Summary

A nature managementplan for Belvedèreduinen, Schipgatduinen, Doornpanne, Hoge Blekker, Hooge Duynen, Spelleplekke, Oostvoorduinen, Plaatsduinen, Ter Yde-Oost, Simliduinen and Sint-Laureinsduinen.

Based on Cosyns E., Jacobs, M., Lambrechts J., Provoost S. & Zwaenepoel A. 2018. Beheerplan voor de Belvedère, Schipgatduinen, Doornpanne, Hoge Blekker, Hooge Duynen, Spelleplekke, Oostvoorduinen, Plaatsduinen, Ter Yde-Oost, Simliduinen en Sint-Laureinsduinen. Eindrapport. WVI, Natuurpuntstudie vzw i.o.v. Agentschap voor Natuur en Bos en meegefinancierd door de Europese Unie in kader van LIFE+12 NAT/BE/000631 'Flemish And North French Dunes Restoration' (in Dutch).

Introduction

Some dune areas at Koksijde and Nieuwpoort were previously already established as nature reserve by Ministerial Decree. For these areas there were already approved management plans which were used for the designation of these areas as Flemish nature reserve (FNR) in the recent past. The current management plan ensures an integration of all these plans into an unified nature management plan for a total of almost 762 ha dune area. It also and especially includes the complete new management measures for several recently acquired areas e.g. Bevedèreduinen, Hoge duynen, Spelleplekke, Oostvoorduinen, Plaatsduinen, Simliduinen and Sint-Laureinsduinen.

Table 1.1. List of the different sub-areas of the study area, indicating the dune complex to which they belong, the area owned by the public authorities mentioned, the year of purchase, the current manager, the status and the sub-areas for which measures have been developed in this management plan as an update of the existing management plan (='Act') or as a new package (= 'New') in the management plan column. X refers to an existing management plan that is not changed.
See also maps 1.2-1.4.

Site	territory	Complex	Surface area ha	Status	Proprietor	Manager	Year of acquisition	Managm. plan
Belvedèreduinen	Koksijde	1	18,77		ANB	ANB	2011	New
Belvedèreweiden	Koksijde	1	6,94	Vlaams natuurreservaat	ANB	ANB	1998	Act
De Noordduinen	Koksijde	1	1,05		Gemeente Koksijde	Gem. Koksijde		New
De Noordduinen	Koksijde	1	1,88		Gemeente Koksijde	Gem. Koksijde		New
De Noordduinen	Koksijde	1	4,45		Gemeente Koksijde	ANB		New
De Noordduinen	Koksijde	1	1		ANB	ANB	2002	New
De Noordduinen	Koksijde	1	59,6	Vlaams natuurreservaat	ANB	ANB	2000	X
Kwartier Adj VI F. Allaeys	Koksijde	1	7,23		Defensie	ANB	2008	X
Doornpanne	Koksijde	2	0,64		Gemeente Koksijde	Gem. Koksijde		New
Doornpanne	Koksijde	2	12,33		ANB	ANB	2001	New
Doornpanne	Koksijde	2	125,47	openbaar bos	IWVA	IWVA		X
Doornpanne	Koksijde	2	0,22		VMM	VMM		New

Doornpanne	Koksijde	2	11,61		ANB	ANB	1986	Act
Doornpanne (Doornpanneduinen)	Koksijde	2	2,55		Prov. West-Vlaanderen	ANB		New
Doornpanne (Sint-André)	Koksijde	2	4,65		Prov. West-Vlaanderen	ANB		New
Doornpanneduinen	Koksijde	2	0,21		Gemeente Koksijde	Gem. Koksijde		New
Hoge Blekker	Koksijde	2	1,31		ANB	ANB	2001	New
Hoge Blekker	Koksijde	2	17,49	Vlaams natuurreservaat	ANB	ANB	1984	Act
Schipgatduinen	Koksijde	2	1,51		Gemeente Koksijde	Gem. Koksijde		New
Schipgatduinen	Koksijde	2	13,66		ANB	ANB	2001	New
Schipgatduinen	Koksijde	2	14,67	Vlaams natuurreservaat	ANB	ANB	1997	Act
Zeereep Schipgatduinen	Koksijde	2	10,42		MDK	MDK		New

