Status Report on the Agulhas Plain Study Area

Prepared for the Kishugu NPC as Part of the Study into the Feasibility of Integrating Fire and Alien Vegetation Management Activities in the Western Cape

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Table of contents

A Status Report on the Agulhas Plain Study Area 1
1. Background 1
2. Objectives of Report 1
3. Structure of this report 2
4. Data Collection Procedure and Protocols 2
5. Area Description 4
5.1. Climate 4
5.2. Fire History 4
5.3. Vegetation 5
5.4. Agriculture 6
5.5. Socio Economics 7
6. Agencies involved in Fire and Alien Vegetation Management 7
6.1 The Nuwejaars Wetland Special Management Area 9
6.1.1 Management planning 9
6.1.2 Resources 12
6.1.3 Fire History 13
6.1.4 Alien Vegetation 14
6.1.5 Key Challenges 14
6.2 The Agulhas National Park (ANP) 16
6.2.1 Management planning 16
6.2.2 Resources 18
6.2.3 Fire History 20
6.2.4 Alien Vegetation 20
6.2.5 Key Challenges 20
6.3 The Walker Bay Fynbos Conservancy (WBFC) 21
6.3.1 Management plans 21
6.3.2 Resources 23
6.3.3 Fire History 25
6.3.4 Alien Vegetation 25
6.3.5 Key Challenges 25
6.4 The Strandveld Fire Management Unit 27
6.4.1 Fire History 27

6.4.2 Alien Vegetation *28*
6.4.3 Key challenges *28*
7. Findings 30
7.1 Limitations to the Study 31
7.2 Management planning 31
7.3 Resources 32
7.4 Heeding the legislation 33
7.5 Managing the Biomass 35
7.6 Conclusions 36
8 Acknowledgments 37
9 Bibliography 37
Appendix 1 Maps **40**

A Status Report on the Agulhas Plain Study Area

A Report Prepared for the *"Study into the Possible Integration of Fire and Alien Vegetation Activities in the Western Cape"*

1. Background

The study to look at ways of integrating alien vegetation clearing operations with veldfire management initiatives commenced in May 2015. Two study areas, one in the Agulhas Plain, and one in the Southern Cape were identified. A series of meetings and interviews were held with stakeholders in each area, primarily to establish the relevant status of both fire and alien management activities within their relevant areas of operation. Particular attention was paid to the various types of planning formats that were applied in each of the areas.

2. Objectives of Report

The overall objective of this report is to record as concisely as possible the findings of a series of field visits and interviews with stakeholders involved in alien vegetation and fire management in the Agulhas Plain Study Area.

The number of field visits and interviews were restricted to meet budgetary and time constraints but are deemed to give a fair indication of the status of the Agulhas Plain in terms of the following:

- The form of structured management strategies or plans as utilised by the various stakeholders;
- How these strategies or plans applied in the field;
- Scale of alien vegetation invasions and level of fire management practiced in selected areas; and

- The challenges confronting alien vegetation and fire managers in the study areas.

This study aims to inform the basis upon which a future “workshop” will be held to explore ways that both fire and alien vegetation can be integrated at ground level planning and execution phases. The ultimate objective is to not only manage both fire and alien vegetation cost effectively, but also to increase the job opportunities currently available.

3. Structure of this report

A brief descriptive overview of the study area is provided as a context to the study. The findings for each of the four study areas, assisted by related literature, are recorded in the following chapters.

4. Data Collection Procedure and Protocols

A series of meetings were held at provincial and regional level to advise stakeholders of the study concept and to engender support for the study.

A study area within the Agulhas Plain regarded as representative of the region was identified as a focus area. Four adjoining Fire Management Units (FMUs) plotted by the Greater Overberg Fire Protection Area (FPA) were chosen as the study area (see maps numbers 1 and 2 in appendix 1).

A management organisation was chosen in each FMU and representatives from each were interviewed during a field trip held in July 2015.

Management approaches by each organisation were assessed from the level of planning that was applied to alien vegetation and fire management.

The following comments are an example of what was captured during discussions on the field trips detailed in Chapter 6. The relevant remarks reflect the perceptions that are held in some quarters and are included to provide context to this report. Some of these comments originate from discussions held in the Southern Cape study area but may have some relevance here as well:

- The Working for Water's WIMS (Water Information Management System) does not take the role of fire in the local environment into account.

- Extended Public Works Programmes (EPWPs) are focused on eradicating alien plants and do not address the broader environmental concerns closely related to alien vegetation management.

- No provision is made for managing the fuel loads created by clearing operations.

- Alien vegetation clearing operations seem to be focused on areas that are not necessarily priority (e.g. catchment areas and along river courses).

- The value of ecosystem services is not taken into account when budgeting for alien clearing operations.

- Contract Working for Water teams should be trained to carry out stack, prescribed and fuel reduction burns. In this way post clearing operations that require a burn can be undertaken without bringing specialist teams in from other areas.

- More money is spent on alien vegetation management than on fire management. This is reflected in the budgets of the different EPWPs. There are more Working for Water teams than there are Working on Fire teams.

- The gains made in the Mountain Catchment Areas that were earlier identified, as priority areas have been lost. Some areas previously cleared have been re-infested and now require initial clearing.

- Some farmers are disillusioned with new Fire Protection Association structures and feel that they do not get enough support to do control burns.

- EPWPs should not be operating in silos. Conservation agencies in particular have a logistical challenge aligning their objectives with several programmes running simultaneously within their areas.

5. Area Description

5.1. Climate

The climate in the region is a typical Mediterranean type climate with long hot and dry summers, and cool wet winters. The highest mean summer temperature however is lower than most areas in the Western Cape with 26^0C recorded in January and 6^0C in August.

Most of the rain falls in winter with levels ranging from 450 mm per annum along the coast to 650 mmm per annum on the low foothills to the north.

The Cape Agulhas has been recorded as the “windiest” stretch of coastline in South Africa (Kraaij, 2008), with prevailing winds dominating from the west in winter, and from the east in summer.

5.2. Fire History

Five fire climate *zones,* also termed ecozones, have been identified in the Western Cape. Each ecozone has a distinct potential for veldfires that is defined by the regional climate. The Agulhas Plain falls within the southwestern coastal zone, where the potential for fire is highest in the summer months. Fires occur mainly in summer under extreme conditions. Fires have also been known to occur in winter under bergwind conditions (van Wilgen BW and Forsyth, 2008).

There is evidence that veldfires have been part of the landscape since the earliest occupation of the Plain 200, 000 years ago (Heydenrych, 1999). Pastoralists who introduced livestock to the Plain in the mid seventeenth century would have moderated the fire regime quite considerably. Frequent fires to stimulate grazing also occurred throughout the subsequent occupation of the area by European farmers.

A period of fire exclusion followed from the 1970’s onwards with the introduction of fire control legislation and concern for liabilities following runaway fires. The last 20 years has since seen an increase in the spread of larger wildfires throughout the Western Cape (van Wilgen BW and Forsyth, 2008) and the same appears to have been the case on the Agulhas Plain.

5.3. Vegetation

Indigenous

The Agulhas Plain has been identified as one of the most ecologically sensitive regions in the country. High levels of endemism combined with high concentrations of rare and endangered plant species have encouraged efforts to establish a number of private and public conservation initiatives in the area.

Maps 3 and 4 illustrate the distribution of the several fynbos types identified by botanists. Western Strandveld dominates the coastal stretches in the west of the study area while the interior is made up predominantly of Sandstone, Limestone and Ferricrete Fynbos types.

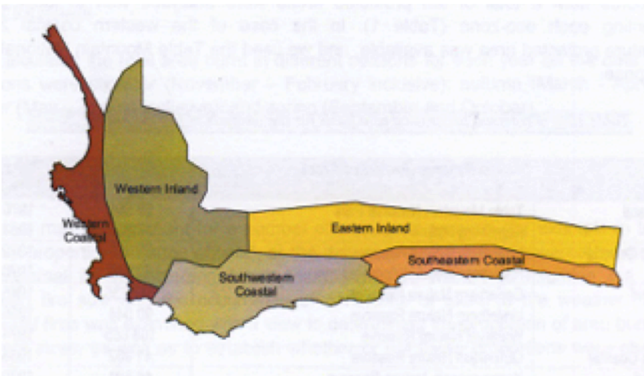

Figure 1: Ecozones in the Western Cape after van Wilgen and Forsyth 2008.

Of particular interest within the area are early milkwood forests that are susceptible to intense fire and alien vegetation infestation.

The Plain is renown for a series of wetlands where two, namely Zoetedalsvlei and Voëvlei, are extremely rare natural coastal lakes. The Heuningnes and Nuwejaars River systems feed a series of freshwater wetlands and peatlands.

Alien vegetation

Maps 5 and 6 in appendix 1 illustrate the extent of the alien vegetation density and distribution in the Greater Overberg FPA and the study area.

Acacia species were planted in the Walker Bay (State Forest) in the 1950's and 1960's, to stabilise the sand dunes. These species have invaded inland in the direction of the wind and veld fires, to the east of what is now the Walker Bay Nature Reserve. Other invader plant species include *Eucalyptus* and *Pinus*, that together with *Acacia* species make up 93% of the area infested (Nowell, 2011).

The extent of the invasion, measured by remote sensing satellite, was reported to be 31% of the Agulhas Plain region. The drawback of this detection method however is that only densities in excess of 50% can be measured (Nowell, 2011). The percentage of the area invaded would thus be much higher than 31%, as can be seen in the maps 5 and 6.

Table 1:	%
Outside funds	31
Fynbos wild flowers	28
Beef cattle	13
Sheep	10
Cultivated Fynbos flowers	5
Dairy cattle	5
Cereal crops	5
Other agriculture	2
Firewood	1
Bees	0
Eco-tourism	0

Organising the clearing efforts across the Agulhas Plain is a major challenge not only because of the vast extend of the infestation across thousands of private and public properties, but because of the immense costs related to the operations. The Flower Valley Conservation Trust has adopted a lead role in this respect by hosting the Agulhas Biodiversity Initiatives (ABI) alien clearing coordination activities. A working group meets regularly to identify priority areas and assess alien clearing needs.

Research has shown that there has been little reduction in extent of the alien plant species infestation over the period 2000 and 2011, despite the extensive clearing operations that have taken place (Nowell, 2011). While this may seem alarming, it should be remembered that there is consensus that had control operations not taken place the situation would have been decidedly worse. In addition the Working for Water Programme has created thousands of job opportunities where there would otherwise have been none, thus assisting in addressing critical social needs in the area.

5.4. Agriculture

Heydenrych (1999) identified four categories of farms in the area: livestock, mixed, fynbos and conservation farms. Table 1 provides a breakdown of income sources derived from the land use.

Of concern to Heydenrych (1999) at the time was that the highest percentage was linked to “outside funding” which indicated that many landowners were likely not managing their farms.

Figures in table 1 are dated for 1999 and earlier, but they do provide an indication of the diversity of land uses applicable in the area. While the commercial cut wildflower industry remains the largest income source for the region, concerns have been registered that some “harvesting” techniques can impact on red data *Proteaceae* and change the structure and compositional attributes of fynbos (Laubscher, 2009). More recent research into the industry has indicated that wildflower farmers have an advanced understanding of ecology, and that they manage the fynbos to both conserve it and at the same time sustain the industry (Treurnicht, 2010)

5.5. Socio Economics

The Agulhas Plain is bisected by two local municipalities, namely the Cape Agulhas Municipality in the eastern half and the Overstrand Municipality to the west. Demographics are thus measured within two different government structures and are expressed here as an estimated mean.

The population is predominantly young with 75% of the inhabitants falling in the 0 to 49 year age group. Unemployment is high (>50%) and just over half the working population earn R0 to 1600 a month. The populations are described as mobile, meaning that there is a constant flow of people in and out of the area. Poverty remains a major challenge while key services such as education and housing are being addressed (Anon., Cape Agulhas Municipality Revised IDP 2013-2014, 2012) (Anon, 2014).

