Fynbos

ecosystem management plan: western cape

Prepared for:

Western Cape Conservation Stewardship Association (WCCSA) & CapeNature

By:

The Nature Conservation Corporation

JULY 2008

This Ecosystem Management Plan forms part of a set of 7, with an EMP Guide Tool for the implementation of these, all available from C.A.P.E. at Kirstenbosch, Cape Town.

NCC Environmental Services (Pty) Ltd trading as
The Nature Conservation Corporation
Reg. No.: 2007/023691/07
P O Box 30223 Tokai 7966
Republic of South Africa
Tel: 021 702 2884
Fax: 021 701 5302
info@natureconservation.co.za
www.natureconservation.co.za

Citation:
Jacobs, K. & Jangle, R. 2008. Fynbos Ecosystem Management Plan: Western Cape. Unpublished, The Nature Conservation Corporation, Cape Town.

Cover photograph: A colourful scene on the Groenlandberg, Grabouw.

acknowledgements

We acknowledge the input from landowners and their valuable contribution to conservation.

Also, on behalf of all the beneficiaries of this project, we acknowledge the main donor Critical Ecosystem Partnership Fund (CEPF), and co-funders: WCCSA, CapeNature and The Nature Conservation Corporation.

Contents

introduction

Fynbos is the archetypal vegetation of the Fynbos Biome and since exploration at the Cape began in earnest, it has always been accorded a special status amongst the world's floras. So much so that it is considered by many as the crown jewel of the temperate flora of the world. It is indeed one of the richest floras per unit area in the world and more comparable with the neo-tropics than other temperate floras.

Visitors to the Cape Floral Kingdom marvel at the stunning array of colours, textures and utterly breath-taking landscapes – one cannot help but be mesmerised by the splendour. Yet we have become jaded. Alien invasive vegetation has become the focus of our attention and erodes our enthusiasm and financial resources.

The reality is that now more than ever do we need to recapture the excitement of this magnificent jewel. In this Ecosystem Management Plan we present pragmatic solutions to management issues and hope to rekindle awareness and reverence for this globally unique ecosystem.

ecosystem description

landscape features

The Fynbos Biome is topographically diverse and this heterogeneity of habitats has been a major driving force in the creation of arguably the most diverse and unique of the temperate floras.

There are other minor substrate units such as conglomerate and alluvium fynbos but none were encountered during this survey and as such are not discussed here.

FFs sandstone fynbos

This unit occurs on acidic soils on sandstones of the Table Mountain Group. The terrain consists of rugged high mountains with steep to gentle slopes, midslope plateaus, high cliffs and deeply dissected in places. Often there is a series of undulating hills and plains.

FFq quartzite fynbos

Quartzite fynbos occurs on acidic to neutral soils on scarps and ridges that are remnants of the original quartzite layers. The vegetation follows a somewhat linear pattern as often these ridges are only ten metres wide!

FFd sand fynbos

This unit occurs on deep sands of marine or aeolian origin. These sands have been leached and are acidic or occasionally neutral. This vegetation occurs as a broad sweep of old dunes or expansive flats from Komaggas on the Namaqualand coast as far east as St Francis Bay on the South Coast.

FFh shale fynbos

Shale fynbos is found on undulating plains and steep to gentle slopes below other geological formations such as granite or sandstone and the neutral soils are leached.

FFb fynbos shale band vegetation

The shale bands of the Cedarberg Formation are sandwiched between the sandstones of the Peninsula and Nardouw Formations. This band varies from 40 - 140m wide and unlike the preceding unit the topography is not extensive or undulating – it is merely a band on the slope and is visible as such. The soils are generally neutral to acidic.

FFc silcrete fynbos

Silcrete is an ancient sedimentary rock that has almost entirely eroded during the course of time. It is however a prominent feature of hilltops and undulating plains on the South Coast especially around Swellendam. It is readily identified by the cobbles and pebbles of fine textured rock and also the neutral fine grained substrate that is usually orange-red or even pinkish.

