

Life Flandre

After LIFE Conservation Plan



Flemish and north-French dunes restoration
LIFE+12 NAT/BE/000631 FLANDRE.

2021-2026

Dunes of Flanders without border !



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1 Project data

Project location

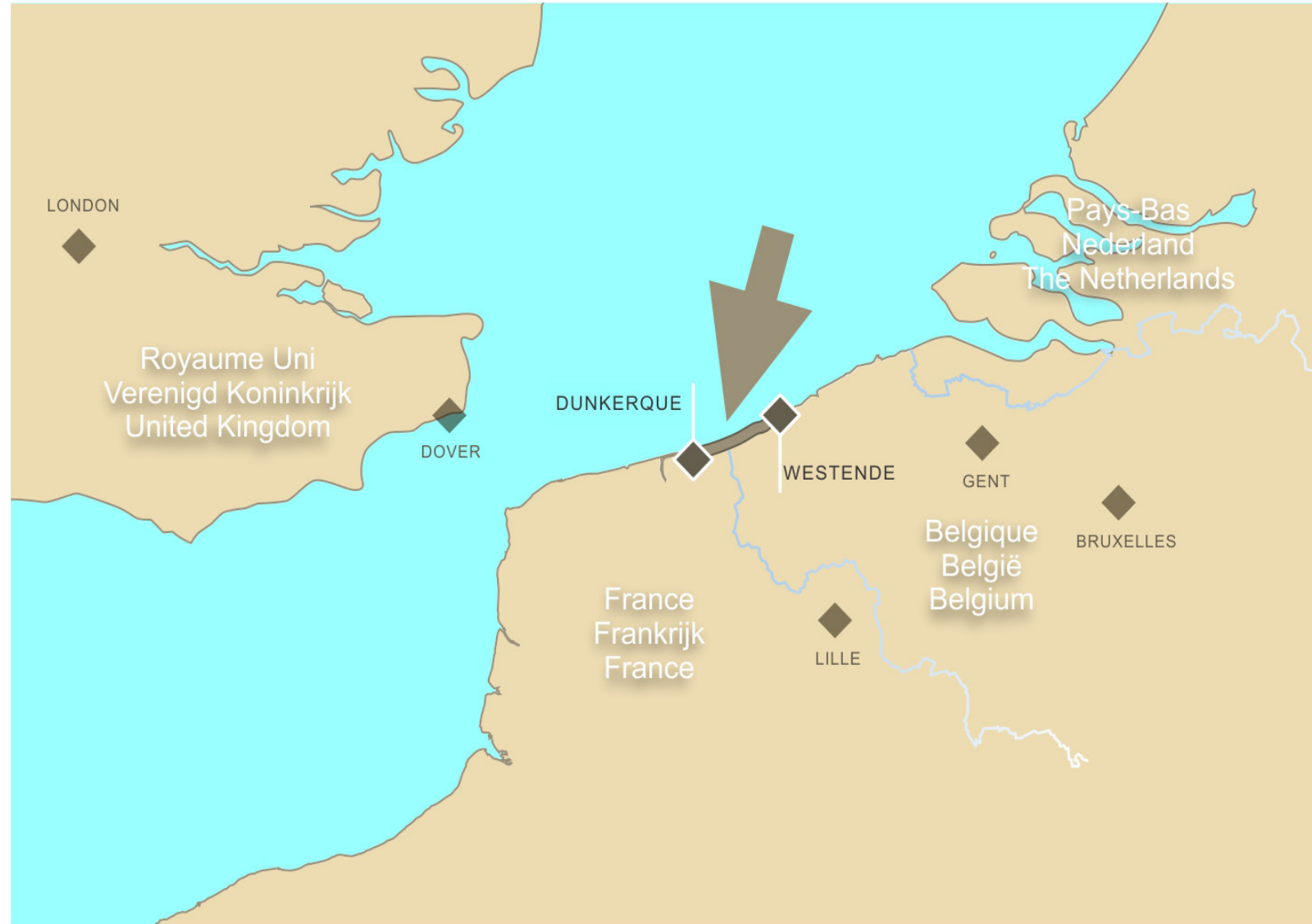
Atlantic Biogeographical Region
Cross-border coastal area 'Dunes de Flandre – Westkust',
between Dunkirk (France) and
Westend (Belgium) on the territories of
the municipalities of:

On the French side:

Leffrincoucke, Zuydcoote,
Ghyvelde, Bray-Dunes

On the Belgian side:

De Panne, Koksijde-Oostduinkerke,
Nieuwpoort, Middelkerke
(partim Westende)



Natura 2000 sites

3 Special Areas of Conservation (SAC) in the frame of the European 'Habitats' directive:

On the French side:

- FR3100474 Dunes de la Plaine Maritime Flamande
- FR3100475 Dunes Flandriennes décalcifiées de Ghyvelde

On the Belgian side:

BE2500001 Duingebieden inclusief IJzermonding en Zwin.

And 1 Special Protection Area (SPA) in the frame of the European 'Birds Directive': BE2500121 Westkust, which largely overlaps with the SAC BE2500001, not really relevant for the project as it was focused on cross border habitat-restoration to implement the European Habitat-directive.

Project start date: 2 September 2013

Project end date: 31 December 2020

Project duration: 88 months

Total budget: 4,066,454 Euro

EU contribution: 2,033,226 Euro
% of eligible costs: 50 %

Coordinating beneficiary: Agency of Nature and Forest of the Flemish Government (Belgium)

Associated beneficiaries:
Département du Nord (France)
Conservatoire de l'Espace littoral et des Rivages lacustres (France)

Project website:
www.lifeflandre.be

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Map 2: the project area: cross border Natura 2000 network between Dunkirk (France) and Westend (Belgium)

2 Overview of the project

2.1 Physical environment of the project area 'Dunes de Flandre – Westkust'

The sedimentary coast of northern France and Belgium, between the harbor of Dunkirk and the seaside resort of Westend, along the shore of the southern North Sea is characterized by

- wide sandy beaches,
- mudflats and salt marshes along the eastern bank of the Yser estuary,
- carved seafront dunes (these are seafront dunes with aeolian blow outs),
- mega-parabolic dunes embracing large humid dune slacks, and,
- 2 to 3,5 kilometers inland, low, gently undulating 'fossil' dunes that were formed between 3000 BC and 800 AD.

The soils of the dunes have a very high lime content, because they contain seashells, except for those of the 'fossil dunes' that have been deeply decalcified. A particularly high biodiversity is also associated with this great diversity of landscapes. Most of the remaining dune areas have been included in the Natura 2000 network in both Member States of the European Union. The total area of beaches, dunes, mudflats and salt marshes within the European Natura 2000 network is 3280 hectares, of which 2200 hectares are on Belgian territory and 1080 hectares on French territory.