6. Agencies involved in Fire and Alien Vegetation Management

Interviews were held with representatives from four organisations that are actively involved in the Agulhas Plain. These organisations were considered representative of both public and private institutions. At the same time field trips were undertaken to the areas to get an understanding of the circumstances under which the various managers worked.

The four institutions that assisted with the study are as follows:

- The Nuwejaars Special Management Area – a collection of private farmers who manage their farmland in accordance to strict conservation principles;

- The Agulhas National Park – proclaimed 16 years ago to manage a small parcel of land that has now been expanded to include 22, 000 ha of pristine coastal Fynbos, wetlands and marine reserve;

- The Walker Bay Fynbos Conservancy – where 26 private landowners manage their land in terms of a Conservation Management Plan; and

- The Sandveld Farmers Association – representing farmers that conduct a diversity of agricultural practices in the Sandveld Region;

These agencies are described in the narrative that follows. An overview is provided on the status and content of management plans, as well as the funding and resources available to sustain management activities. Information on fire history and alien vegetation levels is restricted to that which was made available. Key challenges faced by each organisation are also provided where relevant.

6.1 The Nuwejaars Wetland Special Management Area

The Special Management Area (SMA) is a unique approach to land management whereby 23 individual private landowners are responsible for managing 46, 500 ha in the Agulhas Plain (Erasmus, 2014). The unique initiative is driven by the landowners and farmers themselves with a broad range of objectives including the following: -

- To rehabilitate highly threatened wetlands;
- To sustain and uplift all communities living within the area;
- To develop sustainable utilisation of biophysical products;
- To manage Veldfires and Alien Vegetation; and
- To mitigate the impacts of climate change;

More than 200 of the 300 threatened lowland Fynbos plant species are protected within the SMA. Since 2010 a vast amount of work has gone into restoring the wetlands and coastal lakes that had been degraded by previous land practices. Faunal introductions have been undertaken to achieve very specific conservation objectives, while at the same time establishing funding sources (D'Alton, 2011).

6.1.1 Management planning

The Nuwejaars Wetland Development and Management Framework

The concept of the SMA was conceived as early as 2002 when a group of concerned farmers met to discuss the protection of their livelihoods, while at the same time preserving the critical biodiversity of the region. A lengthy process followed whereby additional landowners joined the movement and partnerships with local funding and conservation agencies were established. The *Development and Management Framework*, drafted by Dennis Moss and Associates over a 4 year period, outlines the core management principals and sets the foundation upon which the SMA is managed (van der Merwe S. W., 2008).

The core objectives for the SMA as defined in the Framework are to,

1. Restore the wetlands,
2. Develop sustainable use of biodiversity products;
3. Promote the well being of all communities living within the system;

The landowners have written a binding constitution that enshrines the principles as contained within the Framework and ensures continuous commitment to the framework into the future irrespective of change in land ownership. There is no need therefore to renew the original Framework.

The Framework is primarily a strategic document that identifies the activities that need to take place to achieve the primary objectives. Fire management is identified as one of these activities. There is however no prescription, or detail on integration with alien vegetation management.

Funding for the Framework was obtained from the Development Bank of South Africa. In 2003 a Non Profit Company was formed to manage the SMA and this enabled funds to be raised from various quarters.

Strategic Biodiversity Management Plan

A plan based on the Framework document was compiled in 2009 (Davies R. , 2009).

The objectives are essentially the same as those detailed in the Framework, namely:

1. To restore wetlands;
2. To encourage the sustainable use of biophysical products;
3. To encourage diverse and sustainable agricultural practices; and
4. To promote the well-being of all communities living in the SMA;

The document is open-ended and does not place any time scales related to the achievement of the objectives. There is also no indication of when the plan should be updated.

The strategic plan contains descriptive and spatial information on the vegetation and wetland types found throughout the SMA. The conservation and management implications of each system are carefully detailed with specific reference to the recommended fire frequencies prescribed per veld type.

It is recommended in the plan that the Nuwejaars Wetland Land Owners Association (NWLOA) Executive Committee ensure that SMA members conform to the following fire management protocols:

- Join the FPA and conduct burns as prescribed;
- Develop a mosaic of diverse veld ages;
- Adhere strictly to recommended fire return intervals; and
- Keep a fire history record;

Alien vegetation species and densities have also been mapped and described along with very clear prescriptions in terms of clearing prioritisations. The NWLOA is advised to “draft a clearing plan based on maps prepared with indicative budgets to solicit funding for clearing” (Davies R. , 2009).

There is thus no overall management plan that sets detailed activities that should to take place in the SMA as though it were a single or autonomous conservation unit. Each landowner is thus responsible for independently managing fire and alien vegetation on their own property. As a member of the SMA however, a landowner is committed to adhering to the SMA principles, but they still manage fire and the alien vegetation according to their own requirements. In other words, a farmer will burn to suit certain grazing regimes, or may restrict alien clearing operations if animals are using it for forage.

The Strategic Biodiversity Management Plan has identified the following land use zones within the SMA:

Primary Zones

- Core Conservation Area; and
- Intensive Agricultural Area.

Secondary Zones

- Consolidated Conservation Area;
- Natural Area;
- Transition Area; and
- Grazing Area.

Each zone has a clearly defined prescription in terms of the activities that should take place within them as well as the type of developments that are suited for each. The extent to which each landowner respects these zones and applies these prescriptions is not clear and could not be determined.

Integrated Fire Management Plan
A detailed operational Fire Management Plan that integrates all alien vegetation activities has been compiled for the SMA. This plan focuses on developing a mosaic of differently aged veld to control the spread of wildfires, as well as the construction of firebreak. The plan however has not been adopted due to a shortage of funds.

6.1.2Resources

Funding
What separates the Nuwejaars Wetland SMA from others in the rest of the world is the fact that there is no continuous funding. Instead funding for the SMA is derived from the agricultural and conservation initiatives being run in the area (D'Alton, 2011). The annual cost of running the SMA is in the region of R1million per annum. In the early stages of establishing the SMA however funding had been received from a range of funders including: -

- The Development Bank of South Africa provided funding to “kickstart” the SMA initiative and to draft the Development and Management Framework;

- The German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) funded a range of projects including wetland restoration, alien clearing and game reintroduction;

- The Table Mountain Fund has funded a Conservation Manager to manage the SMA;

- Whilst in effect strictly a partner, the Overberg District Municipality manages fire management equipment bought by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU). The running costs of the five mobile fire units, one fire tender, and a bus are all carried by the Municipality;

- The United Nations Development Programme (UNDP)/ Global Environment Facility (GEF) has part funded the Agulhas Biodiversity Initiative (ABI). “The Nuwejaars Wetland Special Management Area was tasked with fulfilling *output one* of the UNDP-GEF funded project - i.e. to develop and implement a landscape-level conservation

management and planning system, through public-private partnerships negotiated by a well-capacitated extension service[1]".
Applications for funding for alien clearing operations are made to the Agulhas Biodiversity Initiative (ABI) who manage the annual Working for Water budget in the Agulhas Plain; and

- The Denel Overberg Test Range donated 19 Bontebok and CapeNature another 20. The SMA was responsible for their capture and translocation;

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Staffing
A conservation manager has been appointed to oversee operations within the SMA.

A Working on Fire team based at the Overberg District Municipality Fire Brigade services depot provides assistance with wildfires, firebreaks and prescribed burns.

Five contractor teams, of 10 workers each, are currently employed within the SMA.

A specialist contractor team of 5 is permanently employed on the SMA for day to day management tasks.

6.1.3Fire History
A widespread wildfire burnt across the Agulhas Plain in 2006 before the SMA was effectively managed.

Records are sketchy as there is no single Fire Management Plan that would prescribe a means for keeping records. The Greater Overberg FPA is still in the process of establishing reporting systems.

According to the Strategic Plan each landowner would have to maintain their own records. It is not certain therefore how a standard record would be maintained for the SMA, FMIU or FPA.

The Overberg District Municipality however, currently conducts a series of strategic burns creating a buffer zone on the mountains to the north of the SMA.

[1] http://www.nuwejaars.com/sponsors.html

6.1.4Alien Vegetation
Detailed species and density alien vegetation maps were drawn up in the Framework by van der Merwe (2008), who also provided standard clearing method guidelines. These maps are updated in the Strategic Biodiversity Management Plan (Davies R. , 2009).

Follow up clearing is always identified as priority work by the Conservation Manager when completing Annual plans of Operation (APOs). Vleis, wetlands, marshes and rivers are identified as areas of highest priority.
Lightly infested areas are cleared first, particularly in areas where milkwood and endangered species occur.

All the work in the SMA is currently confined to follow up operations.

6.1.5Key Challenges
The SMA is a bold concept in land management and faces a range of challenges that will define its future. These challenges include the following,

Social risks, the demand for land and high levels of unemployment could threaten land ownership in the region thereby undermining the status of the SMA.

Environmental risks, such as extended drought or rapid climate change could impact on biophysical services to such an extent that the ecological functions of the SMA may be threatened.

Financial risks, should returns from investment into the SMA be insufficient to maintain management operations. An example may be the Integrated Fire Management Plan that has not been adopted.

Climate change – is becoming evident with late rains falling in the warmer spring months. This in addition with a higher carbon level in the atmosphere has led to a noticeably faster growth of alien acacia species. Regrowth subsequent to clearing is sometimes so rapid that plants are too big to be sprayed by herbicide[2].

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[2] Pers. Comm. R. Allardice. July 2015.

The Nuwejaars Wetland SMA falls within the quaternary catchment G50C that has been identified as priority in Forsyth's report prepared for the Working for Water Programme. In figure 2 it can be seen that the majority of operations have been carried out in non-priority areas. It may be argued that more funds could have been directed towards the SMA given its status as a conservation area. (Forsyth & Le Maitre, 2009)

Possibly the biggest challenge remains the co-ordination of conservation activities throughout the SMA. This places a significant challenge to the Conservation Manager who is responsible for the coordination of all aspects of the SMA.

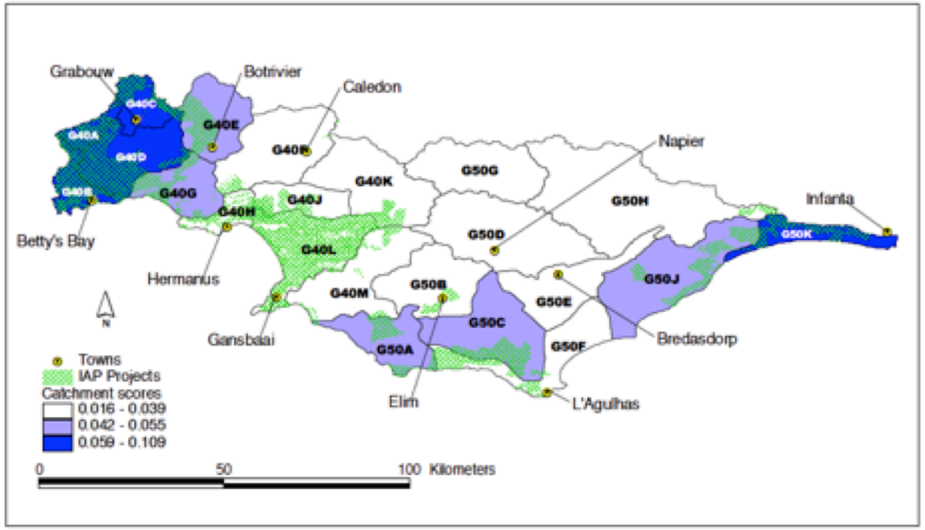

Figure 2: Darker shading indicates the priority catchments for the Overberg region. The green shading indicates where clearing operations have taken place (after Forsyth et al 2009).