FFf ferricrete fynbos

Ferricrete is a distinctive geological formation that contains iron. It is visible as loamy soil with ironstone pebbles or even as laterite or "koffieklip" banks. It is found as extensive intrusion on flats and undulating hills. The soils are neutral to acidic.

FFg granite fynbos

Granite is most often seen as the large batholiths such as Paarl Rock. The slopes below are often strewn with large boulders and rocks. In some areas the granite has long since eroded to form deep soil and all that remains are occasional outcrops and boulders. The soils are distinctive with sharp quartz gravel and loam with a glittery appearance due to the presence of mica. The soils are generally neutral.

FFl limestone fynbos

Limestone is a major feature on the South Coast from the Agulhas Plain to Mossel Bay. Limestone may occur as extensive pavements with terraces and cliffs close to the coast or as rugged hills further inland. The soils are alkaline.

vegetation description

The table below lists the vegetation units incorporated in this Fynbos Ecosystem Management Plan. Vegetation units highlighted are those sampled during the biodiversity and management assessment programme.

Table 1 List of Fynbos Vegetation Units in the Western Cape Province

Reference [1]	VEGETATION TYPES & UNIT	Status [2]	Target [3]
	Sandstone Fynbos		
FFs 1	Bokkeveld Sandstone Fynbos	LT	29%
FFs 2	Graafwater Sandstone Fynbos	VU	29%
FFs 3	Olifants Sandstone Fynbos	LT	29%
FFs 4	Cederberg Sandstone Fynbos	LT	29%
FFs 5	Winterhoek Sandstone Fynbos	LT	29%
FFs 6	Piketberg Sandstone Fynbos	LT	29%
FFs 7	North Hex Sandstone Fynbos	LT	29%
FFs 8	South Hex Sandstone Fynbos	LT	29%
FFs 9	Peninsula Sandstone Fynbos	LT	30%
FFs 10	Hawequas Sandstone Fynbos	LT	30%
FFs 11	Kogelberg Sandstone Fynbos	LT	30%
FFs 12	Overberg Sandstone Fynbos	LT	30%
FFs 13	North Sonderend Sandstone Fynbos	LT	30%
FFs 14	South Sonderend Sandstone Fynbos	LT	30%
FFs 15	North Langeberg Sandstone Fynbos	LT	30%

[1] Sourced from The Vegetation of South Africa, Lesotho and Swaziland (Mucina & Rutherford 2006)

[2] **Conservation Status of vegetation units defined as** LT = Least Threatened; VU = Vulnerable; EN = Endangered and CR = Critically Endangered

[3] The national target for securing representative vegetation for its conservation