Site	Territory	Complex	Surface area ha	Status	Proprietor	Manager	Year of acquisition	Managm. plan
Hannecartbos	Koksijde	3	0,10		ANB	ANB	2002	New
Hannecartbos	Koksijde	3	32,10	Vlaams natuurreservaat	ANB	ANB	1981	X
Hooge duynen	Koksijde	3	0,61		Gemeente Koksijde	Gem. Koksijde		New
Hooge duynen	Koksijde	3	0,80		ANB	ANB	2002	New
Karthuizerduinen	Koksijde	3	5,59	Vlaams natuurreservaat	ANB	ANB	1983	X
Oostvoorduinen	Koksijde	3	52,21		ANB	ANB	2004	New
Oostvoorduinen	Koksijde	3	1,28	Vlaams natuurreservaat	ANB	ANB	2001	New
Plaatsduinen	Koksijde	3	31,32		ANB	ANB	2006	New
Ter Yde	Koksijde	3	8,00		ANB	ANB	2007	New
Ter Yde	Koksijde	3	23,81	Vlaams natuurreservaat	IWVA	ANB	1996	X
Ter Yde	Koksijde	3	58,01	Vlaams natuurreservaat	ANB	ANB	1994	X
Zeereep Zeebermduinen	Koksijde	3	6,83	Vlaams natuurreservaat	MDK	ANB	2001	X
Zeereep Zeebermduinen	Koksijde	3	2,73		MDK	MDK		New
Simliduinen (noord)	Nieuwpoort	4	9,78		ANB	ANB	2017	New
Simliduinen (zuid)	Nieuwpoort	4	18,86		ANB	ANB	2000	New
Groenendijk	Nieuwpoort	4	4,96	Vlaams natuurreservaat	ANB	ANB	2002	X

IJzermonding	Nieuwpoort	5	1,11		Ministerie v. Financiën	Min. Financiën	1999	X
IJzermonding	Nieuwpoort	5	36,03	Vlaams natuurreservaat	ANB	ANB	1985	X
IJzermonding	Nieuwpoort	5	90,20	Vlaams natuurreservaat	MDK	ANB	1999	X
Lombardsijde	Nieuwpoort	5	23,80		Defensie	ANB	1999	X
Lombardsijde	Nieuwpoort	5	0,89		ANB	ANB	2007	X
Loods Lombardsijde	Nieuwpoort	5	0,21		Defensie	ANB		X
Sint-Laureinsduinen	Middelkerke	5	5,95		ANB	ANB	2010	New
Sint-Laureinsduinen	Middelkerke	5	39,46		MDK	ANB	2015	New

Table 1.2.a. Summarized surface area of the areas listed in Table 1.1. according to the dune complex to which they belong.

Complex	**Area (ha)**	**%**
complex 1: Noordduinen - Belvedèreduinen - Belvedère	101,35	13
complex 2: Schipgatduinen-Doornpanne-Sint-André-Hoge Blekker	216,51	29
complex 3: Ter Yde	212,44	28
complex 4: Simliduinen-Groenendijk-Sandeshoved	33,6	4
complex 5: IJzermonding – Sint-Laureinsduinen	197,65	26
Total area	**761,55**	**100**

Table 1.2.b. Summarized surface area of management plan to be updated or newly drawn up per complex and the area for which the existing management plan remains in force without modification.