2130 Fixed coastal dunes with herbaceous vegetation or 'grey dunes' – a couple of variants. Dune grassland with Thymus pulegioides, Asperula cynanchica and Gallium verum on lime-rich dunes, Ter Yde ©Marc Leten*



The natural phreatic groundwater of the dunes results from precipitation infiltration and is fresh and has a high lime and iron content. In the Yser estuary the fresh water from the river mixes with the salt seawater, but the tidal environment of the river-mouth as well as that of the beaches is mainly salty.

Habitats of the Annex I of the European directive 92/43/EEC present in the project area are:

- 1110 Sandbanks which are slightly covered by seawater at low tide
- 1130 Estuaries
- 1140 Mudflats and sandflats not covered by seawater at low tide
- 1210 Annual vegetation of drift lines
- 1310 Salicornia and other annuals colonizing mud and sand
- 1320 Spartina swards (Spartinion maritimae)
- 1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
- 2110 Embryonic shifting dunes
- 2120 Shifting dunes along the shoreline with Ammophila arenaria 'white dunes'
- 2130* Fixed coastal dunes with herbaceous vegetation 'grey dunes'
- 2150* Atlantic decalcified fixed dunes (Calluno-Ulicetea)
- 2160 Dunes with Hippophae rhamnoides
- 2170 Dunes with Salix repens ssp. argentea (Salicion arenariae)
- 2180 Wooded dunes of the Atlantic, Continental and Boreal region
- 2190 Humid dune slacks
- 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine level
- 6510 Lowland hay meadows

Grey dunes dominated by lichens and mosses on decalcified 'fossil' dunes of Adinkerke-Ghyvelde ©Marc Leten





2120 Shifting dunes along the shoreline with *Ammophila arenaria* 'white dune' - Schipgatduinen © Reinhardt Strubbe



Crested lark (*Galerida cristata*) is still present in the remaining 'white dunes' of Flanders ©Jeroen Bot



2190 Humid dune slack - several variants: Pioneer stage in a semi-dynamic dune landscape, Ter Yde ©Marc Leten



2190 Humid dune slack - several variants: Alkaline fen with *Dactylorhiza incarnata* and *Anagallis tenella* ©Marc Leten



2190 Humid dune slack - several variants: Humid hay-meadow with *Dactylorhiza* div. spp. and *Rhinanthus* ©Reinhardt Strubbe



2190 Humid dune slack - several variants: Inundated dune slack with reedbeds. On the foreground: *Hippophae rhamnoides*. **7**

A

Also 8 species of the annex II, and 1 specie of the annex IV lists, all occur in the project area:

- 1014 Narrow-mouthed whorl snail (*Vertigo angustior*)
- 1016 Desmoulin's whorl snail (*Vertigo moulinsiana*)
- 1166 Great crested newt (*Triturus cristatus*)
- 1614 Creeping marsh wort (*Apium repens*)
- 1903 Fen orchid (*Liparis loeselii*)
- 6284 Natterjack toad (*Epidalea calamita*)
- 1351 Harbour porpoise (*Phocoena phocoena*)
- 1364 Grey seal (*Halichoerus grypus*)
- 1365 Common seal (*Phoca vitulina*)

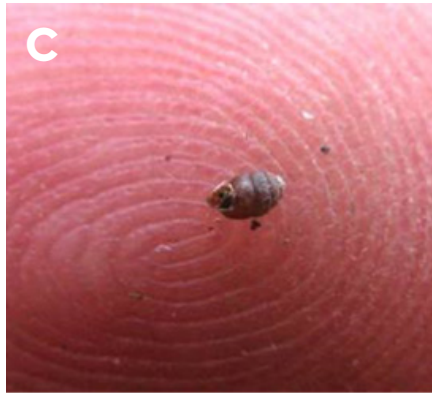
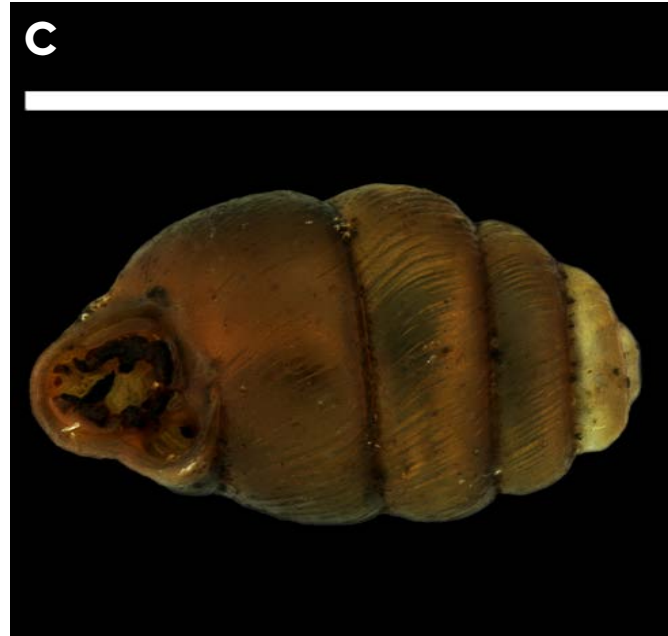
A: Great Crested Newt (Triturus cristatus) ©Reinhardt Strubbe

B: 1903 Fen orchid (Liparis loeselii) ©Thomas Raulin

C: 1014 Narrow-mouthed whorl snail (Vertigo angustior) ©Vincent Prié-Biotope

D: 6284 Natterjack toad (Epidalea calamita) ©Thierry Tancrez

E: 1614 Creeping marsh wort (Apium repens) ©Marc Leten

B**C****D****C****C****E**

2.2

Toponyms and threats

During the 20th Century, the Flemish coast between French Dunkirk and Belgian Westend has got strongly urbanized, resulting in the spatial fragmentation of the coastal dune belt into relict sites separated from each other by urban and suburban built up areas and roads. The 1080 hectare on French territory are divided in 4 distinct sites, from west to east:

- Dune Dewulf between Leffrinckoucke and Zuydcoote;
- Dune Marchand between Zuydcoote and Bray-Dunes;
- Dune du Perroquet between Bray-Dunes and the French-Belgian border;
- Dune fossile de Ghyvelde, 4,500 years old dune belt at 3,5 km distance from the actual coastline, between Ghyvelde and the French-Belgian border.