6.2 The Agulhas National Park (ANP)

The Parks history can be traced back to1999 when 4 ha of land on the southern tip of Africa was proclaimed as a National Park. In the past 16 years, 36 portions of land have been added expanding the area under National Park management to 21, 971 ha [3]. Most of these portions of land are consolidated to form one continuous unit between the Nuwejaars Wetland SMA to the north, and the ocean to the south. An isolated fragment of the National Park, Waterford, is situated to the west of the main Park.

The ANP was founded primarily to conserve lowland Fynbos, particularly the critically endangered central rûens shale renosterveld, the Elim ferricrete fynbos, the exceptional wetland systems, and the diverse marine life of the area.

6.2.1Management planning

The South African National Parks runs an integrated process across all internal division to compile Management Plans in accordance to Sections 39 and 41 of the National Environmental Management: Protected Areas Act (Act 57 of 2003).

Planning cycles in the National Parks are thorough and the first Agulhas National Park Management Plan was completed subsequent to the drafting of the Agulhas National Park State of Knowledge Report (Kraaij, 2008) and Concept Development Plan. The Park Management Plan has since been revised and the current plan was approved by the Minister of Environmental Affairs in 2013.

Agulhas National Park Management Plan (Anon, 2012)
Sections 3, 4 and 5 of the Plan outline the basic policy framework and the “high level objectives” of the ANP. Section 10 of the Plan incorporates the Strategic Plan whereby goals and higher-level objectives for Biodiversity, Tourism, Stakeholder and Operational Management Programmes of the Park are developed into sub-objectives and actions. These sub-objectives and actions are then written up in separate Lower Level Plans per programme and ultimately into operational actions. This process, while rigorous, is essential to ensure that “decision making” and operations can be traced back to the core values and inputs from all stakeholders. It also conforms to the requirement of the National Environmental Management: Biodiversity Act (Act 10 of 2004) and the National Environmental Management: Protected Areas Act (Act 57 of 2003). Programmes of Implementation are identified, with vegetation management falling under the Programme for Biodiversity.

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[3] http://www.sanparks.co.za/parks/agulhas/

The Plan is valid for the period 2013 – 2023.

In the policy framework provided in the Programme, alien vegetation and fire management are identified as key activities to achieve the biodiversity objectives of the Park. While there is no obvious link between the two activities, due to the legislated format of the Park Management Plan, SANParks recognises that, "*the alien management programme will need to consider the importance of fire*" (Anon, 2012) page 38). It is within the Lower Level Plans for both aliens and fire that the identified activities are integrated and implemented.

Fire management is recognised as a high level activity and the preparation of a Fire Management Plan is identified as a key requirement.

Alien and invasive plants were managed as part of a Rehabilitation Programme in the first plan circa 2008. This work was undertaken by the Working for Water Programme. It was unfortunately not included in the 2013-2023 Management Plan. Amendments to correct this situation are envisaged for the 5-year review in 2018.

Fire Management Programme – Agulhas National Park (Cowell, 2012)
This document is the "Plan" identified as the key requirement in the ANP Management Plan.

The following objectives are pursued in the document:

- Maintenance of fire-dependent vegetation types;
- Protection of habitat types not driven by fire (i.e. wetlands); and
- Compliance with the legislation.

The Fire Management Programme is defined for the same period as the Park Management Plan is valid (2013-2023). SANParks will conduct a five-year interim review internally and changes to the Plan submitted to DEA. The Lower Level Plans and Operational Plans are more dynamic and updated annually.

There are sections of the Plan/Programme where specific activities for alien vegetation and fire operations are integrated: -

- Implication of fire for alien plant control (page 15);
- Clearing of alien vegetation and burning of stacks (page 32);
- Use of veldfire in alien plant control (page 32);

The guidelines for fire management contained within the text include considerations that need to be borne in mind when alien vegetation is present.

An excel worksheet schedule of controlled burns is maintained by management and scientific staff, whereby the Park is subdivided into management units averaging about 700 ha in size. The subdivision of the park into fire units was done in conjunction with the alien clearing teams and used the Working for Water NBal units as the basis for dividing the park into areas where fire was need for fynbos maintenance but also as part of alien clearing operations. The schedule indicates which units are to be burnt each year from, 2014 to 2052. The age of the veld at the time of the burn is captured, along with the alien species present before and after the burn.

Alien clearing operations are conducted by the Working for Water contractors in terms of the National Management Unit Clearing Plans (MUCP) and associated National Biological Alien (NBALs) polygons that are supplied by Working for Water.

The management unit boundaries each accommodate a cluster of NBALs.

6.2.2Resources

Funding

SANParks practice a zero based budget policy whereby every cost category is assessed in accordance to an approved Business Plan. Budget variances have to be motivated to the finances division.

SANParks achieved an unqualified budget for 2013/14, generating an income of R540 million against expenditure of R528 million.[4]

The annual operating budget of the ANP is R 23,2 million for 2013/2014, increasing to R30,6 million in 2016/2017.

[4] https://pmg.org.za/committee-meeting/17671/

Roughly 7% of this amount is currently set aside for fire management, while more than 69% of the budget is assigned to rehabilitation. The latter costs are not confined to alien vegetation management however but include a range of activities such as soil erosion and marine or coastal work (Anon, 2012).
A shortcoming in the SANParks Policy is that the fire management budget is only there to maintain fire-fighting equipment and not to conduct prescribed burns. A Fire Management Strategy however has recently been drafted for the SANParks that takes prescribed burning into consideration. This is currently with the SANParks Board for approval.

Staffing
The ANP is staffed by a contingent of 8 managers.

Most of the field work in the ANP is carried out by teams of workers contracted to Extended Public Works Programmes (EPWPs) funded by the Department of Environmental Affairs. The ANP currently has partnership agreements with the following programmes:

- Working for Wetlands;
- Working for Water;
- Working for the Coast;
- Working on Fire; and
- Working for Land;

A Project Manager funded by the Department of Environmental Affairs and seconded to the National Parks manages each of the EPWPs .

Twenty contractors with 12 workers each are currently involved in clearing operations in the Park. This is the largest Working for Water contingent in all the National Parks in South Africa.

Teams from the Table Mountain National Park and Bontebok National Park conduct fire management operations with Agulhas Park Management. The Working on Fire teams based in Bredasdorp and Volunteer Wildfire Services from Cape Town may assist these teams.

6.2.3Fire History
A wildfire burnt 66% of the ANP in 2009 disrupting the scheduled clearing operations and setting the Alien Vegetation Programme back by a few years. It did provide a blank canvas for fire management and alien clearing planning to be done together.

Working for Water teams have been conducting follow-up operations in the fire scar.

6.2.4Alien Vegetation
72% of the ANP area is predominantly infested with *Acacia cyclops*, *Acacia saligna* or *Pinus pinaster*.

Australian myrtle (*Leptospermum laevigatum*) has become an aggressive invader species. In some areas it has adopted creeper like characteristics making it harder to find and eradicate.

Pampas grass, *Cortaderia spp*., is an emerging alien species that has invaded some wetlands and is particularly difficult to remove. Banksia spp is also an emerging alien species and being from Australia is also from a fire driven system.

6.2.5Key Challenges
The vast volumes of dry material following clearing operations remain a source of concern as the high fuel load poses a risk and burning of the area subsequent to clearing remains a challenge.

Neighbours to the ANP have not cleared the *acacia* species along common boundaries in the southern section of the Park. This remains a constant source of infestation. SANParks is engaging with landowners and is not operating within a 2 to 20km zones outside of its boundaries.

The ANP is situated a long way from Bredasdorp and Elim from where the contractor teams have to travel every day. Long commute distances increase costs for the contractors and make it difficult for them to submit competitive quotes

6.3 The Walker Bay Fynbos Conservancy (WBFC)

The Conservancy is a cooperative conservation management effort founded in 1999 whereby 26 landowners jointly manage 14 880 ha of fynbos and forest in the south western region of the Agulhas Plain (Privett, 2015).

6.3.1Management plans

The Walker Bay Fynbos Conservancy Management Plan (Davies R. , 2009)
The WBFC safeguards a wide variety of divergent vegetation types within a relatively small area. Various forms of Strandveld are represented as well as Lime Sand Fynbos and Overberg Sandstone Fynbos. Sand Dunes, Afromontane Forests and Milkwood Forests further contribute towards the diverse habitats within the Conservancy. Each of these habitats have complex and diverse management requirements, and the WBFC Management Plan is therefore provided as a “guide” for future management.

The WBFC Management Plan is prepared in two “parts”. Part 1 provides a detailed description of the biophysical properties, the ecosystems and archaeology, as well as the threats facing the lowland Fynbos ecosystems. Part 2 outlines the management policies and prescriptions that should apply to each habitat.

The WBFC Management Plan lists key objectives to form the basis of all management decisions:

- To encourage landscape conservation;
- To work with environmental authorities;
- To raise funds;
- To develop a conservation ethic;
- To participate in surrounding educational, job creation and social upliftment programmes;
- To become a role model for other conservation entity; and
- To institute all of the above objectives according to the management plan;

Members of the Conservancy, whilst pursuing their own individual landuse objectives, are committed to the objectives above and have a “duty of care” to manage the three major threats facing the conservancy, namely frequent veldfires, alien plant invader species and irresponsible development.

A date for revision is recommended when certain conservancy developments make it necessary[5]. The latest update is currently being written and should be completed and applicable by September 2015 (Privett, 2015).

Part 2 of the WBFC Management Plan includes a section on fire management. The Plan includes a table showing the vegetation types, the key ecological drivers maintaining the vegetation and the corresponding conservation management details for each. Policies for the management of fire are stressed but not detailed. Basic requirements are that the Conservancy members should join an FPA and individual fire management plans are to be compiled by each landowner. The original Management Plan compiled in 2001 by Privett and Kotze included a burning programme where the Conservancy was divided into management "blocks" each with a prescribed burn in accordance to previous history and Fynbos type. The 2006 wildfire however burnt the entire Conservancy and no prescribed burns have since taken place.

An updated veld age and prescribed burn schedule map are currently being compiled as part of the updated Management Plan.

Part 2 of the WBFC Management Plan also stresses the importance of alien vegetation clearing and provides a *priority clearing list* stating:

1. "follow-up" areas to prevent re-infestation;
2. indigenous forest and wetland fringes;
3. light infestation preferably before carrying seed;
4. follow gradients, top to bottom; and
5. leave densest stands till last;

Each landowner is responsible for alien vegetation clearing and fire management operations on their own properties. While the WBFC Management Plan may set standards, principles and objectives for conservation management, there are in effect 26 separate plans underway. The level of integration cannot be ascertained at the current scale of operations.

[5] http://www.fynbos.co.za/html/who_we_aref.htm

CapeNature manages Walker Bay Nature Reserve, which forms part of the WBFC. CapeNature like many other conservation agencies, has entered into partnership agreements with a range of independently funded and managed Extended Public Work Programmes (EPWP), as a way to meet its nature conservation obligations. It is thus difficult to develop a single Management Plan that can be used to achieve its multiple objectives. Management staff have developed a system whereby their management and scientific services staff meet annually to review the ecological status of each reserve. Experts in both fire and alien vegetation management, as well as plant and animal ecologists, contribute towards an **Integrated Work Plan (IWP)**. All priority activities are identified based on the occurrence of fires and the spread of alien vegetation. The IWP is then used to compile an Annual Plan of Operations (APOs). Liaison between CapeNature management and the relevant EPWP ensures that the priority work identified is then addressed in the APOs drafted by the EPWPs. CapeNatures APO is entirely dependant on the management structures available to CapeNature, as well as the budgets made available by way of the partnerships with the EPWPs.

