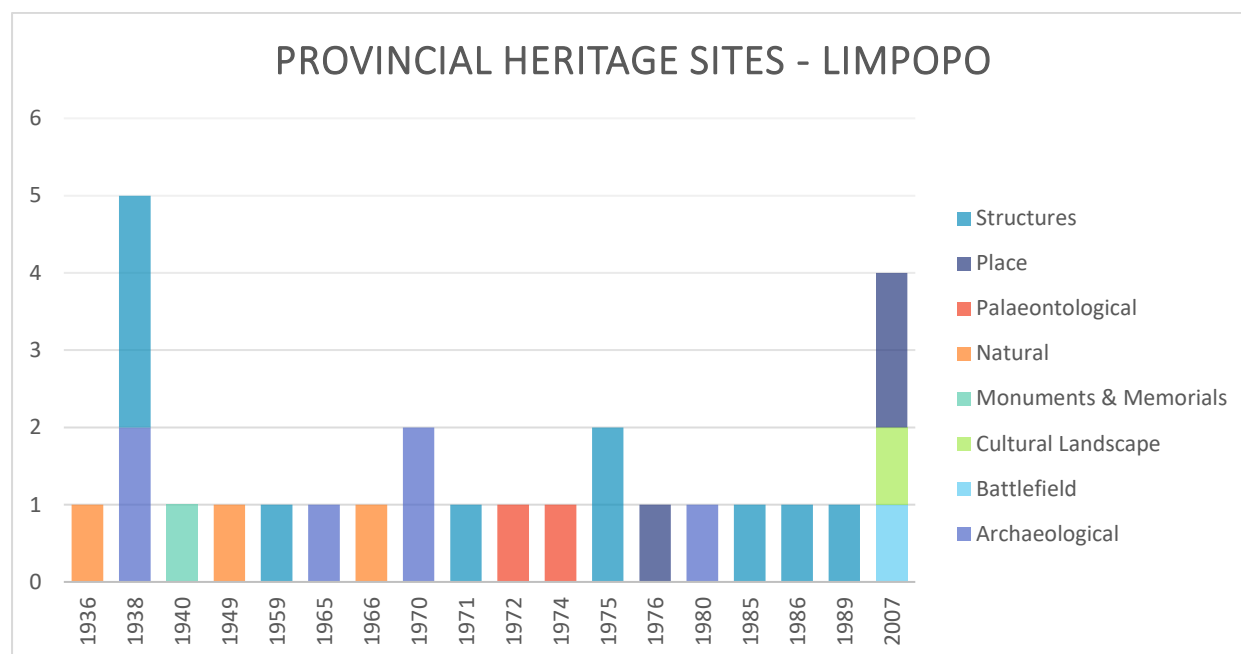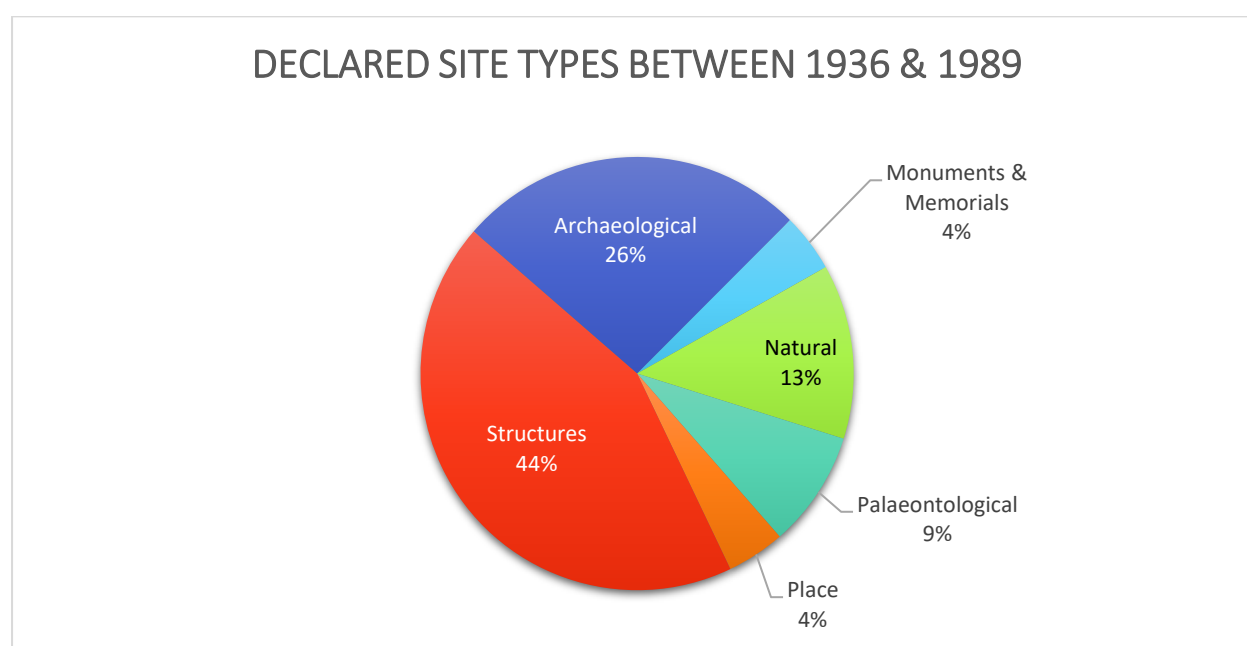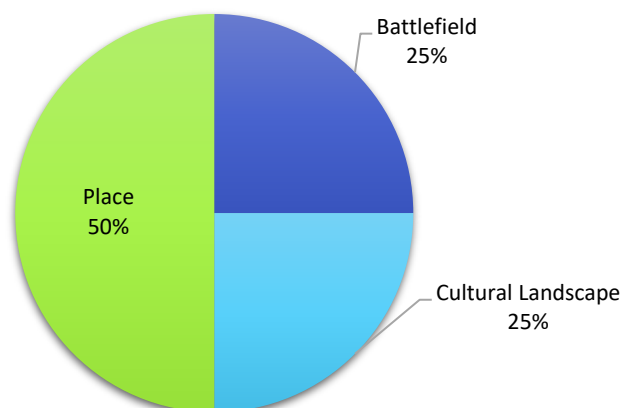

Figure 13: PHS's in Limpopo by year and type

As with other provinces that have actively declared Provincial Heritage Sites within the framework of the NHRA, a breakdown is provided below to better illustrate the shift in sites types declared under the National Monuments Council and LIHRA.