The 2200 hectare on Belgian territory are divided in 10 distinct sites, that are all internally crossed through by several roads. The toponyms from west to east:

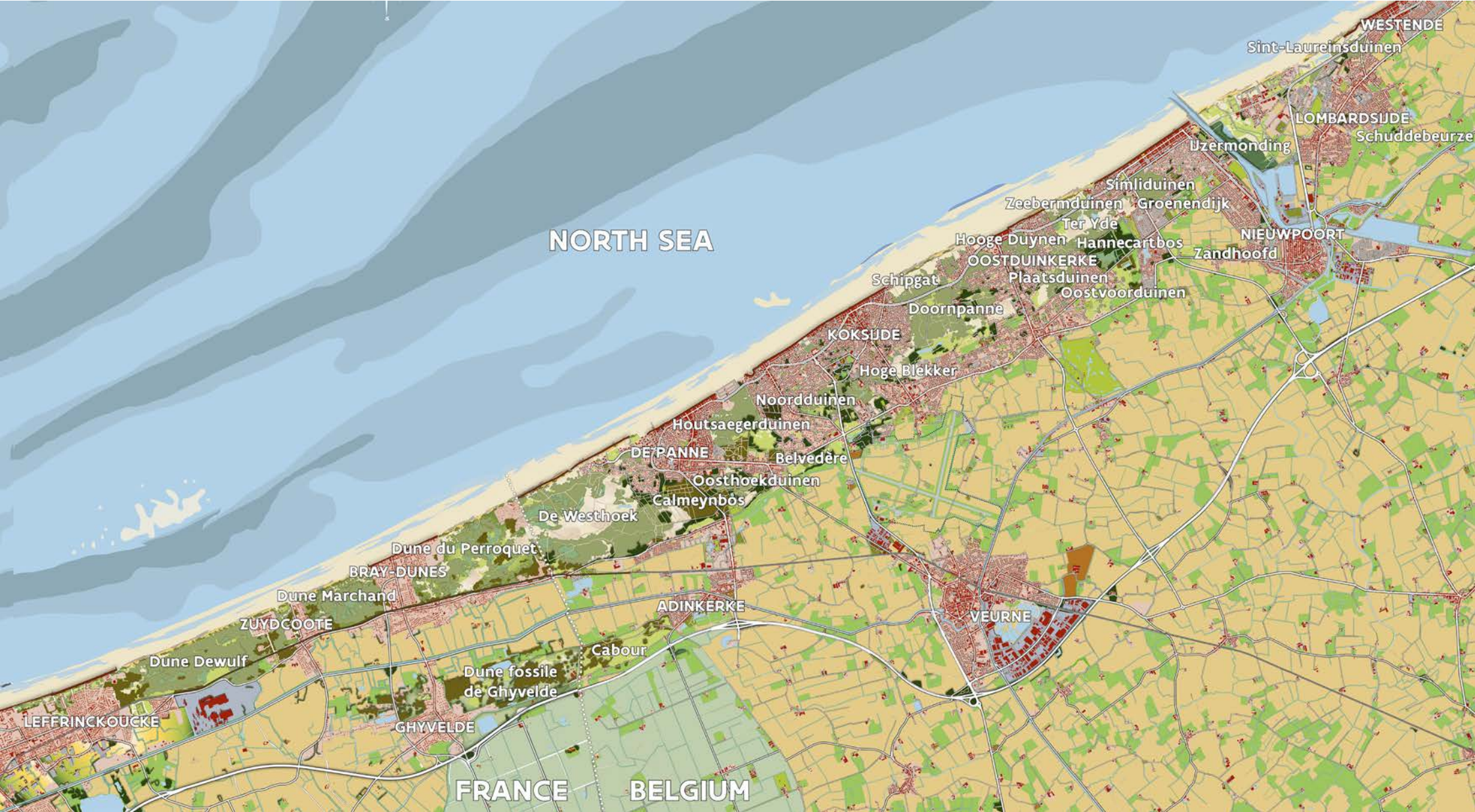
- De Westhoek-Calmeynbos-Oosthoekduinen, between the French-Belgian border and De Panne;
- Domain Cabour-Garzebekeveld, the Belgian part of the fossil dune belt of Ghyvelde (France) and Adinkerke (Belgium);
- Houtsaegeerduinen at De Panne;
- Belvédère-Noordduinen at Koksijde;
- Schipgatduinen-Doornpanne-Hoge Blekker-Witte Burg at Koksijde;
- Hooge Duynen at Oostduinkerke;
- Plaatsduinen-Zeebermduinen-Ter Yde-Hannecartbos-Oostvoorduinen at Oostduinkerke;
- Simliduinen-Groenendijk-Zandhoofd at Nieuwpoort;
- The Yser-rivermouth – Sint-Laureinsduinen between Nieuwpoort and Westende-Bad;
- The at least 1,000 years old fossil dunes of Schuddebeurze between Lombardsijde-dorp and Westende-dorp.

Besides fragmentation of all dune habitats and desiccation of humid dune slacks, urbanization also causes the proliferation in the remaining dune sites of invasive alien plant species (I.A.S.), 'escaping' from surrounding gardens and threatening native species and habitats. The I.A.S. that are most commonly present in the Flemish coastal dunes are *Mahonia div. spp.*, *Rosa rugosa* and *Prunus serotina*, but also *Cotoneaster div. spp.*, *Ribes aureum*, *Ailanthus altissima*, *Baccharis halimifolia*, *Yucca spp.* and several other species are increasingly occurring.

Due to the disappearance after the First World War of the traditional use as grazing land for cattle, the once open dune landscape with its species-rich moss dunes, dune grasslands and humid dune slacks gradually grew dense with shrubs and tall grasses. Also the decline of the wild rabbit population has contributed to that evolution. For several years now, even the drifting bare 'white' dunes have become overgrown with grasses and sea buckthorn. This general increase of the growth of the vegetation is accelerated by the deposition of nitrogen from the air and climate change.

In the lower, less relief-rich older dunes and transition zones from dune to polder, it is not the loss of grazing that is a problem, but exactly the opposite, namely the intensification of agriculture with the associated fertilization and use of herbicides. Flower-rich dune grasslands and dune slacks made way for monotonous, species-poor meadows and arable fields.

Urbanization, causing reduced penetration of precipitation water through paved surfaces and increased drainage through sewers, drainage by the watercourses in the polder-hinterland and finally extraction of groundwater for the production of drinking water all resulted in a lowering of the phreatic groundwater-level of the dunes.