Reference [1]	VEGETATION TYPES & UNIT	Status [2]	Target [3]
FFs 16	South Langeberg Sandstone Fynbos	LT	30%
FFs 17	Potberg Sandstone Fynbos	LT	30%
FFs 18	North Outeniqua Sandstone Fynbos	LT	23%
FFs 19	South Outeniqua Sandstone Fynbos	LT	23%
FFs 20	Tsitsikamma Sandstone Fynbos	VU	23%
FFs 21	North Rooiberg Sandstone Fynbos	LT	27%
FFs 22	South Rooiberg Sandstone Fynbos	LT	27%
FFs 23	North Swartberg Sandstone Fynbos	LT	27%
FFs 24	South Swartberg Sandstone Fynbos	LT	27%
FFs 25	North Kammanassie Sandstone Fynbos	LT	27%
FFs 26	South Kammanassie Sandstone Fynbos	LT	27%
FFs 27	Kouga Sandstone Fynbos	LT	23%
FFs 28	Kouga Grassy Sandstone Fynbos	LT	23%
FFs 30	Western Altimontane Sandstone Fynbos	LT	29%
FFs 31	Swartberg Altimontane Sandstone Fynbos	LT	29%
	Quartzite Fynbos		
FFq 2	Swartruggens Quartzite Fynbos	LT	29%
FFq 3	Matjiesfontein Quartzite Fynbos	LT	27%
FFq 4	Breede Quartzite Fynbos	LT	30%
FFq 5	Grootrivier Quartzite Fynbos	LT	23%
	Sand Fynbos		
FFd 1	Namaqualand Sand Fynbos	LT	29%
FFd 2	Leipoldtville Sand Fynbos	EN	29%
FFd 3	Hopefield Sand Fynbos	EN	30%
FFd 4	Atlantis Sand Fynbos	VU	30%
FFd 5	Cape Flats Sand Fynbos	CR	30%
FFd 6	Hangklip Sand Fynbos	VU	30%
FFd 7	Agulhus Sand Fynbos	VU	32%
FFd 8	Breede Sand Fynbos	VU	30%
FFd 9	Albertinia Sand Fynbos	VU	32%
FFd 10	Knysna Sand Fynbos	EN	23%
FFd 11	Southern Cape Dune Fynbos	LT	36%
	Shale Fynbos		
FFh 1	Kouebokkeveld Shale Fynbos	EN	29%
FFh 2	Matjiesfontein Shale Fynbos	LT	27%
FFh 3	Swartberg Shale Fynbos	LT	27%
FFh 4	Breede Shale Fynbos	VU	30%
FFh 5	Cape Winelands Shale Fynbos	EN	30%
FFh 6	Elgin Shale Fynbos	CR	30%
FFh 7	Greyton Shale Fynbos	VU	30%
FFh 8	Montagu Shale Fynbos	LT	30%
FFh 9	Garden Route Shale Fynbos	EN	23%
	Shale Band Vegetation		
FFb 1	Northern Inland Shale Band Vegetation	LT	29%
FFb 2	Western Coastal Shale Band Vegetation	LT	30%
FFb 3	Central Inland Shale Band Vegetation	LT	27%
FFb 4	Central Coastal Shale Band Vegetation	LT	27%
FFb 5	Eastern Inland Shale Band Vegetation	LT	27%
FFb 6	Eastern Coastal Shale Band Vegetation	EN	27%

Reference [1]	VEGETATION TYPES & UNIT	Status [2]	Target [3]
	Conglomerate Fynbos		
FFt 1	Kango Conglomerate Fynbos	LT	27%
	Alluvium Fynbos		
FFa 1	Kouebokkeveld Alluvium Fynbos	EN	29%
FFa 2	Breede Alluvium Fynbos	EN	30%
FFa 3	Swartland Alluvium Fynbos	CR	30%
FFa 4	Lourensford Alluvium Fynbos	CR	30%
	Granite Fynbos		
FFg 2	Boland Granite Fynbos	EN	30%
FFg 3	Peninsula Granite Fynbos	EN	30%
FFg 4	Robertson Granite Fynbos	LT	30%
FFg 5	Garden Route Granite Fynbos	EN	23%
	Silcrete Fynbos		
FFc 1	Swellendam Silcrete Fynbos	EN	30%
	Ferricrete Fynbos		
FFf 1	Elim Ferricrete Fynbos	EN	30%
FFf 2	Potberg Ferricrete Fynbos	EN	30%
	Limestone Fynbos		
FFl 1	Agulhas Limestone Fynbos	LT	32%
FFl 2	De Hoop Limestone Fynbos	LT	32%
FFl 3	Canca Limestone Fynbos	LT	32%

The Fynbos units are characterised by their geology and as such this is the first important step in identifying them. The major structural communities in the Fynbos vegetation units are:

proteoid fynbos with a dominance of overstorey proteoids with ferns, evergreen bulbous plants and broad-leaved sedges;

ericaceous fynbos is found on fine-grained sands or seasonally moist flat areas and has a high proportion of ericoids and restioids with high numbers of endemic genera such as *Brunia*, *Berzelia* and *Grubbia*;

restioid fynbos although dominated by Restionaceae, has a low cover of shrubs as well and is restricted to the extremes of the local hydrology – either those areas that are hot and dry or those that are cool and wet – any area that root growth is inhibited for most of the year;

asteraceous fynbos has a relatively low cover and is dominated by fine- or elytropappoid-leaf shrubs and deep-rooted non-ericaceous ericoid leaved shrubs such as *Metalasia*, *Passerina* and *Phylica*. It occurs on hot lower slopes and is more commonly found in arid areas;

grassy fynbos is dominated by grasses with a sparse overstorey of small leaved shrubs including Proteaceae and various herbs interspersed.