CapeNature conservators have conducted a study into the costs of clearing alien vegetation by alternative means. The cost of mechanical (bulldozer) clearing was compared to the cost of the manual clearing the vegetation by contractor teams. The cost per ha for mechanical clearing was 33% lower than that for contractors. The authors of this study however caution that mechanical clearing can have a negative impact on erosion potential and seed stores and can therefore only be used under certain favourable conditions. In both methods, fire remains a cost effective tool for reducing post clearing seedling regeneration. It is stressed however that if follow up cannot be undertaken after the fire, the investment in clearing and burning is lost and the post burn invasion of seedlings is enhanced (Geldenhuys, 2010).

6.3.2Resources

Funding

Funding, or more specifically lack of funding, is recognised as a threat to the Conservancy.
A sizable budget is required to meet all the objectives presented in the Management Plan. A Trust has been established and income is derived from annual membership and tourism fees, as well as income from the Walker Bay Hiking Trail. These funds are then used to finance conservation operations.

Landowners in the Conservancy manage a wide range of ecotourism developments. A recreational value of Fynbos biodiversity in the Agulhas Plain was set at R 2 268 per ha in a recent study (van der Merwe A. , 2014).

The WBFC Conservation Management Plan was funded by CAPE (Cape Action Plan for People and the Environment) (Davies R. , 2009) and by an individual donor. The Grootbos Foundation has funded the updated Management Plan.

The WBFC has received numerous corporate donations and was awarded the Iris Darnton Award for International Nature Conservation in 2001 where a donation of R100, 000 was invested in conservancy management projects.

Staffing

An Alien Vegetation Manager, funded by the WESSA – Groen Sebenza Initiative, has been appointed to co-ordinate and manage the alien clearing operations in the Conservancy until December 2015.

ABI have appointed 4 Working for Water teams of 12 workers each, who are currently deployed within the boundaries of the Conservancy. The teams work on a task basis and are given an area to clear in a fixed number of days. The Alien Vegetation Manager supervises the teams.

Each of the 26 properties making up the Conservancy have their own management structures and staff components. The Private Nature Reserves within the Conservancy, namely Grootbos, Wolwefontein, Witkrans, Southern Blooms, Heidehof and Mosaic Farms, are all managed by dedicated Conservation Managers.

A conservation manager had not at the time of the study been appointed to co-ordinate and manage the alien vegetation, fire control and biological surveys as advocated in the Management Plan ((Davies R. , 2009) page 25). As part of the revised and updated Plan for the Conservancy however, it is recommended that a conservation manager be appointed to administrate and coordinate a number of projects over the next 3 to 5 years.

The Working on Fire team based with the Walker Bay Nature Reserves had previously always assisted with wildfire suppression and controlled burn operations. In a recent communication from the Greater Overberg FPA, the Conservancy was advised that Working on Fire had cancelled all contracts and were no longer available for the 2015/2016 fire season.

6.3.3Fire History

Virtually the entire conservancy was burnt in a large wildfire in February 2006. This was a defining period in the management of the conservancy and alerted many members to the importance of proactive fire management that focuses on prevention and protection. One of the tourist structures in Grootbos was destroyed during the fire.

The boundaries of the WBFC have been mapped and identified as one of the Fire Management Units (**FMUs**) in the Greater Overberg FPA. Roger Bailey, Georges Schwegler and Sean Privett have been appointed as Fire Wardens for the FMU. Landowners are strongly encouraged to join the FPA but have to do so individually and at their own discretion.

The most recent fire in the Conservancy was at Heidehof 2015.

A number of fuel reduction burns, or stack burns, following alien clearing operations, have been conducted. Permit applications are submitted to the Overstrand Municipality Fire Brigade Services.

6.3.4Alien Vegetation

The Conservation Manager has updated the alien densities map and has used this information to plan the clearing and follow up operations. Requirements are submitted annually to ABI who administrate the Working for Water funding.

The WBFC have been working on a 3-year alien-clearing plan funded by ABI. Work is currently being finalised on another 3-year plan, but funding from ABI has not been confirmed yet.

Follow up operations are currently taking place in the Heidehof burn scar.
Between 2013 to 2015, 6, 000 ha was cleared in follow-up operations

6.3.5Key Challenges

A major challenge will always be to co-ordinate operations throughout the entire area. While the Management Plan sets the broad principles and objectives upon which the Conservancy is to be managed, the co-ordination, funding and control of the operations presents a considerable logistical challenge.

Seven of the properties run ecotourism operations based on the unique ecosystems that are situated in relatively close proximity to Cape Town. As mentioned earlier, these establishments are at risk, and although no risk assessments were conducted on a visit to the conservancy in July, it is apparent that some structures (and by association tourists) could be endangered in a repeat wildfire as experienced in 2006.

Neighbouring landowners who are not members of the WBFC do not clear alien vegetation. Dense stands along the Conservancy boundaries remain a constant source of seeds, particularly of *Acacia spp* that are transported by baboons and birds. This puts the clearing efforts of the Conservancy at risk.

6.4 The Strandveld Fire Management Unit

The Strandveld FMU is the largest of the 4 selected in the Agulhas Study area. It is also the FMU with the least formal or private protected areas. Most of the landowners in the Strandveld FMU are farmers who are members of the Strandveld Farmers Association. The Association represents the interests of the farmers in the region.

The Strandveld Farmers Association is a partner to ABI and is actively involved in the ABI Alien Clearing Project. A representative sits on the ABI Coordination Unit that is responsible for the strategic planning of the Project.

6.4.1 Fire History

According to Heydenrych (1999) there is evidence to suggest that people have occupied the Agulhas Plain since the Middle Stone Ages and would have used fire to “farm” fynbos to yield edible geophytes. In the later Stone Age, 21 000 years ago, the Agulhas Plain was occupied in much larger numbers and the frequent fires started by hunters led to the extinction of large grazing herbivores.

Khoikoi herders introduced sheep and cattle as long as 2, 000 years ago. It is difficult to quantify the impact that a large number of humans (estimated at 50, 000) and sheep and cattle (together estimated to be 1, 5 million) would have had on the landscape. Soil erosion from the denuded vegetation, and frequent fires would have been significant disturbance factors.

A major change in land use came to the Agulhas Plain when European style farming was introduced in the mid 1650s. Burning for grazing continued and the cultivation of crops was introduced.

Up until quite recently farmers used to carry out what were referred to as “skilpad brande”. This was in effect a form of patch burning, where farmers burnt vegetation for grazing purposes. In so doing a mosaic of variably aged veld was maintained by the farmers over the greater landscape. This practice died away about 25 to 30 years ago and since then the area has seen a proliferation of large runaway wildfires[6]. Someone who has been farming in the region for his entire life in the Strandveld provided this account.

[6] Pers. Comm. G. de Wet, Vice Chair Strandveld Farmers Association. July 2015.

Why farmers stopped the patch burning system is not clear, but it may be related to a number of factors. The Forest Act, and later the National Veld and Forest Fire Act, placed the responsibility for veld fires on the landowners. Exposure to litigation and prosecution would have discouraged farmers from burning. In addition the growth of the flower harvesting industry may have discouraged farmers from burning.

Fire was thus a part of the Agulhas Plain history for thousands of years, until a period starting in roughly the mid eighties when fire appears to have been excluded by farmers.

6.4.2Alien Vegetation

Acacia species were introduced during the 1950s to mid 1960s to stabilise the coastal dunes in the Walker Bay and De Mond State Forests (now proclaimed as provincial nature reserves). Planting was discontinued when it became obvious that the introduced species were invasive. The severe rate of spread of the *Acacia* spp over a period of 15 years can be seen when comparing Heydenrych's (1999) map to the current spread of species (maps 5 and 6).

Alien vegetation follows a 3 year planning cycle guided by the ABI Coordination Unit. Farmers are confident that the work carried out be the Working for Water teams has been effective and has shown positive results

There is some speculation that the severe and large runaway fires in the Agulhas Plain have contributed to the rapid spread of the *Acacia's* that are adapted to intense and frequent fire.

6.4.3Key challenges

The flower industry has seen a sharp decline in exports particularly to Europe. This has forced farmers to switch to alternative farming practices and more farmers are now keeping livestock. This means that more land will be cultivated for feed and that more burns may be introduced to encourage grazing quality. Farmers had already registered the Hoogekraal FPA in the region, but this was recently deregistered and included into the Greater Overberg FPA. Many farmers are sceptical about this development and believe that fees are too high. They used to pay on average R500 a year and now they are paying about R2000 a year. They also claim that it is difficult to get a permit to carry out control burns, and the result is that the authorities spend more time (and money) fighting wildfires than doing fire prevention work.

Many farms, because of traditional subdivisions, are too small today to be economically viable.

Farmers in the Strandveld FMU are not organised into unified formal conservation groups such as the Nuwejaars Wetland SMA or the Walker Bay Fynbos Conservancy. There is thus no cohesive planning strategy for fire management and each farmer is responsible for the management of fire on his own property. This will hopefully change over the long term if the Greater Overberg FPA can extend its influence.

7. Findings

The general description of each management entity is discussed in the foregoing chapters. Table 2 below provides a general summary of the findings to help draw comparisons, particularly with respect to the various levels of planning applicable.

Table 2:	Nuwejaars SMA 46, 500 ha	Agulhas National Park. 21, 971 ha	WBF Conservancy 14, 880 ha	Strandveld FMU
Strategic Plan	Yes, Framework and Strategic Management Plan	Yes, State of Knowledge Report and ANP Management Plan, Fire Management Plan	Yes, WBFC Management Plan 2009 and 2015	No
Operational Plan (Prescriptive)	No	Fire Management Programme Lower Level Plan, WfW APO plans – ANP	Partial, WBFC is both strategic and operational.	No
Fire Management addressed in MP	Guidelines given	Yes	Guidelines given	n/a
Alien Vegetation management addressed in MP	Guidelines given	Yes	Yes	Planning in terms of ABI 3 year plan.
Integration of fire and alien vegetation in MP	In plan not yet financed.	Yes	Guidelines given.	Managed by independent landowners.
Funding Sources	Uncertain, possibly inadequate.	Adequate, but needs better allocation.	Uncertain, possibly inadequate	n/a
Staff resources	1 Conservation Manager,	3 Conservation Managers and 5 EPWP Project Managers	1 Alien Vegetation Manager (funded till Dec.)	n/a
Working for Water Teams	5 teams x 10 workers	20 teams x 12 workers	4 teams x 12 workers	4 teams x 12 workers
Fire records available	No	Yes.	History recorded in WBFC Plan 2015	No
Records of alien invasive plant clearing operations available	Yes – but not provided	Yes – but not provided	Yes.	No

7.1 Limitations to the Study

Trying to establish the status of alien vegetation and fire management integration in the Western Cape is in reality a major undertaking. The vast scale of the alien invader plant species infestation, coupled with the increasing relevance of fire management makes it one of the most important issues today in land management. The annual national budget for Working for Water exceeds R1,5 billion[7] while the budget spend on fire management would most likely match that. The impact and cost of alien vegetation and veldfires on socio economic and biophysical services is inestimable. A topic of this type merits the consideration of a University postgraduate study at least.

To find answers to the questions posed when commencing the study involved the collection of fine scale data. While adequate data can be sourced, it needs to be borne in mind that the period to collect data, analyse it, draft reports, proof read data and present findings was less than 5 months.

There is a fair amount of institutional sensitivity around the provision of data as a vast investment has been made into the development of exclusive systems over time. Discretion had to be exercised when accessing this information and additional care taken to ensure that records are accurate.

An objective of this study was to provide information on a broad and complex issue and this has been done within the set limitations. Like any study however, this information should be subject to criticism and analysis, and hopefully in this process, some advance will be made in resolving the integration of fire and alien vegetation management in the Western Cape.

7.2 Management planning

The most effective way of ensuring that alien vegetation and fire management activities are integrated is by including both activities into an operational plan to cover management activities. This is the reason that specific note was taken of the type of plans used by each organisation in the study.