MAP 3: the cross-border project-area with toponyms © VLM & AGUR + Tom Brouckxou

2.3 A privatized and fragmented ownership resulting in abandonment and encroachment

From the Middle Ages until the end of the 18th Century, the dunes of Flanders had been property of the Count of Flanders and the Abbey Our Lady of the Dunes. During the period of the French revolution and Napoleonic rule between 1794 and 1814, the coastal dunes of Flanders both in France and presentday Belgium were privatized. From the second half of the 19th century on, numerous private landowners tried to take advantage of the development of coastal tourism and seaside resorts to monetize their properties. This has led to the higher mentioned strong urbanization of the north French and Belgian coast.

Mainly after the First World War (1914-1918), the largest part of the dune area was submitted to allotments and the numerous small plots were sold as building lots for houses to private buyers. Fortunately, in the 1970s and 1990s, part of these parceled dunes were protected under the

national legislations and spared from building. Nevertheless, the remaining protected area of dunes had a strongly fragmented ownership structure and the very numerous private owners of small dune parcels, who are often already the second or even third generation of descendants of the original buyers, are not interested in managing their properties for the purpose of maintaining or restoring biodiversity.

This extremely fragmented ownership structure has led to abandonment and so contributed to the overgrowth of the dune landscape by scrub and to loss of biodiversity. In order to restore and maintain biodiversity of and ensure a controlled public access to the coastal dunes of Flanders, the Conservatoire du Littoral and the Agency of Nature and Forests have for the past four decades in France and three decades in Belgium pursued a voluntaristic purchase policy, resulting in the largest part of the

remaining dune area becoming legally protected unalienable public domain. But nonetheless those efforts, a quite large part of the remaining dune area is still privately owned and subjected to abandonment or to too intensive agricultural use.

Until the First World War the dunes were used as grazing land for cattle



2.4

Legal statuses within the national or regional legislation

Belgium:

spatial planning: 'nature site with scientific value', 'nature site' or 'park site' or otherwise (including 'agricultural area's') protected by the Decree of 14/07/1993 protecting the coastal dunes; nearly completely included in the Flemish Ecological Network (VEN: Vlaams Ecologisch Netwerk):

- Large Nature Entities '101 De Westkust' and '102 De Middenkust';
- the sites managed by the Agency for Nature and Forests have the legal status of Nature Reserve, with the exception of the military training grounds;
- 33 % of the site is a protected landscape in the frame of the Decree of 16/04/1996 on Landscape Protection

France:

- The subsite "Dune Marchand" has the legal status of National Nature Reserve (Réserve Naturelle Nationale) within the French Nature Protection Legislation;
- The whole of the coastal dunes between Dunkerque and the Belgian border are a Listed site under the 1930 Act (n°59SC08) (French national legislation).



Sea Spurge (*Euphorbia paralias*) with caterpillar of the Spurge Hawk-moth (*Hyles euphorbiae*) ©Marc Leten

2.5

Cross-border cooperation

As the border between present-day Belgium and France that divides the original physical geographical entity of the Flemish coastal dunes is an artificial line created by the peace treaties of Nijmegen (1678) and Utrecht (1713) and the remaining dunes are facing the same threats on both sides of that border, the main Flemish and French public authorities competent for the acquisition and management of coastal nature sites joined forces for the conception and implementation of the LIFE Nature project Flemish And North-French Dunes Restoration, abbreviated as FLANDRE, that received the necessary support from the European Union. The project partners are:

Agency for Nature and Forest of the Flemish government "Natuur en Bos"
www.natuurenbos.be

Natuur en Bos is responsible for the policy, sustainable management and strengthening of nature, together with all partners. Natuur en Bos is the largest green space owner in Flanders: It manages 52,000 ha of its own forests, nature reserves and parks.

Conservatoire du Littoral
www.conservatoire-du-littoral.fr

French public institution set up in 1975 to safeguard the coastal region. This institution buys land in intervention perimeters approved by the Board of Directors after receiving the advice of local elected representatives and entrusts it to managers - including the Département du Nord.

The Département du Nord – www.lenord.fr

is a territorial authority active in various fields: social, education, road works, environment, etc. It owns or manages more than 3500 hectares of sensitive natural areas in the region, 830 hectares of which are currently owned by the Conservatoire du Littoral.



2.6 Project objectives and achievements

2.6.1 A common perspective for the management of the cross border coastal area: Masterplan, action A1&2

Strengthening the cross border Natura 2000 network by approaching the cross border dune belt as a single coherent area, for which a Flemish and French common vision for nature and interlinked societal functions has been developed on the basis of a scientific analysis of the physical environment and spatial conditions.

The masterplan provides recommendations for the next 15 years to strengthen nature that can be a source of inspiration for spatial planning and coastal defense as well as for nature management.

2.6.2 Perennial cooperation: 'European' cross border protected nature area or nature park, action A1&2

The basis for a perennial cooperation structure for the main Flemish and French public authorities owning and managing the coastal dunes between Dunkirk and Westend, to start with the 3 initial project partners, is provided by a Memorandum of Understanding. The Memorandum of Understanding was signed on the 14 February 2020 at Adinkerke by the representatives of the Agency for Nature and Forest of the Flemish region, the French state, the Conservatoire du Littoral and the Département du Nord.

The Memorandum of Understanding allows for the extension of the partnership to other key actors and provides for the participation of stakeholders in the form of an advisory committee including the municipalities, scientific institutes and NGOs concerned. The implementation of the memorandum of understanding will lead to the development of a more elaborate cross border governance and management structure and the creation of a cross border nature park between Dunkirk and Westend.