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6.3.4. North West

The North West Provincial Heritage Resources Authority did not provide a verification of the database of declared resources in their province, however a verification was supplied in respect to the 2018 summary and analysis report. As no new declarations have been reported to SAHRA, the status quo of **51** declared sites remains as per figure 14.
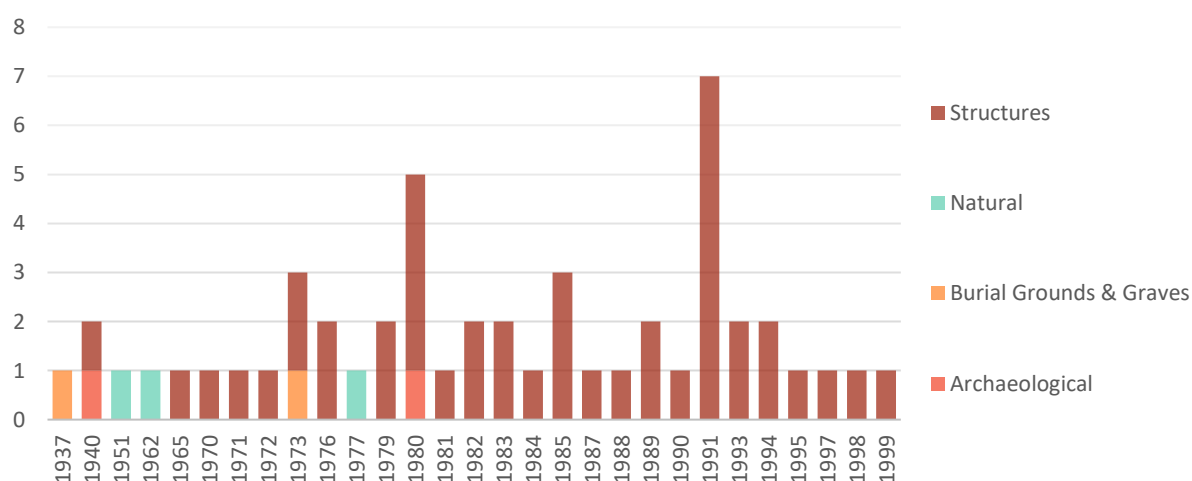

Figure 14: PHS's in the North West by year and type

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6.3.5. KwaZulu Natal

KwaZulu Natal presents a different mode of operation to that of the rest of South Africa in that they operate under their own provincial legislation for the management of heritage resources, namely, the KwaZulu-Natal AMAFA and Research Institute Act, Act No. 5 of 2018 (KZNARIA). Due to this, the KwaZulu-Natal Amafa and Research Institute (AMAFA) do not engage in a practice of formal declaration as per section 27 of the NHRA, rather, the KZNARIA makes provision for the designation of Heritage or Provincial Landmark status on sites depending on the ownership of the property.

Heritage and Provincial Landmarks are recorded within the provincial schedule of specially protected sites as required under section 43 of the KZNARIA. According to KwaZulu Natal Provincial Gazette *2029,* dated 14 December 2018, there are **289** sites entered into the schedule. **269** of these schedule sites additionally hold formal protections under the NHRA as either Provincial Heritage Sites, Heritage Register sites, Heritage Areas, or in one case, a National Heritage Site.

During the 2020 calendar year an intensive process was undertaken to reconcile the KZN schedule with the inventory of the national estate and the formal protections afforded under the NHRA. In the 2019 report, sites which are automatically entered into the schedule as per the KZNARIA were included, however upon review of this procedure, it was decided to omit these until such time as they are formally included on a published schedule.

To create standardisation across all provinces only the **240** sites in KZN that hold PHS status are broken down by type in figure 15 below.
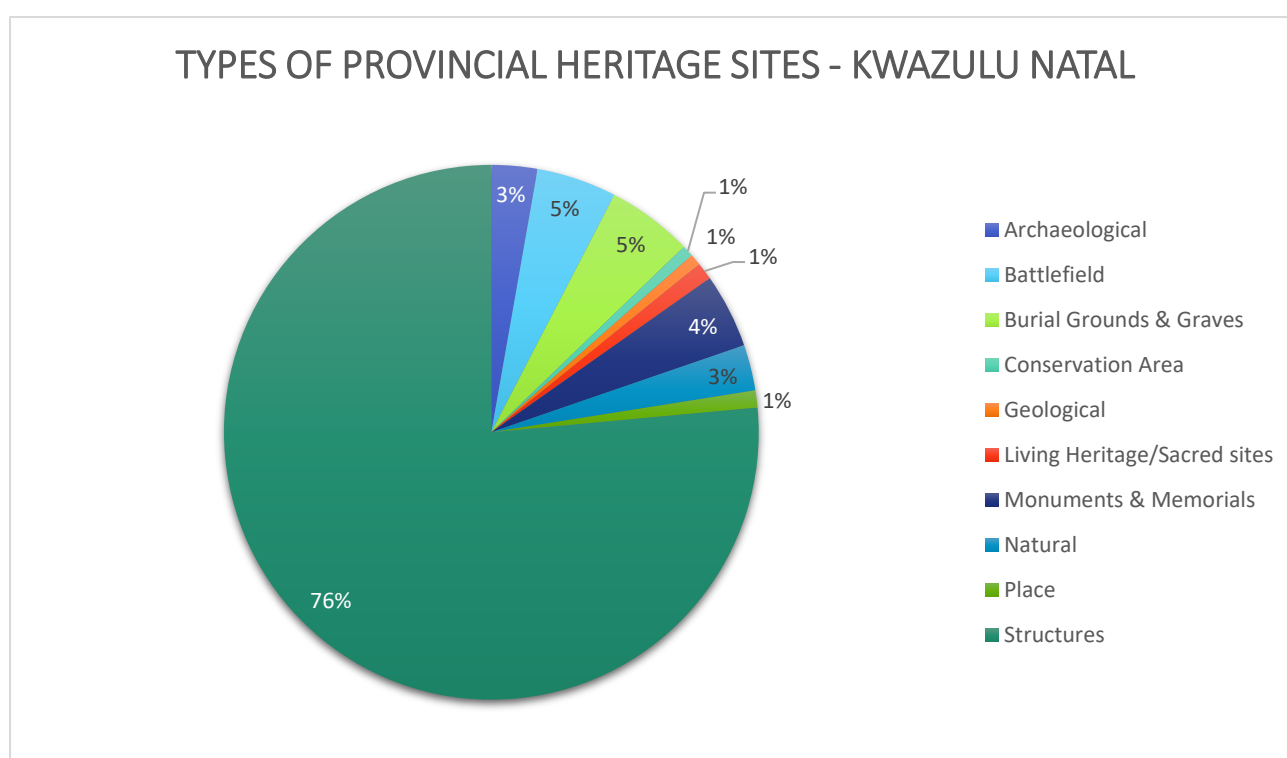