[7] https://sites.google.com/site/wfwplanning/

There are many interpretations of what constitutes a management plan. Generally, all plans include guidelines for the management of a specified area for both the long and short term to achieve certain predetermined objectives. A distinction however was observed in the study area between plans that are mostly descriptive in format opposed to those that are more prescriptive (or operational), where some of the organisations had more strategic level plans while others had planned management activities at a more practical level. Thus, whilst both plans contain objectives for management, the prescriptive plans tend to focus more on the what, where, how and when certain activities need to take place to achieve the objectives. This practical information can be used to compile fundamental budgets and Annual Plans of Operation, and most importantly will indicate what the consequences will be if the activities do not take place. Descriptive plans on the other hand generally only provide a guideline or policies without any detailed activities, with the result that such plans may not be readily implemented.

In management plans observed in the study area, it was evident that the public entities, like CapeNature and the National Parks, have comprehensive planning systems in place covering both the strategic and operational aspects of planning. This is a requirement in terms of the National Environmental Management Act Section 43. The level and degree to which these plans are applied is beyond the mandate of this study, but it is apparent that accurate APOs have been prepared and form part of a robust financial system in the National Parks.

Private instances have in the past relied on more strategic type planning where the focus is on providing guidelines for management. This is possibly because a strategic plan is drafted when the organisation is established. A lack of funding, or the fact that there are multiple landowners making up the conservation unit, probably makes it difficult to prepare fine detailed operational type plans. Wildfires and alien vegetation infestation however, are not constrained by boundaries and the impacts are evident across cadastral units. The ultimate challenge thus is to achieve integration of both these activities on a broad landscape basis. Is it possible to draft an operational plan across a wide geographic region such as the study area?

7.3 Resources

There is a glaring discrepancy between the funds available to the National Parks and the private conservation organisations. This can be seen when comparing the Nuwejaars Wetland SMA that at 46, 500 ha is twice the area of the Agulhas National Park. There is one conservation manager appointed to manage the alien vegetation on the SMA while in the National Park there are 3 Managers and a Project Manager for each of the EPWPs. There are 5 Working for Water teams in the SMA and 20 in the National Park. It could be argued that the National Park is managed as a single unit with conservation as it’s core activity, while the SMA is a collection of 23 different properties each pursuing individual objectives. However, veldfire and alien vegetation responsibilities, as mentioned before, are not confined by boundaries. The scale of infestation and amount of work to be carried out remains the same. If one hopes to successfully manage veldfires and alien vegetation resources must be deployed to those areas that pose the most risk. If not, there will always be the risk that resources will be spent where they are not maybe needed, while in another area priorities are ignored and become the source of runaway wildfires, or alien vegetation invasion. This is a particular risk in disparate patches of privately owned areas of land, despite the establishment of strategic goals for such organisations.

The Working for Water teams are currently deployed throughout the study area and remain the dominant EPWP. This Programme has been in existence for over 20 years and have over this period developed a comprehensive planning and tender system to distribute work on a national basis. In the study area alone there are 33 Working for Water teams actively engaged in alien vegetation operations. In contrast to this there is only one Working on Fire team in Bredasdorp, and recent budgetary cuts have resulted in the Working on Fire team in Hermanus being withdrawn. The emphasis is thus clearly on alien clearing and not proactive fire management despite the clear need for these two activities to be linked.

If alien vegetation and fire management operations were completely integrated on a regional scale it would entail a complex system of development of firebreaks and multiple prescribed burns closely coordinated with the alien vegetation operations. This may result in effective management of fire and alien vegetation clearing with a positive consequence of the number of job opportunities in the region would quadruple.

The challenge thus is to accurately establish the number of job opportunities that could be created. In addition sustainable funding has to be sourced to maintain this initiative.

7.4 Heeding the legislation

All invasive plant species are controlled by regulations contained within the National Environmental Management Biodiversity Act 10 of 2004 (NEMBA). The most recent regulations published in the government gazette on the 1 October 2014 lists 4 different categories of alien and invasive plant species that have to be managed, controlled or eradicated from areas where they may impact on the natural environment.

Of particular interest is the Section 73 paragraph (2) of NEMBA that reads as follows:

73. Duty of care relating to listed invasive species.

(2) A person who is the owner of land on which a listed invasive species occurs must:

- *Notify any relevant competent authority, in writing, of the listed invasive species occurring on that land;*
- *Take steps to control and eradicate the listed invasive species and to prevent it from spreading; and*
- *Take all the required steps to prevent or minimise harm to biodiversity.*

This has a direct bearing on all private landowners who have alien vegetation on their properties. There are numerous properties in the Study Area where dense infestations border the Agulhas National Park and the Walker Bay Fynbos Conservancy and where no effort has been made by the private landowners to control the aggressive invasions on their properties. The investment in time and money made by the conservation agencies in clearing alien vegetation is thus largely wasted.

The City of Cape Towns Invasive Species Unit, and the Department of Environmental Affairs, has approached owners of heavily infested properties that border on the Table Mountain National Park, to encourage them to clear their properties. The campaign initially involves engaging with the owners and providing information emphasising the negative impact of alien vegetation, particularly with respect to the dangers of runaway fires. Landowners have in terms of the legislation quoted above, been given a year to submit a survey of the alien vegetation present on their properties, and to submit a plan on how they intend to clear the alien vegetation.

This law is not only applicable to private landowners and the following section 76 of NEMBA reproduced here is directed at all organs of State:

76. *Invasive species control plans of organs of state:*

(1) The management authority of a protected area preparing a management plan for the area in terms of the Protected Areas Act must incorporate into the management plan an invasive species control and eradication strategy;

(2) All organs of state in all spheres of government must prepare an invasive species monitoring, control and eradication plan for land under their control, as part of their environmental plans in accordance with section 11 of the National Environmental Management Act.

The invasive species monitoring, control and eradication plans of municipalities must be part of their integrated development plans.

The guidelines for these regulations are currently being drafted and a point has been made that fire be integrated into the plans[8].

7.5 Managing the Biomass

The burning of slash, litter and stacks subsequent to clearing operations will always have an element of risk. Fuels associated with alien vegetation create high intensity fires and safe burning operations are expensive. Research into alternative methods of utilising the biomass created after clearing operations is currently underway. .

Post clearing biomass, particularly the woody component, has a significant potential for reuse as raw material in a wide range of fields. UNEP[9] states that the total available biomass of invasive plants in 2004 was estimated to meet the annual requirements for all of South Africa's pulp, paper, and board mills. There are other opportunities for use of resultant biomass from alien vegetation, including conversion to energy from projects such as the production of biofuels, charcoal and biochar. The CSIR undertook to determine the volumes of alien vegetation biomass standing on the Agulhas Plain and the conversion of this to energy. In the 2011 biomass-to-energy study (IAP2ENERGY), the CSIR determined that a purely economic model of converting to biomass to energy was not feasible. However, the range of options mentioned above will all be considered with the project concluding in March 2016[10]. Partnerships involving government, farmers and conservation agencies would however be required to develop an effective business model (Stafford, W. 2011).

Other options for using biomass include the Working for Water's Value-Added Industries Programme whereby wood is made available for processing, such as for building materials, indoor and outdoor furniture, screens and blinds, wooden toys furniture and fencing and even coffins[11] and wood-sheet boards for insulation, all creating jobs, especially in rural areas[12]. There is thus a vast market for cleared alien vegetation which can increase local economies, provide jobs and opportunities for employment beyond the jobs created by the clearing operations and therefore promote social upliftment on a wider scale.

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[8] Pers. Comm. Dr Ian MacDonald. Environmental Consultant. Augusts 2015
[9] http://www.unep.org/training/programmes/Instructor%20Version/Part_3/readings/WfW_case.pdf
[10] http://www.flowervalley.org.za/category/agulhas-biodiversity-initiative/
[11] Working for Water. *Partnership to Build 'Eco-Friendly Coffins' Wins R1m World Bank Award.*6 June 2005. http://www.dwaf.gov.za/Docs
[12] Working for Water. *Secondary Industries*. www.dwaf.gov.za/wfw/Secondary Ind/

7.6 Conclusions

It is evident that the management of alien vegetation and fire in the various areas does not follow a standard norm. There are vast variations in approach mostly determined by the various organisations objectives, their access to resources, and also by the level of planning exercised.

The challenges faced by the organisations also vary quite considerably again most likely because objectives and planning levels vary. Formal organisations tend to adopt prescriptive plans ranging from broad to annual spatial plans, while private organizations tend more towards ad hoc and strategic plans as resources or needs vary. Of interest is the fact that funding is not a common problem experienced by all, a fact that may auger well for future planning.

While it has been difficult to set up appointments with staff in some organisations there has been a great deal of support from most for the study. There is an underlying sense that everyone feels there is “another way of doing things” that may be more effective.

This Study was limited in scope by resources and time, but some early observations warranting examination would include:

- There is an outstanding opportunity to develop sustainable work in all spheres of environmental management but most particularly in fire management;

- The influence of the FPAs has grown and is recognized by most landowners, but there is still a vast amount of work that can be done to extend that influence;

- Integrated fire management, is practiced to some extent by all landusers, but has invariably **NOT** included the management of alien vegetation. Many managers recognize this fact as a problem but are incapable of integrating operations due to the segregated nature of funding, or, the extended public works programmes that are only active within their areas of interest;

- Some managers have expressed the need to explore the management of fire and alien vegetation on a regional basis as opposed to the current chequered format where cadastral boundaries generally confine operations to specific area

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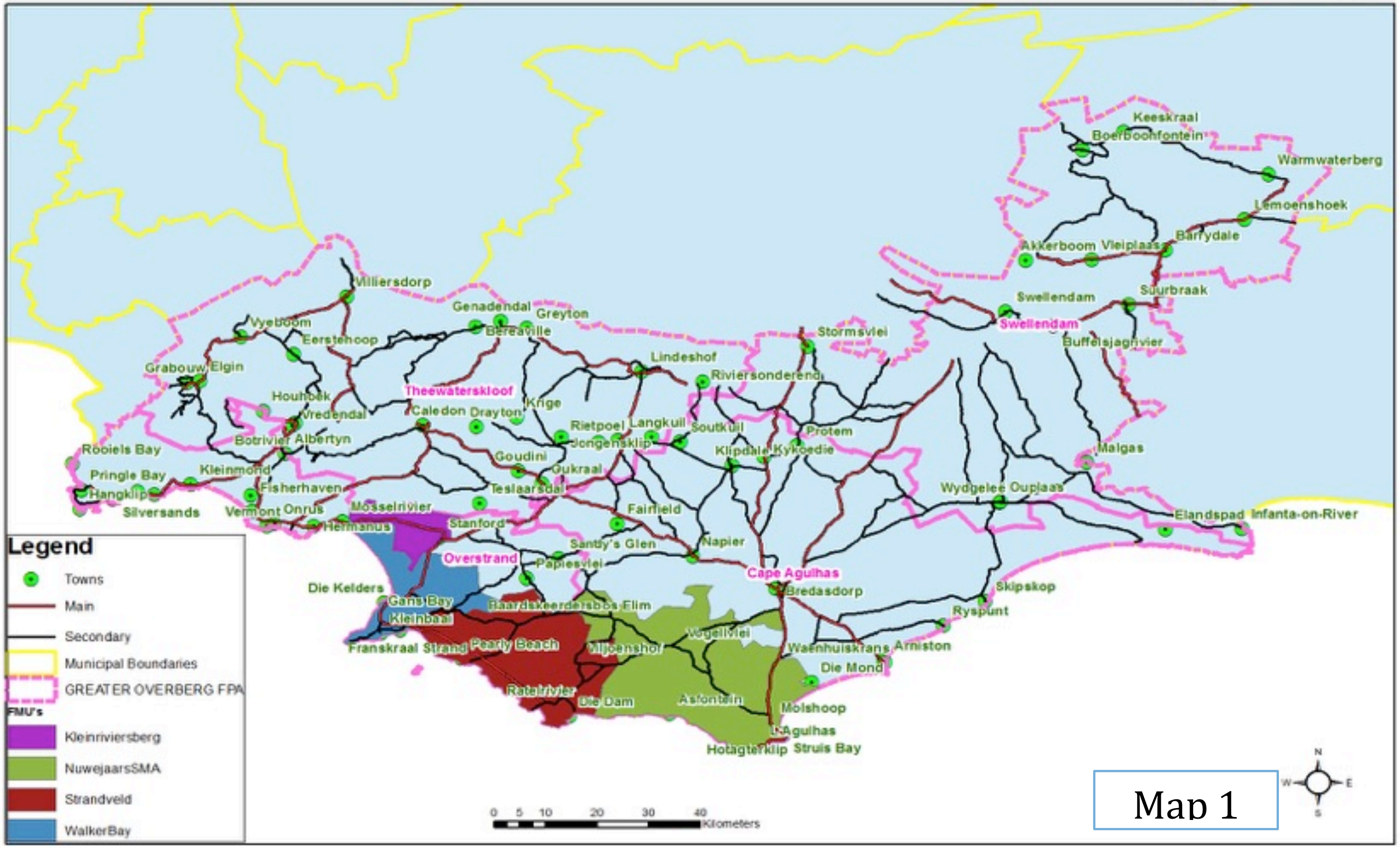
Appendix 1 Maps

The maps included here are at a resolution that is best suited for printing and posting with e-mail. High-resolution maps are available on request and will be used at the workshops scheduled for November 2015.