Complex	1	2	3	4	5	Total
Management plan to be actualized	6,94	43,53				50,47
Newly drawn management plan	27,30	47,51	95,77	28,64	45,41	244,63
Existing management plan OK	67,11	125,47	116,67	4,96	152,24	466,45
Total surface area (ha)	101,35	216,51	212,44	33,6	197,65	**761,55**

The total area of these Flemish nature reserves dune after approval of the management plan, will be 761,55 ha.
The Flemish Region is the owner of the largest part of the territory.
Management and administration is carried out by the Flemish authorities,
the Ministry of the environment, Nature and energy
Agentschap voor Natuur en Bos,
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Dunes of the project area are for the largest part included in the European Natura 2000 network:
- the special protection area in the framework of the European 'Bird' Directive 'West Coast' (code BE2500121) and
- the Site of Community Importance in the framework of the European 'Habitat' Directive 'Dune areas including the Yzer Estuary and Zwin' (code BE2500001
Habitats mentioned in the SBZ BE2500001 are summarized below. As a protected species in annex II of the habitat directive are reported for the project area: *Triturus cristatus*, (crested Newt, 1166), *Bufo calamita* (Natterjack toad, 1202) *Vertigo angustior* (1014) and *Apium repens* (1614).

2. General description

Within the boundaries of the project area one can find a huge variety of macromorphological units and related landscapes. It comprises almost all types of coastal habitats: strandline, foredune, white dunes, parabolic dunes etc. All are part of a belt of recently established dunes and are characterised by a calcareous, sandy soil. The floristic richness and diversity of habitats results from the complexity of the underlying, often small scaled, variety in abiotic patterns and processes, which can be summarised as follows:
the variation in topography;
the variation in soil conditions (sand-clay, lime content…);
the very local influence of salt water;
Biotic factors are superimposed on the abiotic conditions. Moreover, the human influence has been substantial and has undoubtedly contributed to both the establishment and the disappearance of species and also the development and degradation of habitats.

9 types of habitat are present within the boundaries of the project zone:

Strandline and embryonic dunes (partim Eu-habitat 2110)
Here sand is trapped by beach debris and specialized grasses.This includes vegetation along the high tide line. It is usually ephemeral, salt tolerant and composed of a limited number of species e.g. *Cakile maritime*, *Salsola kali* ssp. *Kali, Honkenya peploides* and *Atriplex glabriuscula*.

White dunes (partim Eu-habitat 2110) occur mainly on the seaward side of the dune system. The first stage in sand deposition occurs here, normally above direct tidal influence. The vegetation is limited in species diversity, dependent on its ability to withstand the influence of salt spray and trap moving sand. The most characteristic being couch grasses *(Elytrigia spp.)* and marram grass *(Ammophila arenaria)*. Where the rate of sand deposition is less but the surface is still mostly bare sand a greater variety of plants can survive e.g. *Carex arenaria* and *Festuca arenaria*.

Fixed dunes dominated by species of grass and herbs (**grey dunes** – Eu-habitat 2130) occur further inland where sand deposition is no longer significant. Many plant species exist here and help to stabilize the dune surface and create a thin layer of humus. This type of vegetation usually develops under the influence of grazing. Apart from species-rich communities of *Koelerion albescentis* (class of sandy dry grasslands), *Corynephorion* (grey hair-grass sward) and the *Thero-Airion* alliance (ephemeral-rich *Aira* swards), Habitat type 2130 is also characterised by cryptogam-richness (patchy moss and lichen carpets). The lime content of these moss dunes varies depending on the parent substrate and the process of increasing decalcification promoting the gradual transition of the species composition. Where ground may be heterogeneous, with open areas remaining, often through cattle and horse action, dune mosses such as *Tortula ruraliformis* (acrocarpous) and *Brachythecium albicans* (pleurocarpous) may be important (*Phleo-Tortuletum ruraliformis* communities). In the initial stages of leaching, ground lichens of the genus *Cladonia* may be frequent to abundant and, mostly being