Figure 15: PHS's in KZN schedule of protected sites

In comparison to figure 15 above, the sites included in the schedule that were not formally declared as Provincial Heritage Sites (former National Monuments) are far more diverse in their nature.

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- Built Environment
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- National Inventory
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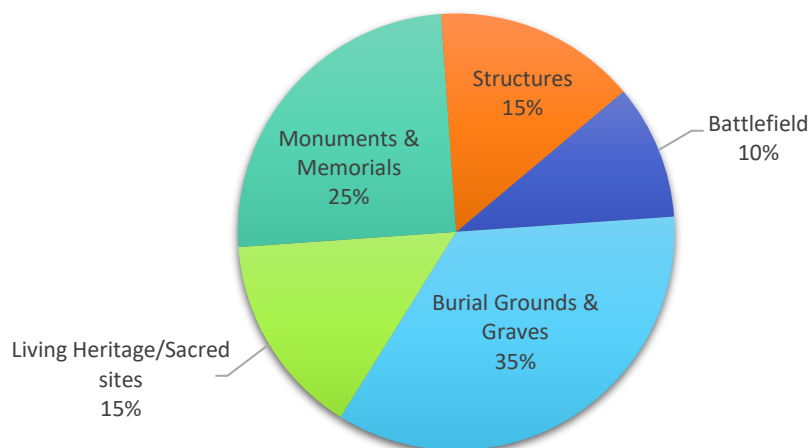/FACEBOOK   @TWITTER

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Figure 16: Schedule sites not formally declared under the NHRA

6.3.6. Northern Cape

The Northern Cape Provincial Heritage Resources Authority, also known as Ngwao-Boswa Jwa Kapa Bokone (NBKB), have not supplied a verification of datasets. During the 2020 calendar year it was identified through archival research that three buildings associated with the Moffat Mission Station were declared in 1978 but were subsumed into a single entry on previous reports. This current report has expanded these into their own records thus creating a variance from the figures presented in the 2019 report, resulting in a total PHS population of **176** in the Northern Cape.

NBKB has previously engaged in a process of declaration under the NHRA, this resulted in the declaration of one archaeological site in 2008, namely, the Wildebeest Kuil Rock Engraving site. As this is a singular archaeological site, a further breakdown will not be provided.
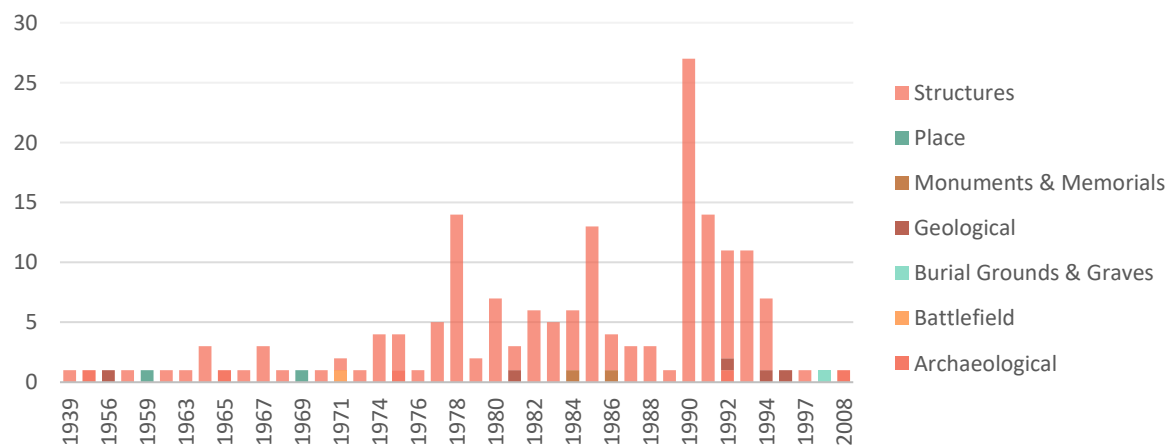
Figure 17: PHS's in the Northern Cape by year and type