GREATER OVERBERG FPA

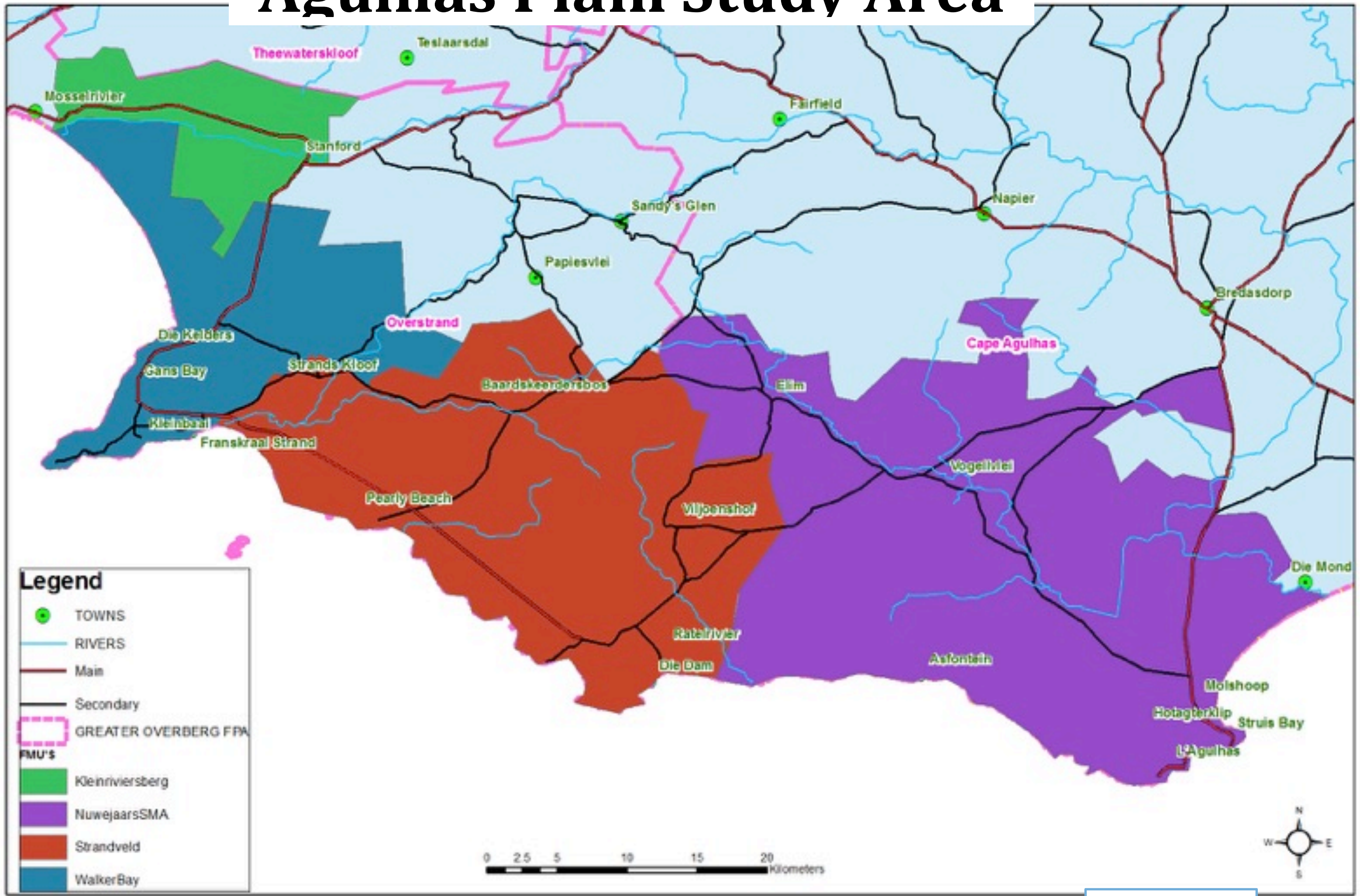
FIREWISE



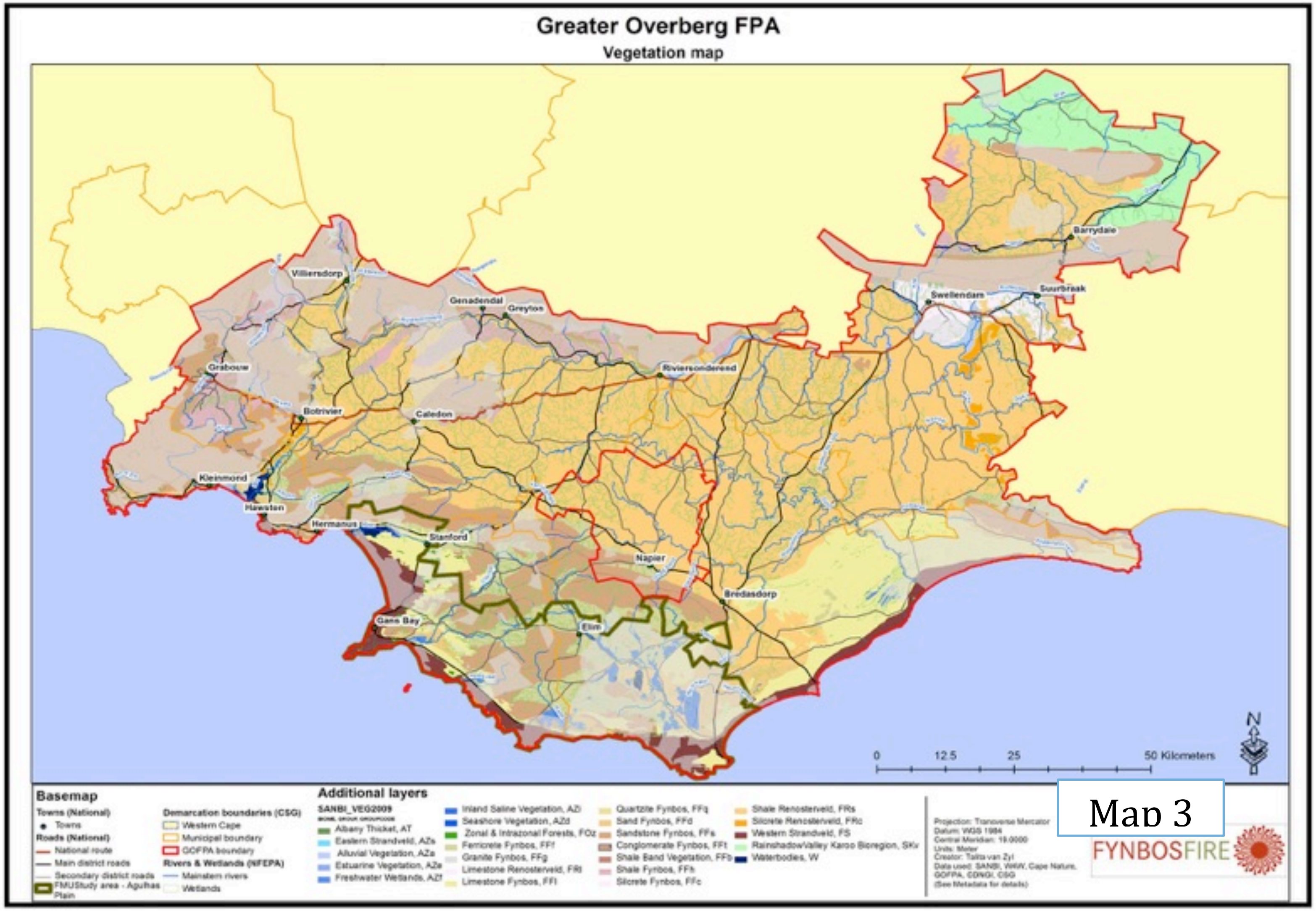
Map 1

GREATER OVERBERG FPA

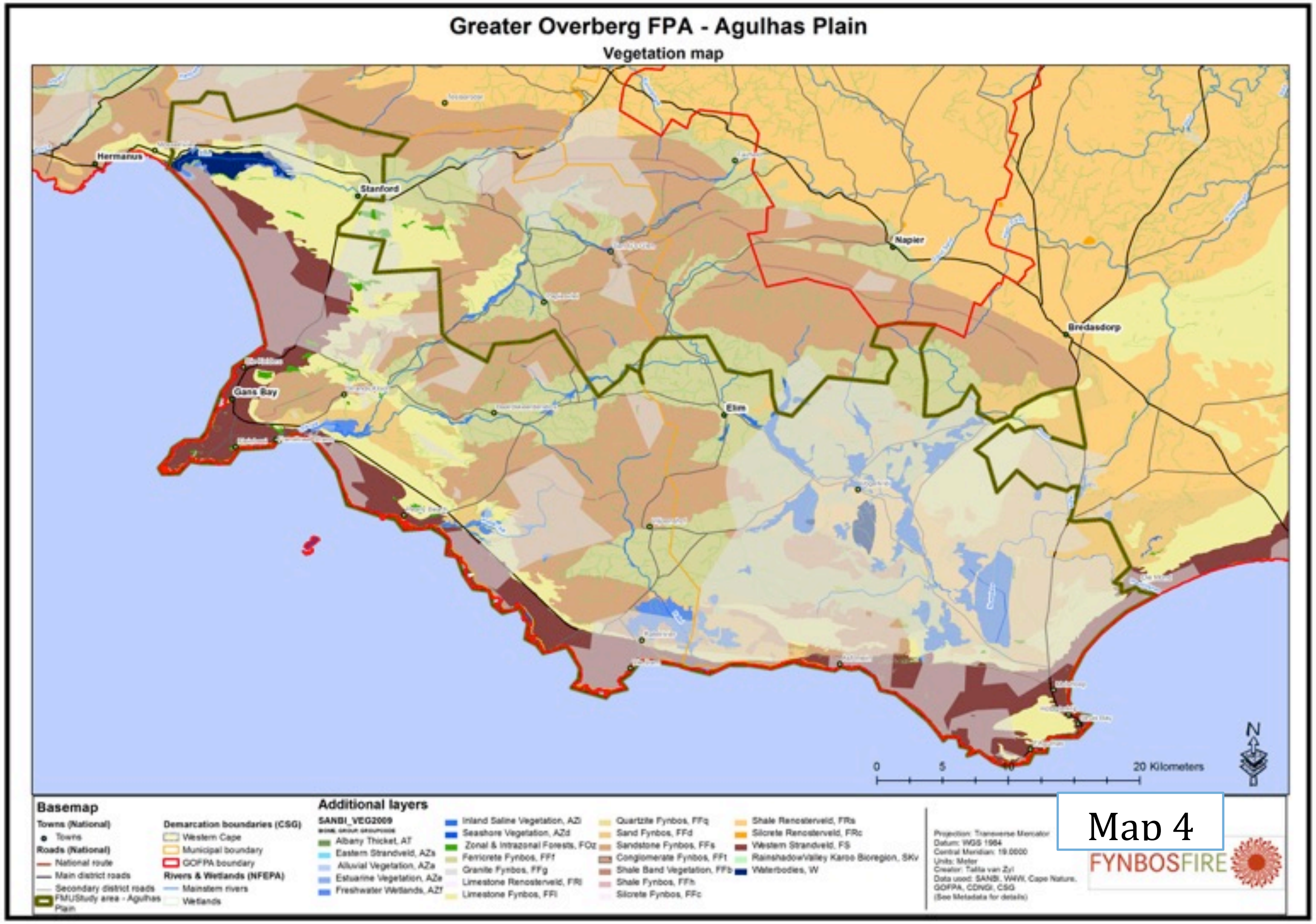
Agulhas Plain Study Area



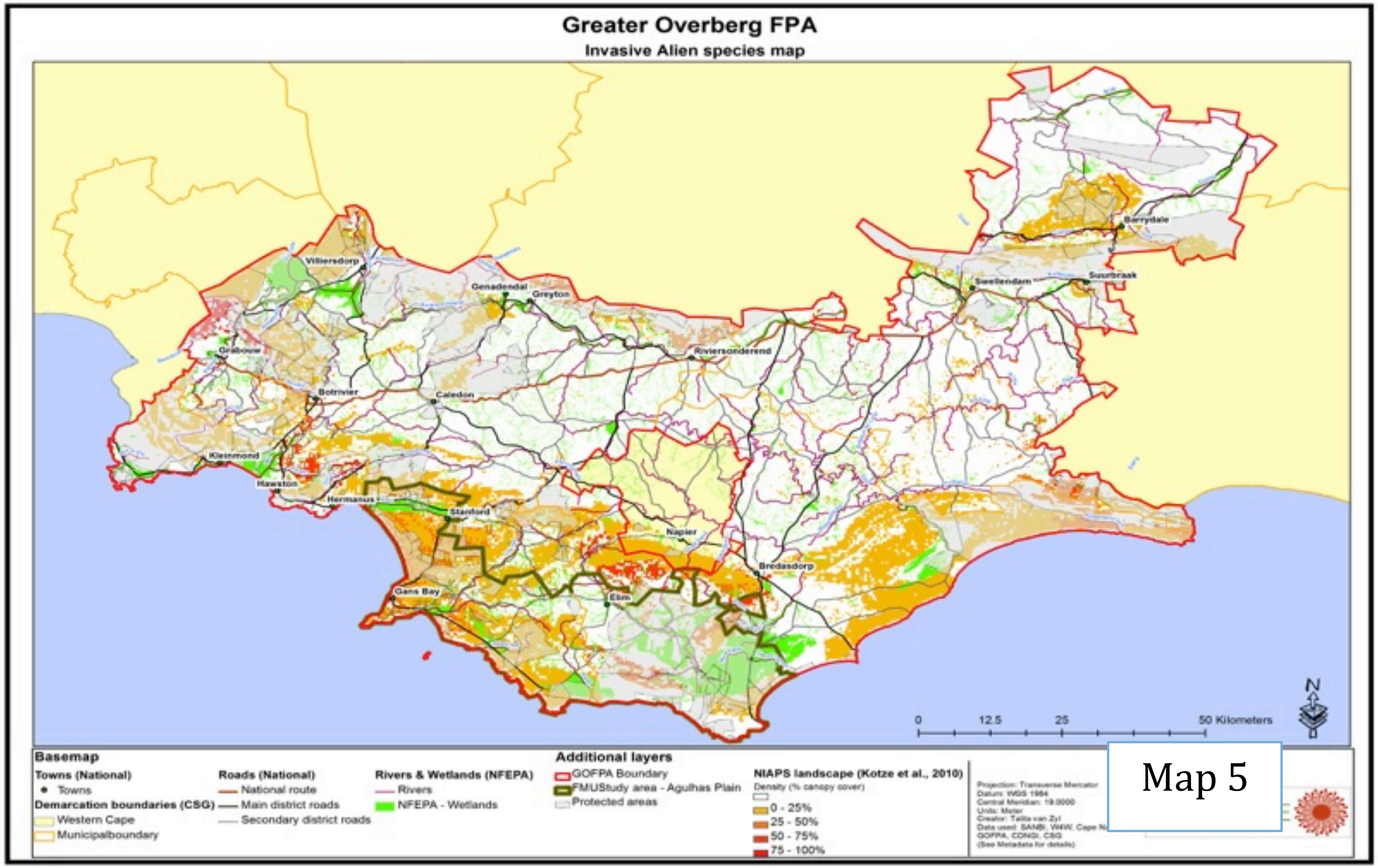
Map 2


Greater Overberg FPA
Vegetation map
Villiersdorp
Genadendal
Greyton
Grabouw
Botrivier
Caledon
Riviersonderend
Kleinmond
Hawston
Hermanus
Stanford
Napier
Bredasdorp
Gans Bay
Elim
Barrydale
Swellendam
Suurbraak
0
12.5
25
50 Kilometers
N
Basemap
Towns (National)
Towns
Roads (National)
National route
Main district roads
Secondary district roads
FMUStudy area - Agulhas Plain
Demarcation boundaries (CSG)
Western Cape
Municipal boundary
GOFPA boundary
Rivers & Wetlands (NFEPA)
Mainstem rivers
Wetlands
Additional layers
SANBI_VEG2009
Albany Thicket, AT
Eastern Strandveld, AZs
Alluvial Vegetation, AZa
Estuarine Vegetation, AZe
Freshwater Wetlands, AZf
Inland Saline Vegetation, AZi
Seashore Vegetation, AZd
Zonal & Intrazonal Forests, FOz
Ferricrete Fynbos, FFf
Granite Fynbos, FFg
Limestone Renosterveld, FRl
Limestone Fynbos, FFl
Quartzite Fynbos, FFq
Sand Fynbos, FFd
Sandstone Fynbos, FFs
Conglomerate Fynbos, FFt
Shale Band Vegetation, FFb
Shale Fynbos, FFh
Silcrete Fynbos, FFc
Shale Renosterveld, FRs
Silcrete Renosterveld, FRc
Western Strandveld, FS
RainshadowValley Karoo Bioregion, SKv
Waterbodies, W
Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 19.0000
Units: Meter
Creator: Talita van Zyl
Data used: SANBI, WWW, Cape Nature, GOFPA, CDNGI, CSG
(See Metadata for details)
FYNBOSFIRE

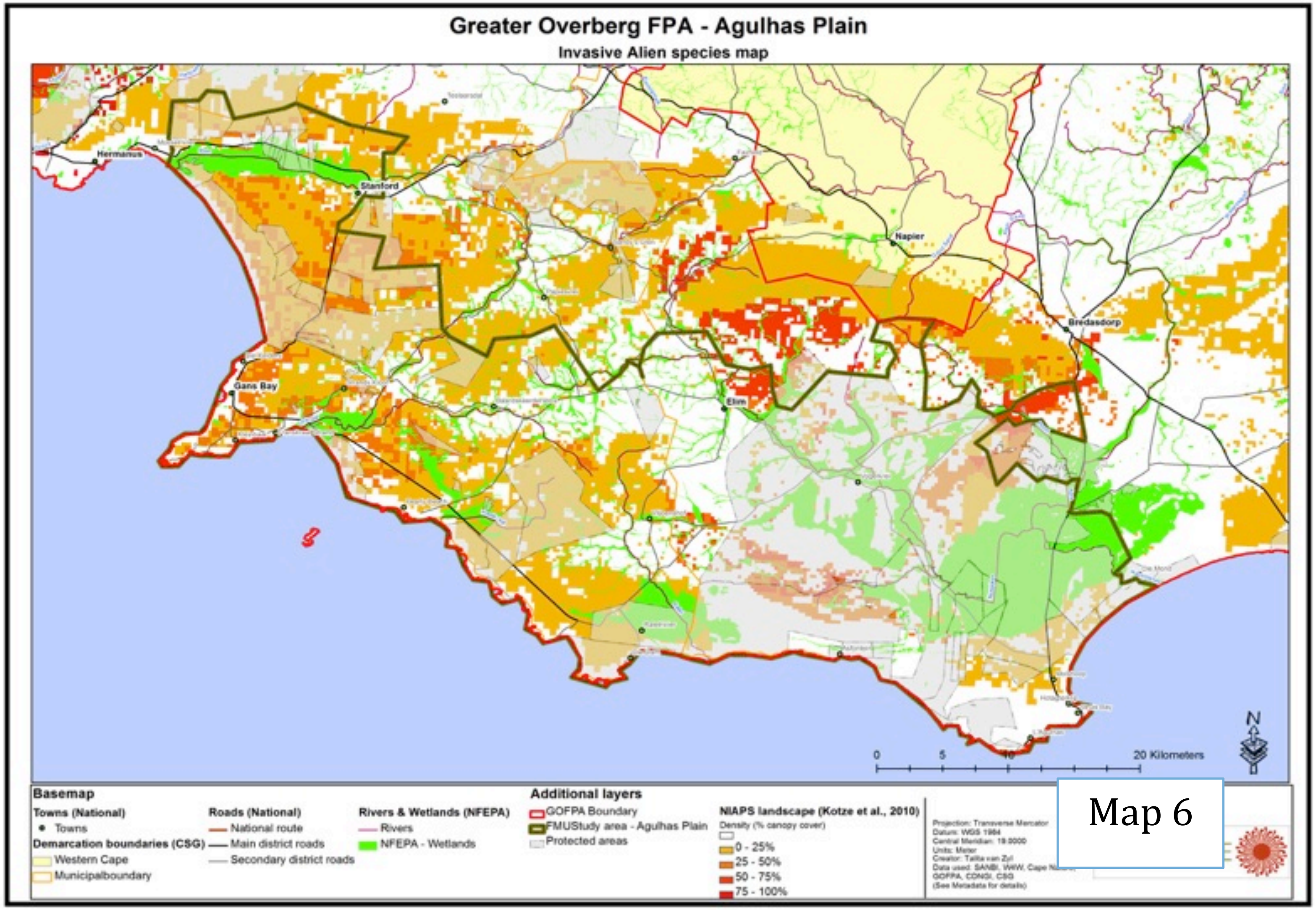
Map 3


Greater Overberg FPA - Agulhas Plain
Vegetation map
Hermanus
Stanford
Napier
Bredasdorp
Gans Bay
Elim
0
5
10
20 Kilometers
N
Basemap
Towns (National)
Towns
Roads (National)
National route
Main district roads
Secondary district roads
FMUStudy area - Agulhas Plain
Demarcation boundaries (CSG)
Western Cape
Municipal boundary
GOFPA boundary
Rivers & Wetlands (NFEPA)
Mainstem rivers
Wetlands
Additional layers
SANBI_VEG2009
Albany Thicket, AT
Eastern Strandveld, AZs
Alluvial Vegetation, AZa
Estuarine Vegetation, AZe
Freshwater Wetlands, AZf
Inland Saline Vegetation, AZi
Seashore Vegetation, AZd
Zonal & Intrazonal Forests, FOz
Ferricrete Fynbos, FFf
Granite Fynbos, FFg
Limestone Renosterveld, FRl
Limestone Fynbos, FFl
Quartzite Fynbos, FFq
Sand Fynbos, FFd
Sandstone Fynbos, FFs
Conglomerate Fynbos, FFt
Shale Band Vegetation, FFb
Shale Fynbos, FFh
Silcrete Fynbos, FFc
Shale Renosterveld, FRs
Silcrete Renosterveld, FRc
Western Strandveld, FS
Rainshadow Valley Karoo Bioregion, SKv
Waterbodies, W
Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 19.0000
Units: Meter
Creator: Talita van Zyl
Data used: SANBI, W4W, Cape Nature, GOFPA, CDNGI, CSG
(See Metadata for details)
FYNBOSFIRE