FFs Sandstone Fynbos

Sandstone fynbos is the most variable of the fynbos types and almost defies a general description. Each mountain range has its own variant and even within these ranges it differs from one area to another – so much so that even plant communities differ from one slope to the next. All the structural communities are present.

FFq Quartzite Fynbos

An arid fynbos with asteraceous and proteoid fynbos, occasionally also restioid fynbos.

FFd Sand Fynbos

Structural dominance depends on the depth of the water table. Where the water table is deep and the only moisture available is as a result of precipitation restioid fynbos will dominate. Proteoid fynbos dominates where it is shallow and non-fluctuating. Asteraceous fynbos dominates where it is deeper, but still accessible and finally ericaceous fynbos dominates where it is seasonally moist at the surface.

FFh Shale Fynbos

Dominated by proteoid and asteraceous fynbos which grades into renosterveld at the lower slopes.

FFb Fynbos Shale Band Vegetation

This unit is diverse and most easily recognised as a longitudinal band of structurally different vegetation on an otherwise "uniform" slope. This is a newly described vegetation type, is poorly researched and due its heterogeneity across its range is allied to many other vegetation types.

FFc Silcrete Fynbos

Mostly asteraceous fynbos but also grassy fynbos where disturbed. Proteoid fynbos occurs on southern slopes and ericaceous fynbos is found in wetter areas.

FFf Ferricrete Fynbos

Contains all structural elements, but the largest patches tend to be either asteraceous fynbos with proteoid elements or grassy fynbos with low growing proteoid elements, particularly where disturbed.

FFg Granite Fynbos

Granite fynbos is dominated by proteoid and asteraceous fynbos but also has extensive patches of thicket and scrub along drainage lines and on boulder fields.

FFl Limestone Fynbos

The main structural components except grassy fynbos are all present. Ericaceous fynbos is rare and restricted to higher altitude south-facing slopes.

key issues

fire

Fire is essential in fynbos vegetation and it is widely accepted that it stimulates recruitment and helps maintain high species diversity.

Fire frequency as a management tool should relate to the mean annual precipitation (MAP). Arid units may only naturally burn every three to four decades whereas on the higher rainfall South Coast 10-12 years may be more appropriate. The species composition and structure of the vegetation are often a product of the frequency, burning season and related to these, fire intensity.

Too frequent fire that does not take into account the life history of the majority of species will favour those that mature quickly and produce a large seed bed such as grasses or Asteraceae. The burning season is as important in that fire during spring will destroy the seeds of bulbs and annuals or prevent them setting seed. Fire during summer or very early autumn would not have a negative effect on seed set.

Very hot fires would favour those species whose seeds are stored deep underground by ants or species that hold their seeds in fire-proof seed heads.

Fire is used as a tool in the management of fynbos, but is also a widely abused tool. In mesic environments, if fynbos is burned too frequently, it will transform into grassland or asteraceous fynbos.

The consensus however is that fire should not be excluded from fynbos ecosystems.

faunal interaction

Large mammals have largely been absent from fynbos for almost two centuries and we can only speculate as to their effects on the vegetation. Fynbos however has evolved with animals and is reliant on them for its fundamental processes such as pollination and dispersal.

An interesting method of dispersal by mole rats (*Bathyergus suillus* and others) and the proliferation of bulbs by porcupine (*Hystrix africaeaustralis*) deserve mention. Many bulbs especially Hyacinthaceae and Iridaceae produce masses of bulbils or cormlets around the parent rootstock. These break dormancy when the adult plant is consumed or removed. The value in this lies not only in genetic material surviving but also for pollination. Instead of several scattered individuals there will now be several clumps flowering – far more certain to attract pollinators. Further to this is that there will be a larger seed set because of an increased number of seed capsules. These mammals are also important because they turn the soil over and thereby make nutrients available.