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6.3.7. Eastern Cape

The Eastern Cape Provincial Heritage Resources Authority (ECPHRA) have not supplied a verification of datasets provided to them, nor has there been any additional data supplied to SAHRA for inclusion in the inventory of the national estate, thus the status quo of **587** Provincial Heritage Sites remains.
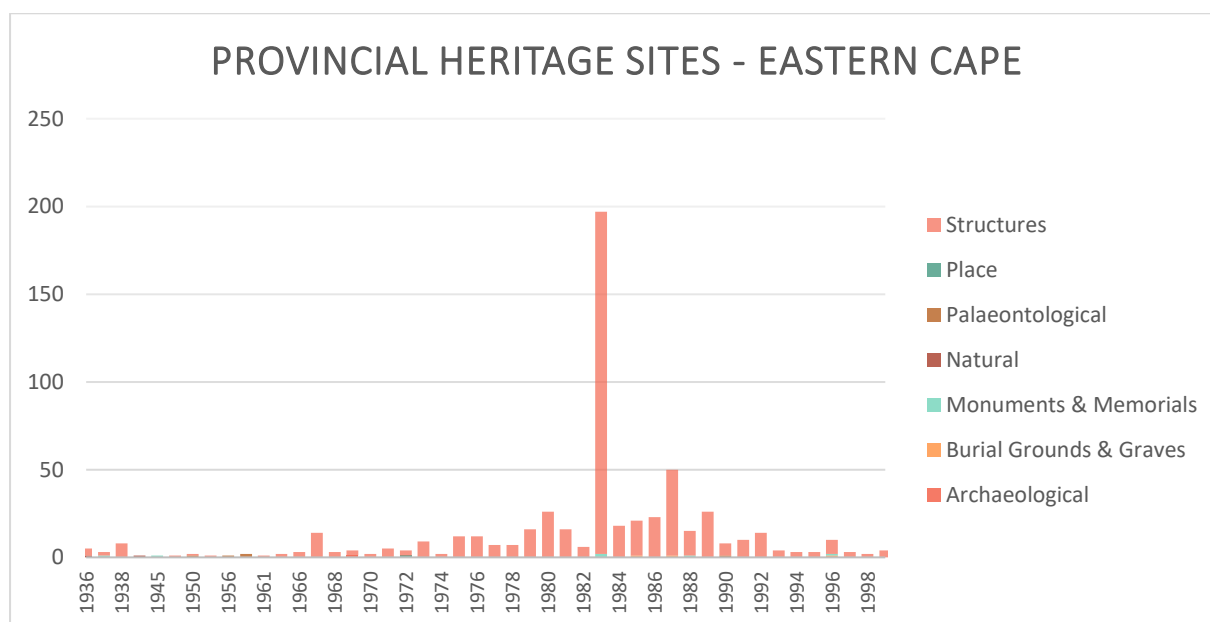

Figure 18: PHS's in the Eastern Cape by year and type

6.3.8. Mpumalanga

The datasets supplied to the Mpumalanga were not verified, however in 2019 SAHRA, through the National Inventory Unit, undertook a process of examining the Mpumalanga datasets and provided more accurate mapping and boundary data to aid in further management. Through this process two additional Provincial Sites were added to the national database of declared sites. The total population is now at **54** Provincial Heritage Sites (figure 21).
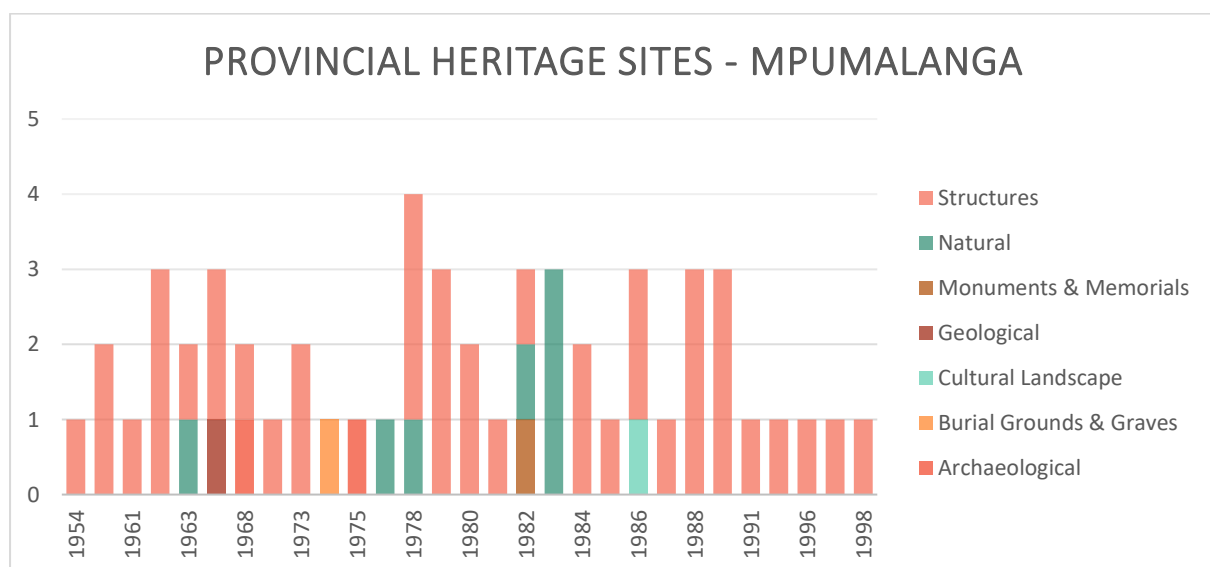
Figure 19: PHS's in Mpumalanga by year and type