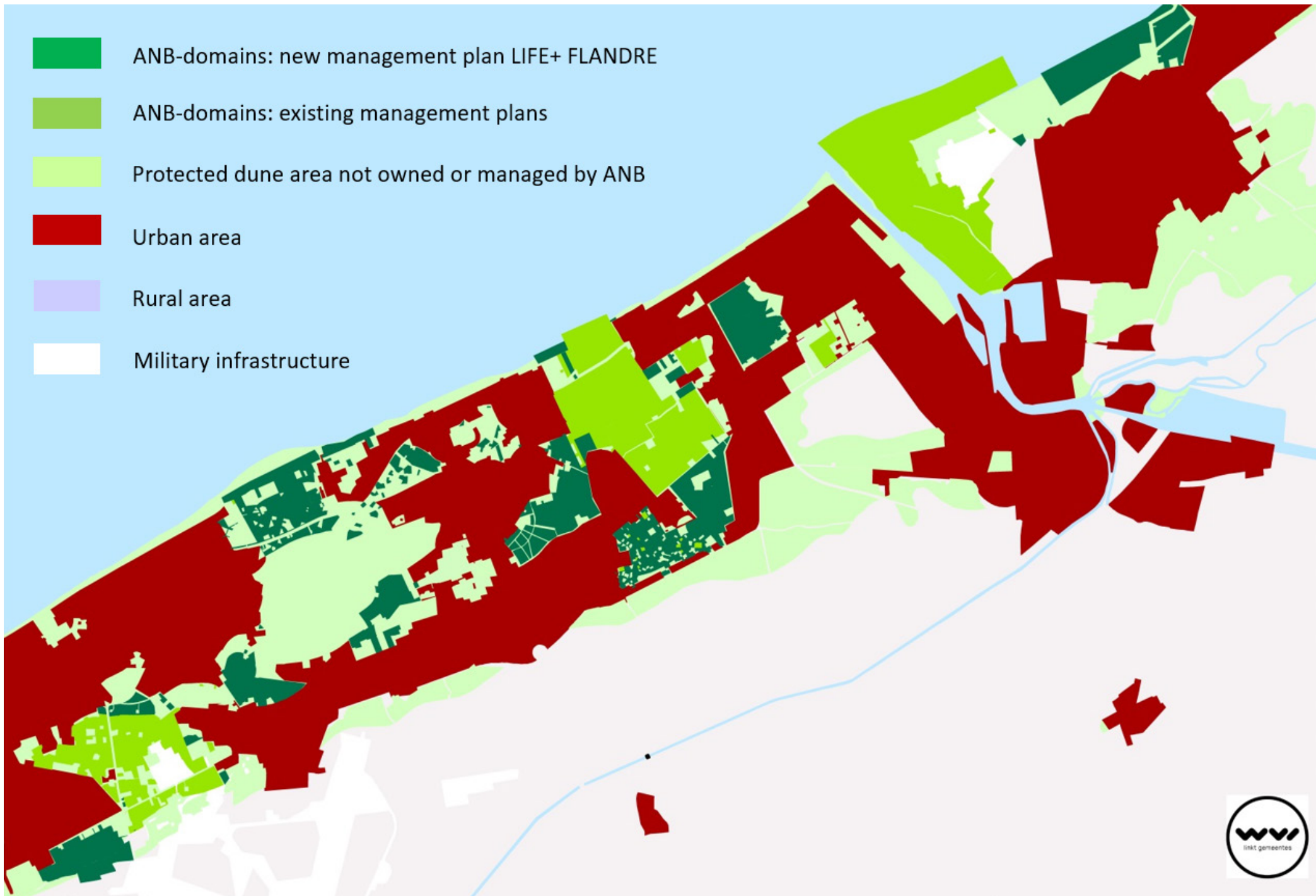
2.6.3 Management plan for dunes that were recently acquired in Belgium by the Agency for Nature and Forests, action A3

A nature management plan was elaborated for 295 hectares of dunes that had been acquired or taken into management through contract by the Agency of Nature and Forest between 2004 and 2018, including 45 hectares of dunes purchased between 2014 and December 2017 in the frame of action B1 of the LIFE FLANDRE project.

This management plan was approved by decree of the Flemish Minister of the Environment, Nature and Agriculture of 23 April 2019 and has a validity of 24 years and, according to the Flemish regulation, has to be scrutinized and if necessary actualized all 5 years.

The signature by the representatives of the French and Flemish competent authorities of the Memorandum of Understanding on 14 February 2020





Map 4 Action A.3 colored dark green: the ANB domains for which the management plan has been drawn up and approved in the frame of LIFE+ FLANDRE © Wvi

The implementation of the approved management plan will :

- Achieve an increase by nature restoration measures of the surface area of the target habitats of:

Code	Habitat	Increase surface area (ha)	Current total area along the whole Belgian coast (ha) within SAC BE2500001	Increase in % of the current total area
2110	Embryonic shifting dunes	0.26	6.90	+ 3.77 %
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> 'white dunes'	3.61	453.60	+ 0.80 %
2130*	Fixed coastal dunes with herbaceous vegetation 'grey dunes'	9.63	607.20	+ 1.59 %
2170	Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>)	2.17	70.90	+ 3.06 %
2190	Humid dune slacks	7.91	46.50	+ 17.01 %



Wheatear (*Oenanthe oenanthe*) – ©Jeroen Bot



Dune Cup (*Peziza ammophila*) ©Jacky Launoy

→ Ensure the maintenance and optimization of the Favorable Conservation Status (by controlling invasive alien species and reducing overgrowth by tall grasses and shrubs) of the following target habitats:

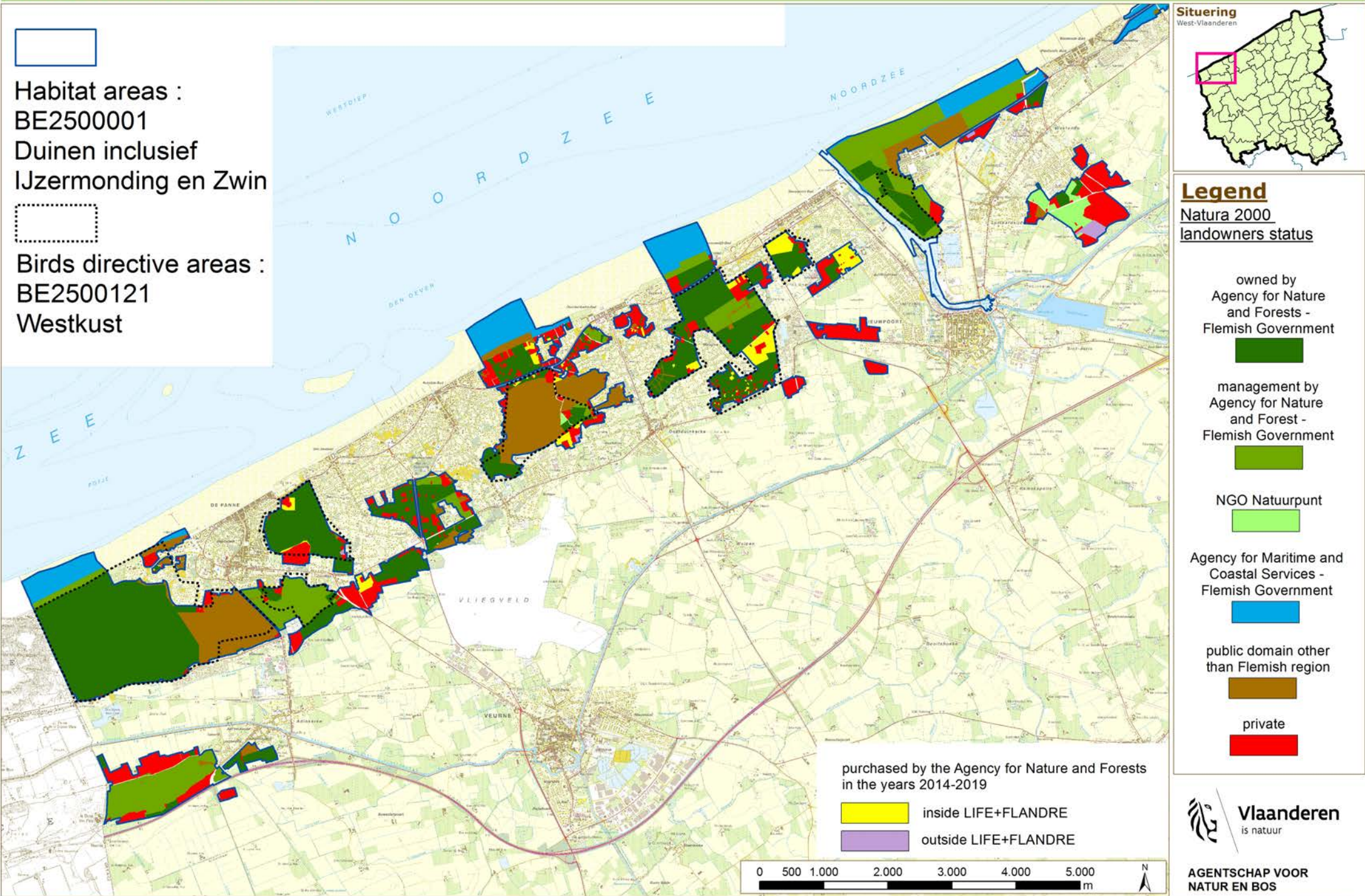
Code	Habitat	Maintained FCS (ha)	Current total area along the whole Belgian coast within SAC BE2500001 (ha)	% of current total area submitted to management plan
2110	Embryonic shifting dunes	0.81	6.90	11.7 %
2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i> 'white dunes'	54.16	453.60	11.9 %
2130*	Fixed coastal dunes with herbaceous vegetation 'grey dunes'	72.39	607.20	11.9 %
2160	Dunes with <i>Hippophaë rhamnoides</i>	77.29	595.20	13 %
2170	Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>)	8.77	70.90	12.4 %
2180	2180 Wooded dunes of the Atlantic region	17.62	280.50	6.3 %
2190	Humid dune slacks	19.57	46.50	42 %