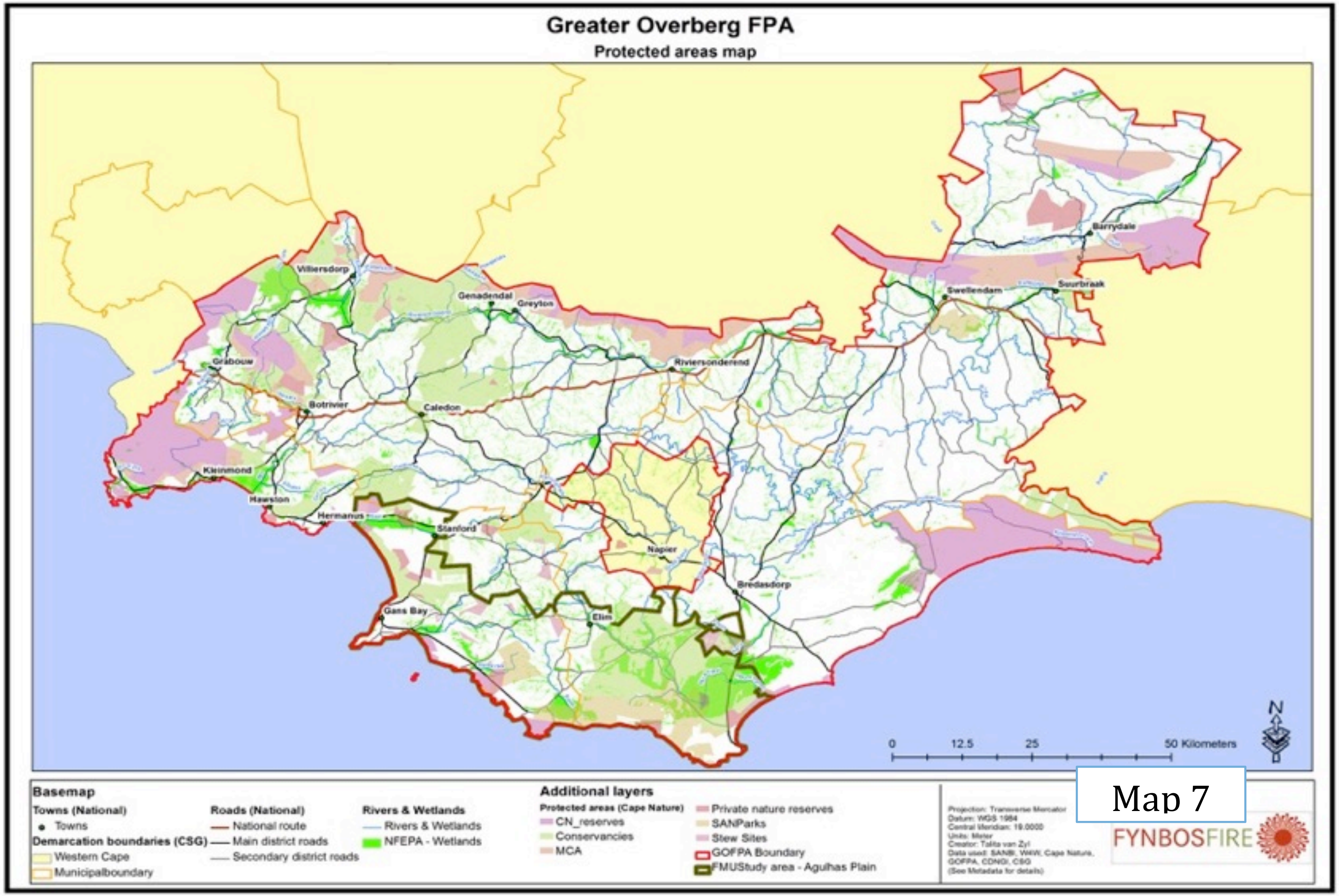
Map 4



Greater Overberg FPA
Invasive Alien species map
Villiersdorp
Genadendal
Greyton
Grabouw
Riviersonderend
Botrivier
Caledon
Swellendam
Suurbraak
Barrydale
Kleinmond
Hawston
Hermanus
Stanford
Napier
Bredasdorp
Gans Bay
Elim
0
12.5
25
50 Kilometers
N
Basemap
Towns (National)
Towns
Demarcation boundaries (CSG)
Western Cape
Municipalboundary
Roads (National)
National route
Main district roads
Secondary district roads
Rivers & Wetlands (NFEPA)
Rivers
NFEPA - Wetlands
Additional layers
GOFPA Boundary
FMUStudy area - Agulhas Plain
Protected areas
NIAPS landscape (Kotze et al., 2010)
Density (% canopy cover)
0 - 25%
25 - 50%
50 - 75%
75 - 100%
Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 19.0000
Units: Meter
Creator: Talita van Zyl
Map 5

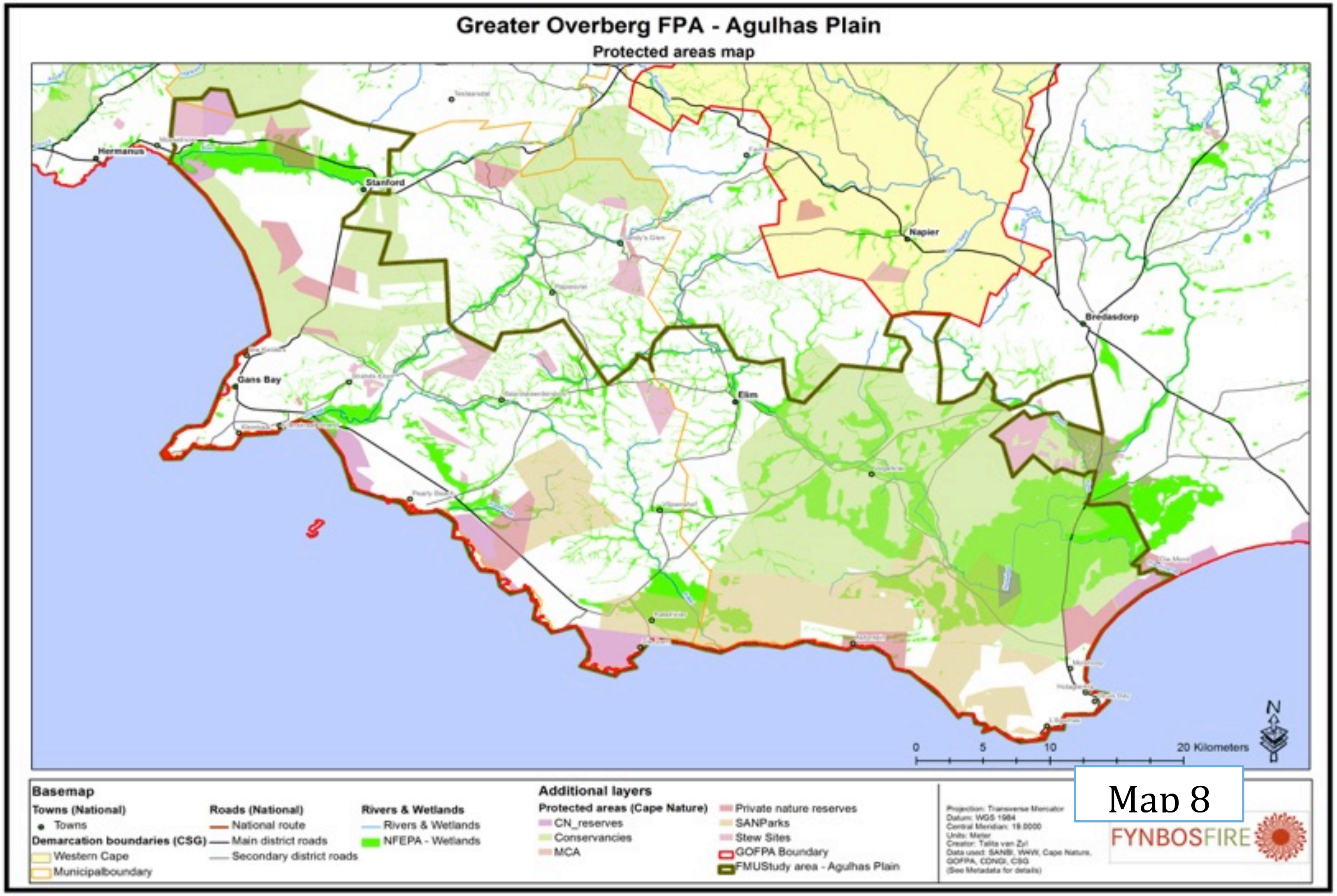

Greater Overberg FPA - Agulhas Plain
Invasive Alien species map
Hermanus
Stanford
Napier
Bredasdorp
Gans Bay
Elim
0
5
10
20 Kilometers
N
Basemap
Towns (National)
Towns
Demarcation boundaries (CSG)
Western Cape
Municipalboundary
Roads (National)
National route
Main district roads
Secondary district roads
Rivers & Wetlands (NFEPA)
Rivers
NFEPA - Wetlands
Additional layers
GOFPA Boundary
FMUStudy area - Agulhas Plain
Protected areas
NIAPS landscape (Kotze et al., 2010)
Density (% canopy cover)
0 - 25%
25 - 50%
50 - 75%
75 - 100%
Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 19.0000
Units: Meter
(See Metadata for details)

Map 6



Greater Overberg FPA
Protected areas map
Villiersdorp
Genadendal
Greyton
Grabouw
Botrivier
Caledon
Riviersonderend
Barrydale
Swellendam
Suurbraak
Kleinmond
Hawston
Hermanus
Stanford
Napier
Bredasdorp
Gans Bay
Elim
N
0
12.5
25
50 Kilometers
Basemap
Towns (National)
Towns
Demarcation boundaries (CSG)
Western Cape
Municipalboundary
Roads (National)
National route
Main district roads
Secondary district roads
Rivers & Wetlands
Rivers & Wetlands
NFEPA - Wetlands
Additional layers
Protected areas (Cape Nature)
CN_reserves
Conservancies
MCA
Private nature reserves
SANParks
Stew Sites
GOFPA Boundary
FMUStudy area - Agulhas Plain
Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 19.0000
Units: Meter
Creator: Talita van Zyl
Data used: SANBI, WWW, Cape Nature, GOFPA, CDNGI, CSG
(See Metadata for details)
FYNBOSFIRE

Map 7


Greater Overberg FPA - Agulhas Plain
Protected areas map
Hermanus
Stanford
Napier
Bredasdorp
Gans Bay
Elim
0
5
10
20 Kilometers
N
Basemap
Towns (National)
Towns
Demarcation boundaries (CSG)
Western Cape
Municipalboundary
Roads (National)
National route
Main district roads
Secondary district roads
Rivers & Wetlands
Rivers & Wetlands
NFEPA - Wetlands
Additional layers
Protected areas (Cape Nature)
CN_reserves
Conservancies
MCA
Private nature reserves
SANParks
Stew Sites
GOFPA Boundary
FMUStudy area - Agulhas Plain
FYNBOSFIRE
Map 8