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6.3.9. Gauteng

The Gauteng datasets have not been verified; thus, the baseline of Provincial Heritage Sites remains as stated in the 2017 report. A wider verification and categorisation exercise will need to be undertaken regarding the inventory of formally protected resources in Gauteng prior to the provision of a post 2000 breakdown as has been provided for the previous provinces discussed.
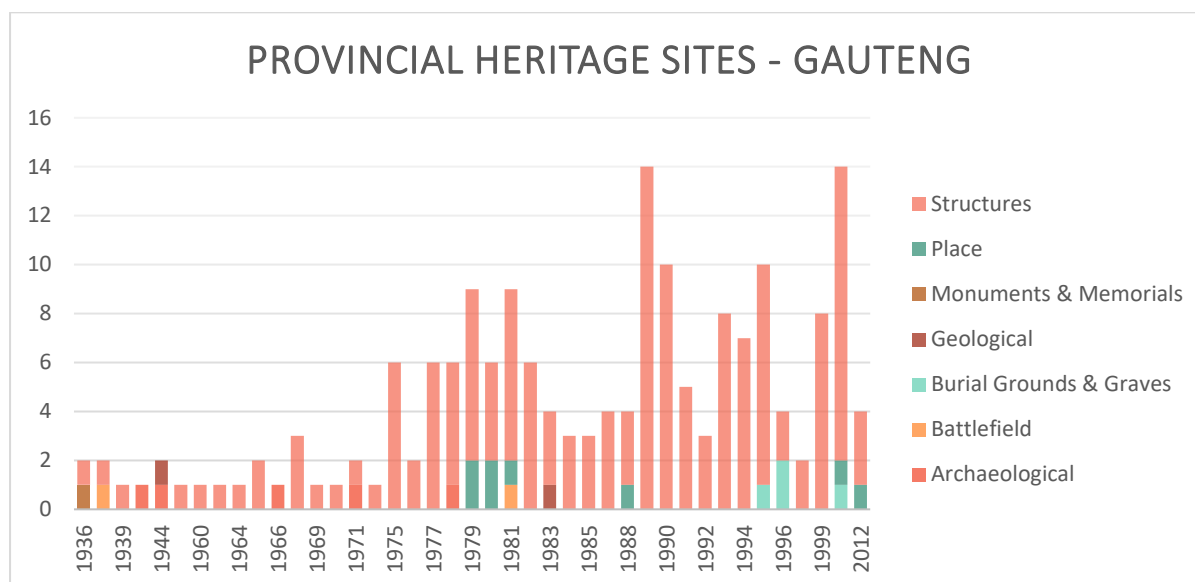

Figure 20: PHS's in Gauteng by year and type

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Glacial Pavements Provincial Heritage Site - Northern Cape

7. Projects to Populate the Inventory of the National Estate

The population of the Inventory of the National Estate can be achieved through a variety of means, including short term projects run by SAHRA. Due to the nature of 2020 and the lockdown restrictions, projects which were normally run that required field work were not conducted. Due to this restriction, only projects that continued during this time are reported below.

7.1. Heritage Impact Assessment Extraction Project

The information required by SAHRA to populate areas of the inventory with sparse coverage can be extracted from the Heritage Impact Assessments that are part of the Section 38 process, as well as other documents such as heritage resources management plans that are submitted to SAHRA. The identified resources are however still "locked" within the documents and require extraction onto SAHRIS in order to be usable for the purposes of populating the inventory of the national estate. We estimate that the data contained within these reports has the potential to increase the number of sites recorded in the inventory by over 400%.

SAHRA's National Inventory Unit has been undertaking a programme to extract this data into the inventory of the national estate. The project has thus far resulted in 3 internship opportunities and the capture of **948** sites into the inventory of the national estate.
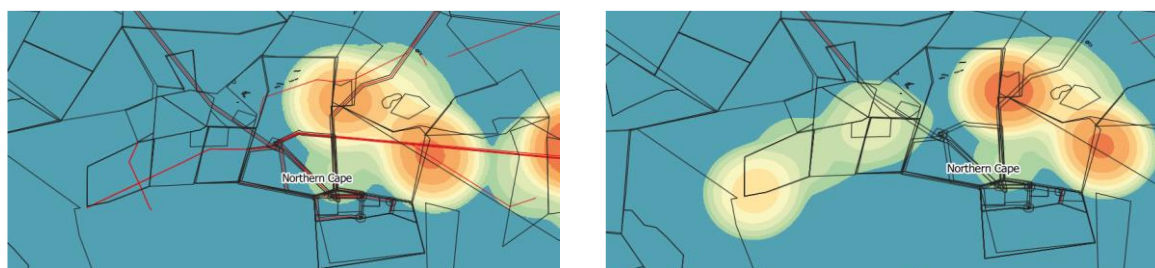

Figure 21: Density of heritage resources before extraction (left) compared to after extraction (right)

7.2. Provincial Heritage Site Mapping Project

Having noted the challenges regarding the verification of data sets supplied to Provincial Authorities. SAHRA has undertaken a project to re-examine all Provincial Heritage Site records within the inventory in order to verify location data as well as record the boundaries of those sites as per the declaration.

This process has entailed the comparison of historical property boundaries with modern erven, digitisation of surveyor diagrams, and archival research. This has led to the demarcation of numerous declared heritage sites, as well as the rectification of declarations that may have been incorrectly categorised or omitted in the historical data bases that were used to populate the modern national inventory database.

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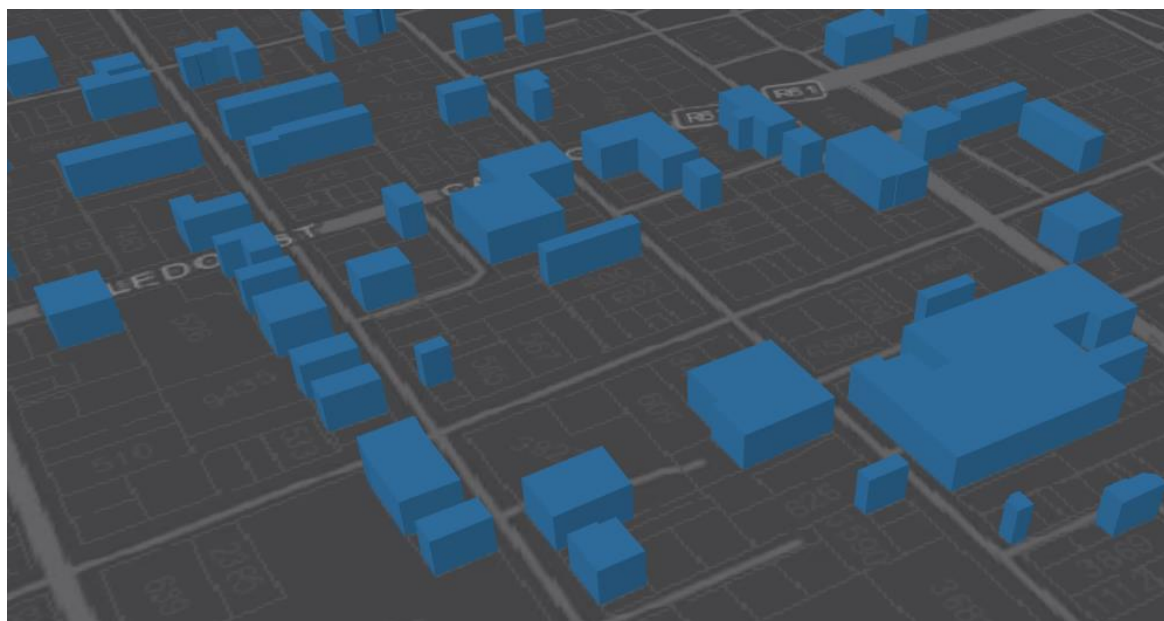HERITAGE
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Figure 22: Selected Provincial Heritage Sites mapped in Graaff-Reinet – Eastern Cape