2.6.4 Completion of the public domain of dunes by purchase of land, actions B1 & B2

Purchase of land in order to submit the purchased dunes to an appropriate management aimed at the restoration and maintenance of biodiversity and ensure public access in accordance with the carrying capacity of the vulnerable dune ecosystem. The project proposal foresaw the acquisition of 30 hectare in Belgium by the Agency of Nature and Forests (action B1) and 58,8 hectares in France by the Conservatoire du Littoral (action B2). Finally the actions B1 and B2 resulted on the 31st December 2020 in the acquisition of:

In Belgium 63 ha 36 a 27 ca by 64 acts (notarial purchase deeds) within the SAC "BE2500001 Duingebieden inclusief IJzermonding en Zwin. In France 73 ha 90 a 06 ca by 25 acts (notarial purchase deeds and court rulings (expropriations)) within the Natura 2000 network and 13 ha 70 a 08 ca outside the Natura 2000 network by 7 acts












LIFE Nature+ FLANDRE
Action B2

Intervention du Conservatoire du littoral


Eligibilité des propriétés acquises

-  PRIVE ELIGIBLE (budget)
-  PRIVE ELIGIBLE (surface)
-  PUBLIC ELIGIBLE (budget)
-  PUBLIC ELIGIBLE (surface)

Domaine protégé

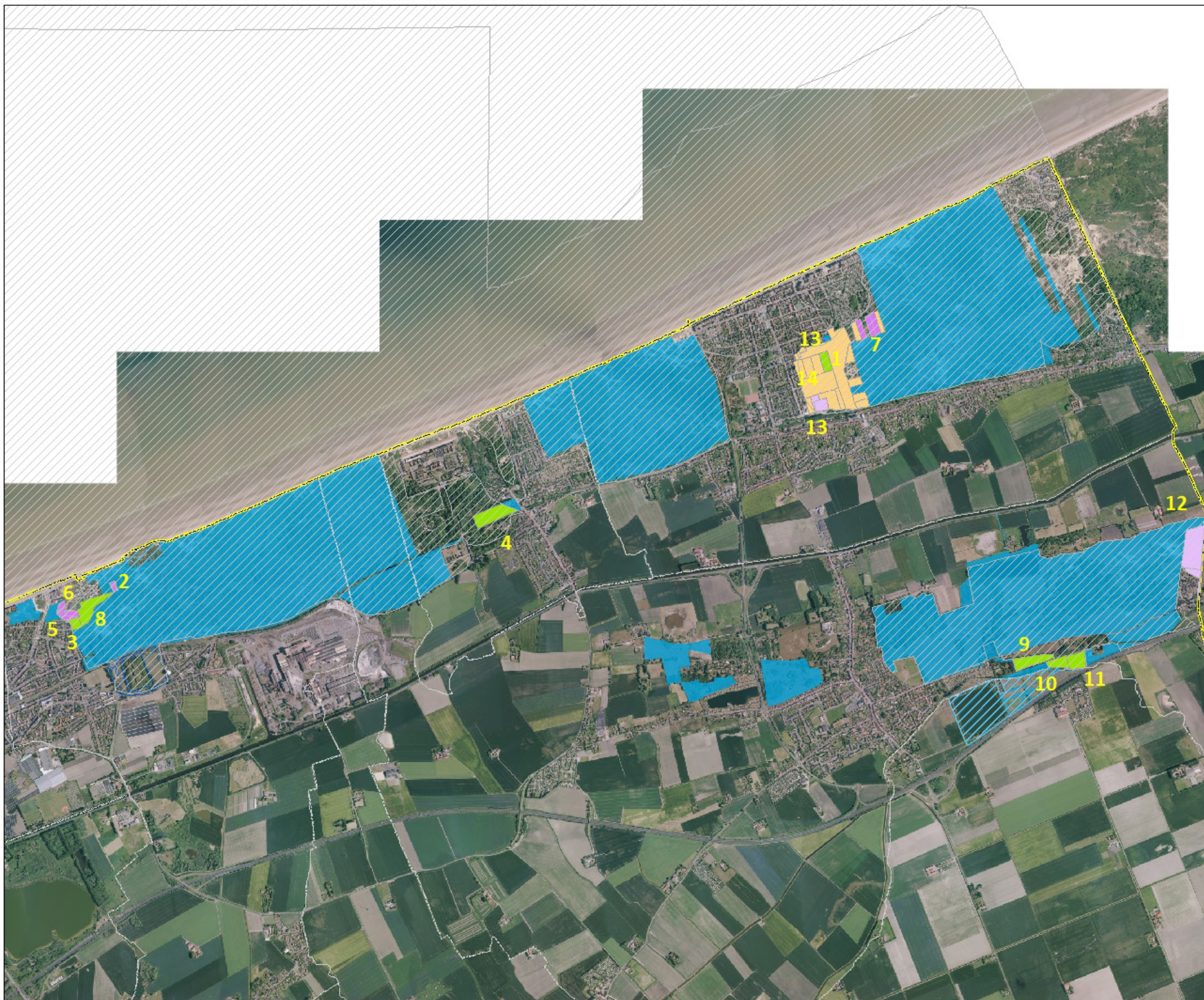
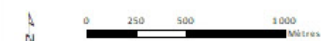
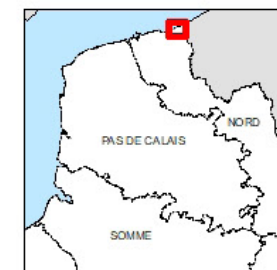
-  Acquisition
-  Affectation
-  Servitude