grey, form 'Grey dune'. The sparsely covering herb layer exists of several winter annuals such as *Phleum arenarium* on lime containing soils.
The Grey dunes (Eu-habitat 2130) of the project area dunes mainly exist from *Polygalo-Koelerion* related grassland. The presence of such species as *Helianthemum nummularia, Thymus pulegioides, Silene nutans and Polygala vulgaris* indicates affinity with the *Anthyllido-Thesietum humifusi* and the *Anthyllido-Silenetum* community which all are typical for lime containing sandy soils. The best examples of this vegetation type can be found in the northern part of 'de Doornpanne' and in the "Oostvoorduinen". In addition to the already mentioned species locally one can find also some special species like *Briza media, Euphrasia stricta s. l., Linum catharticum* and *Ononis repens.*
Festuco-Galietum veri related grasslands can be found in 'Oostvoorduinen' and are characterised by the dominance of graminoids e.g. *Antoxanthum odoratum, Agrostis capillaris and Holcus lanatus.* Another characteristic of this community is the co-occurrence of species with affinity to decalcified soils (*Rumex acetosella*) and of those species that are more related to lime rich soils e.g. *Galium verum*. At several places the semi natural grassland communities are degraded as a consequence of coarse grass *(Calamagrostis epigejos* and *Arrhenaterum elatius)* invasion. These grass species dominate several places that consist of monospecific grassland. When grazed or mown the dominance of these grass species will rapidly decline and a more species rich grassland soon will develop.

Dune slacks (partim EU-habitat 2190 - 2170)
Humid dune slacks are a component of most large, dynamic or previously dynamic, dune systems. They are damp or wet hollows left between dunes where the groundwater reaches or approaches the surface of the sand. Their most distinguishing feature is a seasonally fluctuating water table which usually reaches a maximum in winter and spring and drops in summer. Secondary dune slacks result from a blowout, where erosion down to the water table has occurred. If the erosion is extensive, a large flat area of wet sand is exposed. Most of the dune slacks in the project area are secondary dune slacks. The wet sand is colonised by plants and a succession occurs. Microbial mats can be important at the pioneer stage and, by fixing nitrogen, may facilitate colonisation by higher plants A range of wetland plants are important and early vegetation can be extremely species-rich with plants such as *Carex trinervis, C. viridula* and *C. flacca* and *Juncus articulatus.*
Young dune slacks now are present in 'Schipgatduinen', 'Doornpanne south-east', Ter Yde, Simliduinen and Sint-Laureinsduinen, however this type of habitat is very scarce.
The shift from pioneer stage to more mature stages mostly occurs within 5-10 years. *Salix* spp. (e.g. *Salix repens*) usually colonise early in the succession but at this stage do not dominate. A species-rich phase of typical dune slack species including *Parnassia palustris*, *Blackstonia perfoliata, Dactylorhiza incarnata* and *Epipactis palustris* develops, often rapidly.
Without the disturbance of grazing, mowing or damage caused by anaerobic conditions in very wet slacks, the biomass increases, organic matter accumulates and the nutrient status (particularly nitrogen and phosphorus) of the soil increases. This results in increasing dominance of tall grasses and shrubs. At most occasions these communities are degraded with Salix spp and only *Salix repens* as a remnant of a passed botanical glory.

Scrub (Eu-habitat 2160)
A few shrubby species are capable of invading sand dunes to form scrub. Sea Buckthorn (*Hippophae rhamnoides*) is omnipresent and is the most dominant species. Along with *Crataegus monogyna*, *Sambucus nigra,* wild roses (*Rosa* spp.) and brambles (*Rubus* spp.), it can form dense, impenetrable thickets. The non-spiny species, *Ligustrum vulgare*, is abundant at some well-located places but almost absent from others.
Succession from scrub to woodland can be expected, with trees such as *Quercus robur*, *Betula spp, Fraxinus excelsior* and *Acer pseudoplatanus* which are able to colonise dune scrub. However, the landward margins of the dune system was typically highly managed and most forest were often planted.