As at the end of 2020, quality control is being undertaken prior to the upload of the mapped boundaries to SAHRIS. The level of upload completion per province is as follows.

Province	% of PHS boundaries uploaded to SAHRIS
Eastern Cape	60%
Free State	29%
Gauteng	3%
KwaZulu-Natal	2%
Limpopo	17%
Mpumalanga	33%
North West	0%
Northern Cape	7%
Western Cape	3%
Total	17%

8. Heritage Inventories and Risk Management

With the adoption of the Sendai Framework for Disaster Reduction 2015-2030 at the United Nations World Conference, the discourse around the management of disaster risk has widened to include the effects of various hazards on cultural heritage at a disaster management level. This drive is not a new development within the heritage sector. Bodies such as UNESCO and ICCROM have been pushing for the identification and mitigation of risks affecting cultural heritage for many years (See UNESCO, 2010; Stovel, 1998).

Despite this drive and the longevity of the operations in this field, disconnects between disaster management and heritage specialists still exist and further contribute to risks affecting heritage resources (Jigasu, 2005, 2015; Tandon, 2018). Whilst South Africa has been making strides in the fulfilment of the Sendai Framework, cultural heritage is still not included in the disaster management

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value chain (NDMC, 2005, NDMC, 2017, Mtengwane, 2019), thus disconnecting the protection of heritage resources from disaster risk management initiatives.

Within the field of disaster risk management for cultural heritage resources, a heavy emphasis is placed on the formulation of effective and comprehensive heritage inventories coupled with comprehensive documentation. This emphasis places heritage inventories as the key driver in the identification and mitigation of risk, furthermore, heritage inventories serve as the driver behind response and recovery mechanisms for when risk becomes a reality (Stovel, 1998; McCarthy, 2013; Meyers, 2016; Vafadari *et al.*, 2017).

Within the 2018 and 2019 Summary and Analysis of the National Estate reports, we used the data present within the inventory of the national estate to compile models identifying heritage resources existing within areas that are susceptible to a variety of hazards such as Veld fire, flooding, and uncontrolled development. The purpose of this exercise was to illustrate the importance of heritage inventories as an effective tool for risk management and the potential for an understanding of these risk to contribute to an environment of proactive management.

An area which was not previously considered was the impact a global pandemic would have on the management of heritage resources.

In response to the COVID-19 pandemic, the South African Government issued strict guidelines and restrictions on movement of people. This initial lockdown and the subsequent prolonged movement restrictions impacted on the protection, monitoring, and management of heritage resources.

These restrictions were not unique to South Africa. Globally, the pandemic has prevented heritage institutions from being able to ensure continued maintenance, monitoring and security of heritage sites and museums (Europa Nostra, 2020).

The management of heritage has long been a discipline that requires physical presence to observe and notify relevant bodies of immediate factors placing a heritage resource at risk. The COVID-19 pandemic however made it largely impossible for heritage officials to access heritage resources to ensure that this monitoring occurs.

The question faced by SAHRA during the initial, more stringent, lock down levels introduced to combat the pandemic is how does the entity continue fulfil it's role of monitoring heritage resources when people are not able to physical access these places?

8.1. A Remote Sensing Approach to Risk Management for Heritage Resources

Due to the nature of the pandemic and associated restrictions, it has placed pressure on many heritage organizations to creatively use technology and develop new ways of preserving and protecting heritage resources. Whilst SAHRA was effectively prepared for the continuation of most business processes through the early adoption of technology for facilitation of management functions through SAHRIS, the monitoring of sites under our remit was still based on a physical process of inspection.
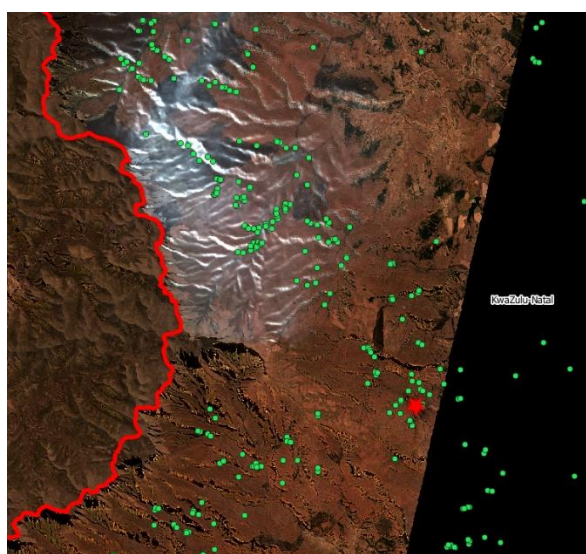
With the challenges introduced by the pandemic, SAHRA needed to rapidly investigate new ways of remotely monitoring sites. The adoption of remote sensing techniques became an avenue to facilitate this.