Autres interventions

-  Site d'Intérêt Communautaire

Limites territoriales et administratives

-  Départements
-  Communes du Nord



Map 6: the parcels purchased by the Conservatoire du Littoral in the frame of action B2 are numbered from 1 to 14 © Conservatoire du Littoral – Manche – Mer du Nord

2.6.5 Restoration of coastal dune habitats

The concrete 'large scale' conservation actions C1 to C5 of LIFE+ Nature FLANDRE aimed at:

C1, C2 and C3: Restoring the 3 main habitats linked to the open dune landscape:

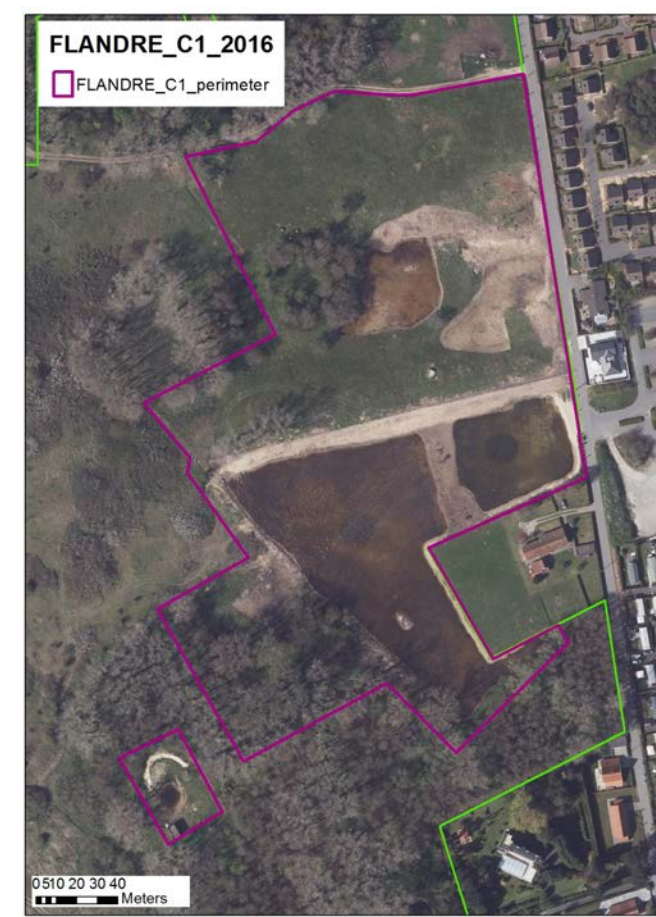
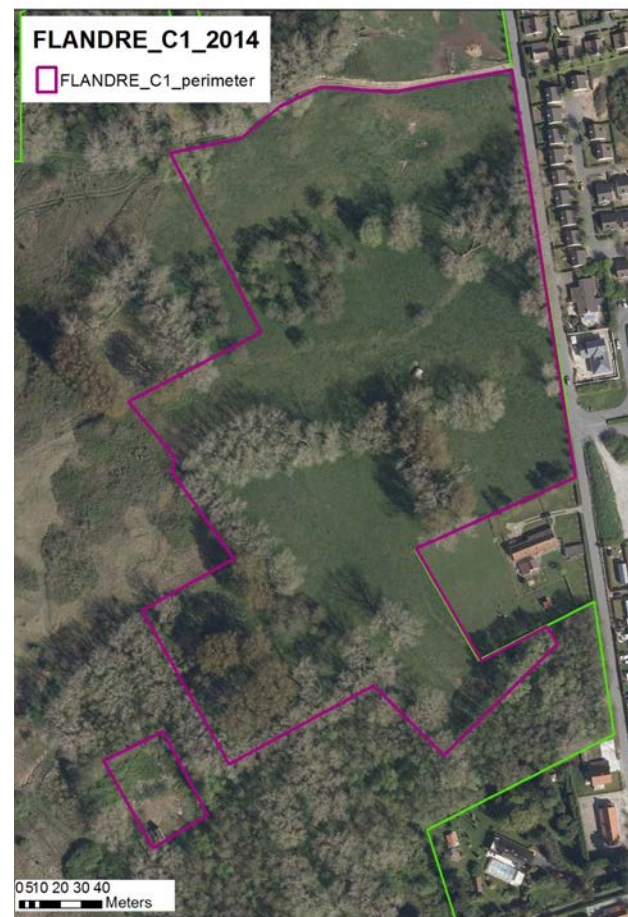
- ➔ 2120 Shifting dunes along the shoreline with *Ammophila arenaria* 'white dunes'
- ➔ 2130* Fixed coastal dunes with herbaceous vegetation 'grey dunes'
- ➔ 2190 Humid dune slack

Aerial photographs of the Oostvoorduinen-Oost before (2014) and after (2016) the removal of the superior layer of soil to restore habitats '2190 Humid dune slack' and '2130 Grey dunes' (action C.1)*

C4: Restoring the biotope of the Narrow Whorl-Snail (*Vertigo angustior*, code 1014) consisting of habitat '6430 Hydrophilous tall herb fringe communities of plains'

C5: Providing aquatic reproduction biotope to the Great Crested Newt (*Triturus cristatus*, code 1166) and Natterjack Toad (*Epidalea calamita*, code 1202)

Maps 7-1,2 & 3: Location of the concrete habitat restoration actions C2, C3, C4 in the French coastal dunes