soil interfaces

Where two soil types meet there is often a "tension zone". Different soils harbour different vegetation types and the meeting point is known as an ecotone. The vegetation here is often a unique combination of both parent types. These ecotones are biologically important because they are often areas of active speciation. For this reason disturbance in this zone must be avoided and it is preferable to buffer it with at least 30m of vegetation on either side.

invasive alien vegetation

The effects of invasive alien vegetation on indigenous vegetation are generally well-known. One effect that has not been discussed before is the transformation of fynbos shrublands into thicket. Many invasive aliens such as rooikrans *Acacia cyclops* and Port Jackson willow *A. saligna* are small trees. They attract birds that disseminate seeds of thicket precursors such as taaibos *Rhus* spp., wild olive *Olea europaea* ssp. *africana* and coastal cabbage tree *Cussonia thyrsiflora*. Once alien clearing has taken place these species are left standing. This is the start of the thicket clumps.

Although thickets do occur in fynbos vegetation especially granite fynbos, they are restricted to small kloofs and rocky outcrops. Their presence in sandstone fynbos especially is not an entirely natural phenomenon.

management objectives

"Sensitive, vulnerable, highly dynamic or stressed ecosystems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure" (National Environmental Management Act, 1998).

site environmental management plan

objective: *To have a site specific Environmental/Conservation Management Plan in place, to guide management actions required on a site scale.*

management actions:

- Commission a site specific EMP to be compiled;
- Use monitoring, observations and site specific requirements to inform further management actions required;
- Make recommendations for revision and highlight areas of under performance;
- Review site EMP as/when required, as defined in the EMP.

funding

objective: *To have an environmental management budget in place that allows for the implementation of this EMP and a site-specific EMP, through the development of a site Annual Plan of Operation (**APO**).*

management actions:

The landowner/manager is to prepare an APO. The APO will consist of the required operating and capital expenditure as well as planned funding sources through external agencies and programmes. The APO will consist of:

- A sustainable budget that is costed annually to allow for the implementation of the EMP.
- Complete an APO, using the template provided in the EMP Guide Tool, by year end of each year.

Opportunities for external funding and assistance do exist; see EMP Guide Tool for funding opportunities.

vegetation management

alien vegetation

objective: *To remove all invasive alien vegetation from the natural areas by the most cost-effective methods with the least amount of damage to the natural environment. Invasive alien vegetation transforms and replaces indigenous vegetation, adds to the fuel load, increasing the fire frequency and intensity, transforms the riparian zones, affects the functioning of aquatic ecosystems by altering water quality and flow and unnaturally supports an increase in rooikat* Felis caracal.

The **Best Practice Guideline: Alien Vegetation Management** provides the information required for control of the invasive alien flora.

Before any clearing of alien vegetation is initiated, it must be understood that when the programme starts, it must be implemented until completion. There is no value in *ad hoc* clearing, with no follow-up program.

management actions:

- Obtain an aerial photograph of the area whenever an official survey is undertaken, to assess plant growth and extent of alien infestation.
- Identify areas for clearing to ensure compliance with the Conservation of Agricultural Resources Act (CARA) regulations.
- Demarcate areas that will not be cleared of alien plant species initially (ensuring that the CARA regulations are complied with at all times).
- Removal of all invasive alien plant species from the natural areas, excluding those identified above.
- Regular assessment of invasive species control and intensity of invasion.

It may be necessary to contract certain tasks such as extensive alien vegetation clearing to private contractors if there is insufficient capacity within the staff establishment or if it is economically beneficial. All private contractors on site must however be strictly controlled.

natural vegetation

objective: *To ensure that the remaining areas of natural vegetation are best managed so as to contribute towards biodiversity conservation, retaining representative samples of our natural vegetation so as to allow for biodiversity and ecological processes to persist.*

management actions:

- Identify the vegetation type/s present on your property;
- Familiarise yourself with best conservation management practices for the particular vegetation type e.g. prescribed ecological burns as per appropriate fire regime;

See the **Best Practice Guideline: Fire Management & Prevention** for more detail.