Forest (Eu-habitat 2180)
Almost without exception all forests are of anthropogenic origin. Poplars (*Populus x Canadensis, P. alba and P. albescens)*, pine (*Pinus nigra)* and *Ulmus minor* are the most frequent planted species.
In general, the ground flora consists of ruderal annuals, such as *Claytonia perfoliata*, *Anthriscus caucalis, Stellaria media* and of perennial species, like *Urtica dioica*, *Glechoma hederacea, Galium aparine and Poa trivialis*.
Certainly, the lime-rich woods are interesting for other groups of organisms such as fungi and snails. It is especially under the trees with little dense foliage such as poplar or common ash that special species of snails

were found e.g. the common Jersey, reverse vertigo, *Vertigo angustior* etc. *Vertigo angustior* deserves special attention as a species to Appendix II of the habitat directive. In the lowlands, this species is limited to the coastal dunes, but displays in this area relatively broad ecological amplitude.

Open water
Ponds rich in limestone and poor in food are an excellent site for macroalgae. In addition, one also find different vascular plant species such as opposite-leaf pondweed (Groenlandia densa) and alkaline bog pondweed, rare at the international level. Creation of new ponds also has positive consequences for amphibians and dragonflies. Both the crested Newt and natterjack toads in recent years deployed on the coast and the number of species of dragonflies and damselflies observed (including travellers) also is well increased.

Fauna

Birds
The project area is inhabited by a wide array of wildlife among them important numbers of breeding bird species. Birds were well studied in the project area during past years. During last decenium a lot of bird species were recorded including several species that are mentioned on the Red list of Flemish Birds e.g. Nightingale (*Luscinia megarhynchos*), Turtur dove (*Streptopelia turtur*)
The forest support a wide variety of bird species including 3 species of woodpecker i.e. Green, Great and Lesser spotted woodpecker and at least 3 species of diurnal raptors and the Long-eared Owl (*Asio otus*). Perhaps the most important bird habitat is provided by the open area covered with grey dune vegetation and scattered with solitary trees. This is the core habitat of the Tree pipit (*Anthus trivialis).* The water side vegetation, including small reed beds, holds rarities like the Sedge warbler (*Acrocephalus schoenoboanus*) and the Blue throat (*Luscinia svecica*), a species proteced by the Annex-I of the European Bird directive.
During the last three decades, three major trends in the species composition can be observed:
- Birds of open dune and strandline are under high recreational pressure, and have virtually disappeared e.g. crested Lark (*Galerida cristata*) and the meadow pipit (*Anthus pratensis*);
- The diversity and density of forest species increased as a result of vegetation succession (scrub encroachment),
- The numbers of hygrophylous species reduced significantly (water stress of the dune ecosystem) however, some species have been observed around the new dune slack in Sint-Laureinsduinen e.g. the Shelduck, little Grebe and Lapwing

Reptiles.
The viviparous lizard is the only species known in these dunes.

Amphibians
A dozen of ponds have been sampled. These are refuge areas for many amphibians which take advantage of the food present. Great Crested Newt (*Triturus cristatus*) (annex II and IV of the Habitat Directive) were already discovered in the Oosthoek-Noordduinen area. Here also a lot of Natterjack Toad (*Bufo calamita*) were recorded from the same location. Ponds provide also valuable habitat for many different invertebrates such as Dragonflies, specialised beetles and spiders and different species of Molluscs (e.g. *Vertigo antivertigo*)

Mammals
The project area is also important for mammals. So far, several bats species were observed, albeit usually in low numbers and with only sporadic overwintering individuals. The Pipistrelle (Pipistrellus pipistrellus) is often present. In addition, occasionally also the late Aviator, rugged Pipistrelle and whiskered bat are observed. The presence of war infrastructure in the area may serve as a wintering habitat for several bats. Until now only very few species were recorded but this will change if the vestiges could made more comfortable for bats.
In addition several other species of mammals were observed in the nature reserve e.g. mustelids (stone marten, polecat), various species of rodents, Lagomorphs and Insectivores. Noteworthy is the presence of a population garden Dormouse (Eliomys quercinus) near Belvedère and in Oostvoorduinen. Foxes are generally prevalent in the project area.