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The use of remote sensing for the management of heritage resources has a long history, with the practise becoming more prominent in the years post the declassification of data captured by the CORONA, ARGON and LANYARD military space imaging programmes (Luo *et al.*, 2019; Parcak, 2009).
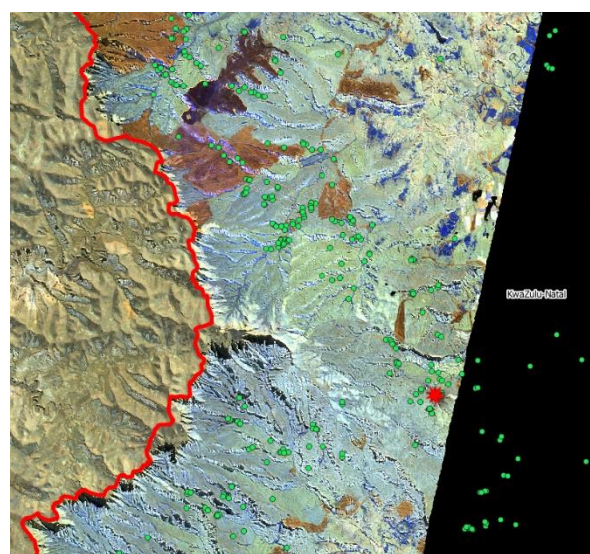
With the modern, wider, availability of satellite imagery and sensors that allow for the interrogation of data beyond the visible electromagnetic spectrum, remote sensing for management applications in heritage has become more widespread with large scale programmes such as the "Open initiative on the use of space technologies to monitor natural and cultural heritage of UNESCO sites" being formed (Parcak, 2009). This approach has further proven to be quite effective in monitoring damage and looting at sites where accessibility is either limited or impossible due to issues such as armed conflict (see Cerra *et al.*, 2016; Angiuli *et al.*, 2020).

Within August of 2020 SAHRA became aware of the extensive wildfire which had progressed through the uKhahlamba-Drakensberg Park - World Heritage Site during July and August. The park is known for its dense concentration of Rock-Art sites, including the Game Pass Shelter National Heritage Site which had been newly declared in March of 2020.
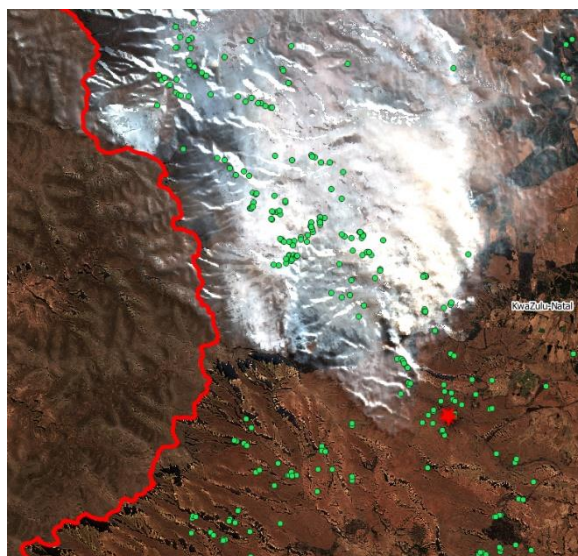
Whilst a formal report on any potential impact the fire may have had on the site was not available, it was possible for SAHRA to use freely available Sentinel-2 satellite imagery to examine the extent of the burned area in relation to the heritage resources recorded in the inventory, and importantly any potential impact on the Game Pass Shelter NHS.

True colour composite Sentinal-2 imagery (Bands 4, 3, 2) showing fire progression as at 15 July 2020 in relation to recorded sites (Game Pass NHS shown as red star).

False colour atmospheric penetration composite Sentinal-2 imagery (Bands 12, 11, 8A) showing fire progression as at 15 July 2020 in relation to recorded sites (Game Pass NHS shown as red star).

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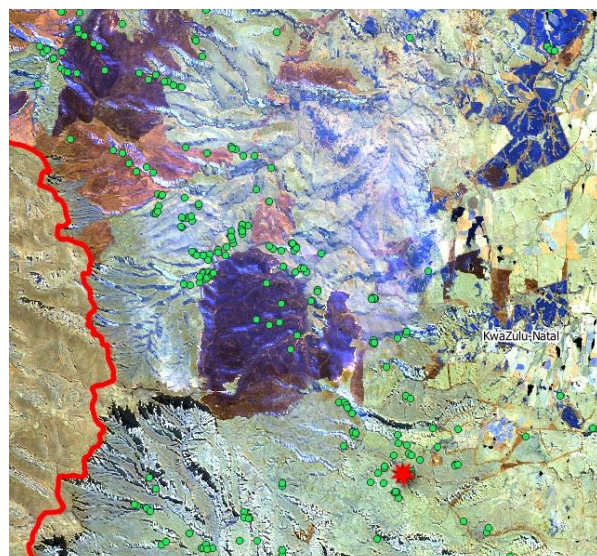**HERITAGE**
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True colour composite Sentinal-2 imagery (Bands 4, 3, 2) showing fire progression as at 17 July 2020 in relation to recorded sites (Game Pass NHS shown as red star).

False colour atmospheric penetration composite Sentinal-2 imagery (Bands 12, 11, 8A) showing fire progression as at 17 July 2020 in relation to recorded sites (Game Pass NHS shown as red star).
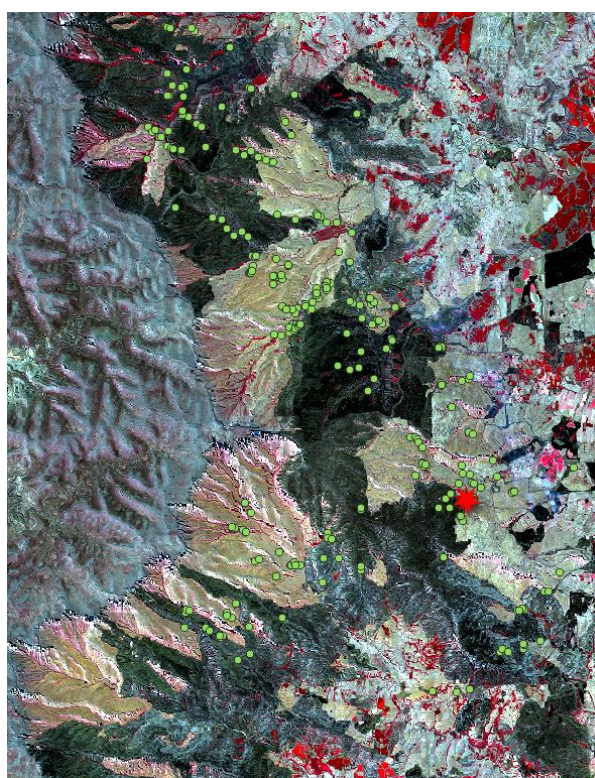