- Develop a plant species checklist;
- Contribute records of rare and threatened species and localities to SANBI;
- Map the location of rare and threatened plant species to inform management activities e.g. road/path placement;
- Make provision for seasonal monitoring, during spring and autumn months, of rare and threatened flora on site (where possible comment should be made on numbers of individuals and locality);

- A reintroduction plan must be prepared if areas are to be rehabilitated, stating species to be reintroduced and the source of material.

fauna management

objective: *To promote the conservation of indigenous fauna (the big and hairy and small and slimy alike), as an important component contributing to and maintaining ecosystem functioning.*

management actions:

- Develop faunal species lists including mammals, birds, reptiles, amphibians, arachnids and scorpions, and other invertebrates;
- Conduct at least *ad hoc* monitoring of faunal populations and maintain recordkeeping;
- Contribute significant records and localities of fauna to the Atlas databases at the Animal Demography Unit (**ADU**) at University of Cape Town (**UCT**);
- Ensure that management and recreational activities do not impact on sensitive species;
- Implement responsible problem animal management, where necessary, ensuring to be in possession of the relevant permits;
- Eradicate invasive exotic faunal species, where necessary, ensuring to be in possession of the relevant permits;
- Limit the impact (competition and predation) by domestic animals on indigenous species. Where residential estates abut natural areas, it may be necessary to compile a policy on pets. It is preferable to be proactive in this regard.
- Compile a policy on introduction (accidental or deliberate) of potentially invasive species (e.g. wildfowl) or wild animals previously kept as pets e.g. tortoises which could genetically pollute local races or harbour geographically isolated diseases.
- Commission a reintroduction policy and plan for species that used to occur in the area and the suitable carrying capacities. Investigate the potential for reintroductions, specifically small game, which may have previously occurred naturally in the area. Herbivores are essential for biodiversity and ecosystem processes to persist.

Before reintroduction the following points need to be considered:

- Was the desired species naturally resident in the area?
- Why did the animal become extinct in the area?
- Is that causal factor still a threat?
- Is the habitat still suitable for the species?
- What are the potential negative effects of the reintroduction?
- Where is the nearest existing population?

The careful reintroduction of species can enhance the conservation value of the area and increase the marketability of the site. All reintroductions must be based on sound ecological principles. CapeNature must be consulted on the translocation and reintroduction of all fauna.

access management

objective: *To inform the best placement and management of access points and pathways, avoiding sensitive process areas such as steep slopes and prevent excessive path braiding and consequent erosion.*

management actions:

- Conduct an audit of the siting and condition of existing access points and pathways;
- Identify suitable access points and pathways, and decommission those in sensitive process areas;
- Maintain pathways/boardwalks to ensure its use and not the making of alternative routes;
- Implement a rehabilitation programme, where this is required.

use of living resources

objective: *To ensure sustainable use of natural resources, minimising adverse effects on biodiversity and ecosystem processes.*

See the **Best Practice Guideline: Sustainable Utilisation of Natural Resources** for more detail.

recreation & tourism management

objective: *To ensure the appropriate use of natural areas for recreation and tourism, minimising detrimental impact on biodiversity and sensitive processes.*

See the **Best Practice Guideline: Recreation & Tourism Use** for more detail.

road maintenance & erosion control

objective: *To ensure that geomorphological processes and soils are adequately understood and impacts thereon duly minimised, avoiding the consequent loss of natural resources and habitat.*

management actions:

- Identify and understand erosion sources;
- Prioritise erosion problems requiring control efforts;
- Where the terrain has sustained damage due to excessive trampling and/or past access by vehicles, implement a rehabilitation programme. Have measures in place to prevent further erosion damage;
- Road and footpath erosion control must be monitored and managed on an ongoing basis;
- Records should be kept (preferably photographs) of previous erosion management, in order to measure effectivity.