Diurnal butterflies and grasshoppers

Several species of diurnal butterflies have been observed in the last decade. The main observations concern several rare species of gray dunes: the rare Queen of Spain Fritillary (*Issoria lathonia*), the Brown Argus (*Aricia agestis*) and grayling (*Hipparchia semele)*. In addition several species of grasshoppers were observed almost half of which is included in the red list. Especially Grey dunes support many grasshopper species including endangered species e.g. Blue-Winged Grasshopper (*Oedipoda caerulescens*).

Moths.
Until now, there has not been any study that is explicit about the moths in the reserve. But some observations provide us with some information on this group of insects. From our investigations, it becomes obvious that the nature reserve also has several species of moths. As well as other night active insects they serve as food for bats.

Spiders & ground dwelling beetles
In total also 117 species of spiders have been captured of which 38 are included on the red list. Except spiders 78 species of beetles were trapped with pitfalls. 27 species of them are on the red list. The grey dunes are important as habitat for several threatened species: 11 endangered species have been trapped in the Plaatsduinen, 10 in the Belvedere site and 9 in the gray dunes of Sint-Laureinsduinen. A dozen of endangered species have been found in the wet Valley of the same site.

3. Threats

Several threats were identified. During the 20th Century, dunes of the project area got strongly spatially fragmented and degraded by urbanization, water extraction, recreation, fixation of sand drift, invasion by exotic species, intensification of agriculture in the transition zones between dunes and polders and the extinction of traditional agro pastoral use of the remaining dune areas that resulted in overgrowth of the dune landscape by scrub.

The extraction of water in the Doornpanne has reduced the habitat area for many species of plants of the hygrosère of fresh water in this area. The new extraction technique based on a water-infiltration technique can create opportunities to restore former dune slack habitat.

More and more species are introduced outside their natural geographic range due to the increasing rate of trade in the world. Some of them are able to establish in their new environment and to develop dense populations where they can outcompete native species or disrupt ecosystem functioning. They are called invasive alien species. An eclectic spectrum of management or control actions has been developed and used against these species, with adaptations to local realities and conditions. One of the main management actions is the eradication of such species as Populus alba/canescens, Prunus serotina, Mahonia, Rosa rugosa…
An eclectic range of management or control measures has been developed and used against these species, with adaptations to the conditions and local realities. Among the management measures, the main is the eradication of species such as Populus alba/canescens, Prunus serotina, Mahonia, Rosa rugosa. Priority is given to the restoration of vulnerable Eu-habitats e.g. grey dunes, mobile dunes etc.

Disturbance is a broad concept. In this report it is defined as any intervention or event which prevents the intended functioning of the ecosystem or in the case of species directly or indirectly negatively affects the population size or the individuals themselves. Grey dunes are very sensitive to trampling by people or cattle. Therefore, the periodic shutdown of unique, beautiful areas of grey dunes can be considered a management option. A significant disturbance of potential coastal habitat and coastal species takes place on the beach. People may make use of the whole beach area causing e.g. disturbance to characteristic bird species.

Especially at places with a historical use as arable land dune vegetation has a ruderal character. This kind of vegetation form a bottleneck if the intention is to convert them to e.g. lime-rich dune grasslands. Incisive interventions in the abiotic environment, will be necessary to reduce soil fertility. Until recently most areas suffer from a fast bush encroachment. However at several places adequate nature management measures were implemented (e.g. mowing, cutting of scrub…) giving opportunities to the development of prior Eu-habitats (e.g. Koksijde, Oostvoorduinen, Nieuwpoort Simliduinen, Middelkerke, Sint-Laureinsduinen).