Figure 23: False colour composite Sentinel-2 imagery (Bands 8, 4, 3) showing fire affected areas in black – As at 03 September 2020. (Game Pass NHS shown as red star)

By the end of August 2020, a large area of the uKhahlamba-Drakensberg Park - World Heritage Site was affected by the fire. By calculating the Normalised Burn Ration (NBR) of the uKhahlamba-Drakensberg Park using Sentinel-2 imagery from before and after the fire, we are able to estimate the burn severity of the region and identify those sites which fall within areas more severely affected. From this analysis we have noted that **26.3%** of the 270 sites in the sample area fall within regions of Moderate-High and High burn severity, indicating the need for further examination of these sites for

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possible impact. The Game Pass Shelter NHS falls just within a region of Moderate-Low burn severity but will require further verification to determine if the site was impacted by the fire action.
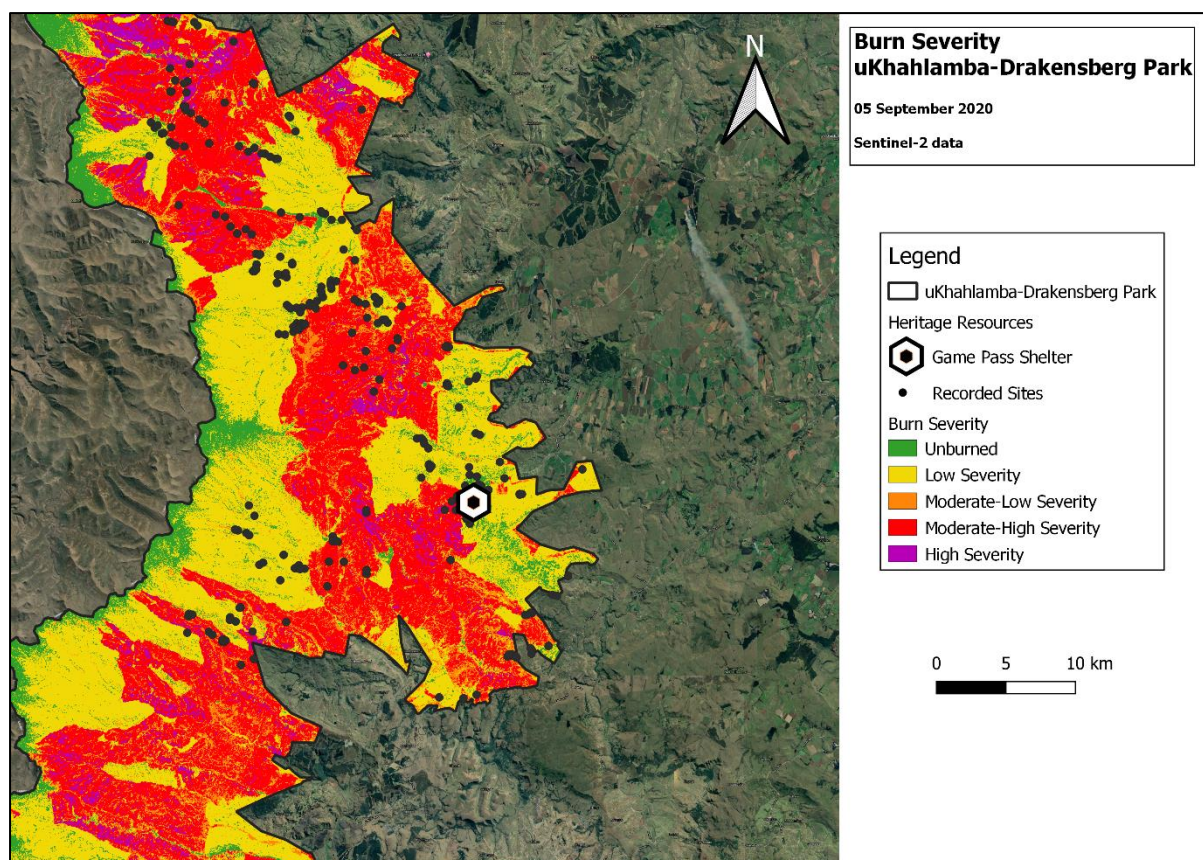
8.1.1. Towards a National Heritage Resources Fire Alert System

In previous summary and analysis reports, it was noted that one of the major risks facing heritage resources in South Africa is fire, both directly and indirectly. Due to the number of identified heritage resources being located within areas of extreme and high risk (see SAHRA, 2019), SAHRA has begun a process of setting up fire alerts, for the areas around and within the boundaries of declared National Heritage Sites using the NASA Fire Information for Resource Management System (FIRMS). FIRMS is a freely available resource that provides active fire locations within 3 hours of its obervation by satelite.

Whilst work is still ongoing in respect to the setup of alert areas around all NHS's, the rapid alerts provided on sites has already proven beneficial in the proactive management of heritage resources.

The alerts produced for the areas surrounding the Dal Josafat Cultural Landscape has allowed the staff present on the site to maintain appropriate readiness levels should any detections prove to be a source of risk.

As the inclusion of more heritage sites on the active alert system progresses, it will allow for more rapid response to detected fires.

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9. Acknowledgements

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