See the **Best Practice Guideline: Sensitive Development** for more detail.

signage & awareness

objective: *To inform of the sensitivity and value of biodiversity features and ecosystem processes, and to facilitate the appropriate use thereof.*

management actions:

- In order to achieve the above, three types of signage need to be considered: **directional**, **informational** and **interpretational**. The first guides visitors to and around the area, while the second provides information on some aspects of the area and management (such as erosion control). Interpretation of the environment, the third form of signage, would focus on aspects such as

functioning of the ecosystem in the natural areas, emphasising the unique biodiversity and ecological processes.

- Where necessary, a signage policy and manual should be compiled;
- Signs indicating the name of the site should be erected at all vehicular and pedestrian access points;
- Signage must be set up to inform of areas being rehabilitated;
- Awareness programmes must be initiated for the purpose of informing and educating residents and visitors regarding environmental sensitivity and interaction (e.g. snake encounters, the value of biodiversity, biological monitoring and rehabilitation)

fencing

objective: *Where necessary, fence areas for access control and management.*

While a definite demarcation of the boundary of natural areas helps visually establish such areas as being of conservation value, rather than simply vacant open space, fencing also limits the natural transit of wildlife and therefore ecosystem processes. It is apparent that continuity of best practice conservation management is required across cadastral boundaries in order for the broader ecosystem to best benefit from holistic management.

management actions:

- Where possible, internal and common cadastral fencing should be removed to allow for connectivity;
- Appropriate fencing should be used, and where possible jackal-proof and electric fencing should be avoided;
- Public road-side boundaries should be well demarcated for access control and to prevent wildlife road kill;
- All roads not for public vehicular access must have locked gates;
- Stiles may be placed over fences to allow access along approved pedestrian paths;
- Where fencing hinders the natural transit of wildlife, provision must be made for thoroughfare e.g. bottom fence strand raised for tortoises;
- Fence line and access gates should be regularly inspected.

archaeological and heritage features

objective: *To ensure that the archaeological and heritage aspects of the site are protected as defined in the Natural Heritage Resources Act 25 of 1999.*

management actions:

- Inform SAHRA of potential heritage features on site and acquire advice on protection measures. These features may be of significant archaeological importance and damage to these features would lower their archaeological value and possibly their tourism value;
- Keep record of heritage features on site;
- Prevent any damage to these features.

monitoring and recordkeeping

objective: *To evaluate management actions of the site as well as monitor biodiversity components and ecological processes. Data can contribute towards regional conservation plans and initiatives and further highlight conservation priorities.*

management actions:

- It is critical that sites collect baseline information (resource inventory) as a priority;
- Establish a plan of action/objective for monitoring of specific features, components and processes;
- Describe methods used and maintain these;
- Map fixed monitoring sites or features to be monitored, preferably with a GPS;
- Keep data safe and have duplicates;
- All research activities (external studies) are to be controlled i.e. written permission granted with the condition that a copy of the final research report is provided;
- Manager to compile monthly report, incorporating all incidents, significant events and findings and operations that have taken place.

staff training and skills development

objective: *To continually capacitate and train staff in environmental knowledge and a range of skills and enhance their capacity.*

management actions:

- Staff training should include the following:
  - Regular fire training and fire exercises
  - Use of appropriate machinery, tools and technology
  - Public relations and interactions
  - Ecosystem components
  - Management training
  - Waste management & recycling
  - Use of herbicide application
  - Methods for alien vegetation control

ecological connectivity

objective: *Identify suitable corridors or expansions for connecting natural and protected areas to improve the overall resilience of the protected area and allow processes to function at an appropriate scale and so allow for holistic management of the ecosystem.*

management actions:

- Liaise with CapeNature Regional Office regarding expansion and connectivity opportunities;
- Approach and liaise with neighbours in this regard;
- Draw up a Memorandum of Understanding or contractual agreement between neighbours detailing areas of responsibility amongst others.

voluntary conservation

objective: *Consider proclaiming natural areas for conservation in perpetuity, via the CapeNature Stewardship program.*

management actions:

- Familiarise with the three levels of **stewardship options** i.e. Voluntary Conservation Site, Biodiversity Agreement and Contract Nature Reserve;
- Landowner should contact local CapeNature stewardship coordinator to discuss options and benefits.