4. Nature conservation policy and nature management

The main nature conservation objectives are:

- Put conditions to ensure to protect and restore the typical mosaic of coastal dune habitat types in order to create opportunities for the conservation or re-establishment of populations of sensitive, coast specific plant and animal species;
- coordinate on the EU-nature conservation policy. This means prior protection and restoration of Eu-habitat (e.g. grey dunes and dune slack habitat) in order to enlarge their area and to enhance quality;
- putting conditions to the sustainable accessibility for hikers, horse riders and MTB of several dune massifs managed by the forest and Nature Agency

Given the level of importance to conserve and restore 'fixed dunes with herbaceous vegetation or grey dunes (Eu-habitat 2130)', 'Dunes with *Salix arenaria*' (Eu-habitat 2170) and 'humid dune slacks' (Eu-habitat 2190) it will be essential to use techniques to restore open dune habitats in areas mainly covered by scrub whilst ensuring the conservation of all habitat types and landscape values. One of the major nature restoration measures foreseen in the nature management plan is the removal of scrubs from several locations e.g. Belvedèreduinen, Sint-Laureinsduinen. In order to enhance the establishment of the typical habitat communities, sod cutting of these places will be essential. Since the 1980s, the reduction of the populations of rabbits, which restricted the growth of trees and shrubs, has encouraged the installation of scrub, including sea buckthorn. The restoration measures are to clear e.g. manually (pruning shears, saws etc.) or mechanically (brush cutters, tractors...) the adjacent areas of grey dunes or dune slacks.

A major challenge is the preservation of natural dynamics in some places e.g. Schipgatduinen, Hoge Blekker, Ter Yde and Sint-Laureinsduinen. The option is to promote sand dynamics at least in well-defined parts of these dune areas. One of the current problems is the rapid succession in which Ammophila has fixed the sand, and the rapid invasion and spread of sea buckthorn (*Hippophaë rhamnoides*) forming dense and impenetrable thickets.

Another important challenge for the beach-dune transition area is the installation of a zone with limited access (only accessible with a nature guide). These areas are expected in the north-eastern part of the Schipgatduinen and in the north-west of Sint-Laureinsduinen in order to ensure favourable conditions for the nesting of the Crestedl ark (*Galerida cristata*) and the Meadow pipit (*Anthus pratensis*).
In order to protect beautiful areas of grey dunes from trampling and to encourage the populations of some vulnerable species of insects, such as *Bembix rostrata*, *Issoria lathonia, Oedipoda caerulescens* and *Hipparchia semele*, which all suffer from trampling by people or livestock dune areas with a significant area of this habitat can be excluded from grazing and recreational use. This will be the case in Belvedèreduinen and some parts of Hoge Blekker, Doornpanne and Simliduinen.

As recurring management in most areas extensive grazing is foreseen. At all locations areas will be fenced to allow grazing with domestic stock (mainly horses and cattle in addition or sheep). In this way it is aimed that further scrub invasion and scrub regrowth would be controlled and the desired mosaic of low dune grassland with bare sand patches would be restored and maintained. Any regrowth not controlled by grazing stock could be treated later by cutting or mowing.

Last but not least, to ensure the conservation of the Great Crested Newt and of the Natterjack toad one will enforce the already existing network of fresh waterponds.

5. Recreation

To ensure a sustainable use of the nature reserve for outdoor recreation a recreational management plan is also designed. It will mainly result in :
- the construction of some missing routes in order to promote the further development of a supra-local recreational walking and cycling network,
- the marking of existing roads and paths for the their allotted function as hiking, horseback trail, ride or bike route;

- the maintenance of existing signposts and unify all signage;
- unifying and renewing signs in accordance with the new legislation;
- the maintenance and, where necessary, restoration of existing recreational infrastructure;
- Defining and designating playground and free strolling areas;
- The dissemination of information through various channels and with different means.

6. Monitoring

In this chapter, we indicate the elements on which the potential monitoring could focus. A monitoring programme will give valuable information about the effectiveness of the different nature restoration projects. Monitoring will include a floristic inventory, a vegetation survey, groundwater measurement, and observations on rare species and common wildlife especially birds, butterflies, grasshoppers, amphibians and bats.

7. Action program

A scheduled management program is summarized in addition to the management plan.

8. Budget

In this chapter, all management measures are budgeted over a period of 27 years.

9. Maps

There is a collection of A3 format maps included in the management plan.