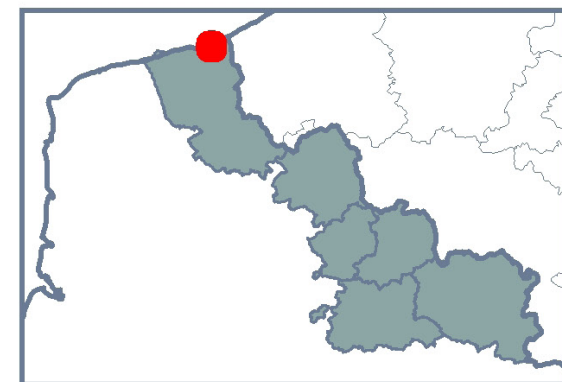




LIFE+ Nature FLANDRE
Dune Dewulf

- Action C2 work completed by 1 March 2020
- Action C2 additional area
- Action C3 fences completed by 1 March 2020
- action C4 work completed by 1 March 2020
- Action C5 ponds completed by 1 March 2020
- pre-project grazing area
- Municipal boundaries
- Espace Naturel Sensible
- NATURA 2000 FR3100474
- Walking paths

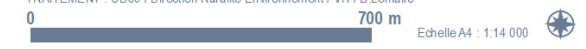
Localisation



LIFE + 12 NAT/BE/000631



DATE : 16/06/2020
SOURCES : Département du Nord / PPIGE / IGN / SIGALE / DREAL / Cadastre DGI
TRAITEMENT : CD59 / Direction Ruralité Environnement / VH / B.Lemaire

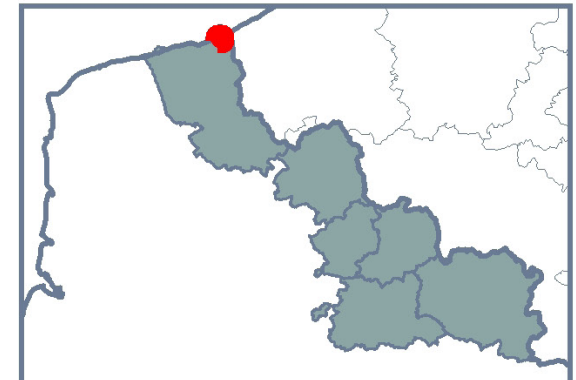




LIFE+ Nature FLANDRE
Dune Marchand

- Action C2 work completed by 1 March 2020
- Action C3 fences completed by 1 March 2020
- action C4 work completed by 1 March 2020
- Action C5 ponds completed by 1 March 2020
- pre-project grazing area
- Municipal boundaries
- Espace Naturel Sensible
- NATURA 2000 FR3100474
- Walking paths

Localisation

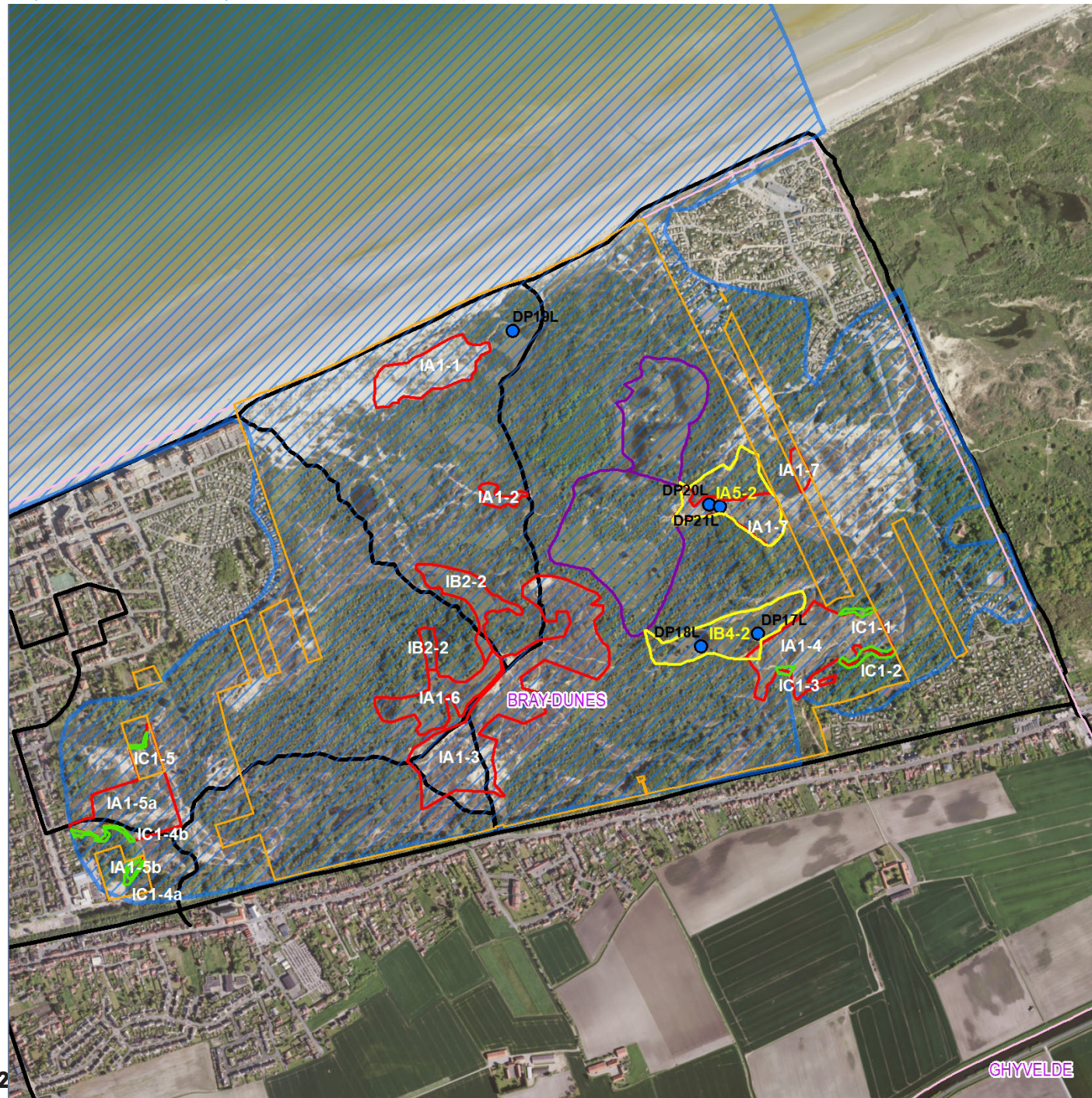


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DATE : 16/06/2020
SOURCES : Département du Nord / PPIGE / IGN / SIGALE / DREAL / Cadastre DGI
TRAITEMENT : CD59 / Direction Ruralité Environnement / VH / B Lemaire

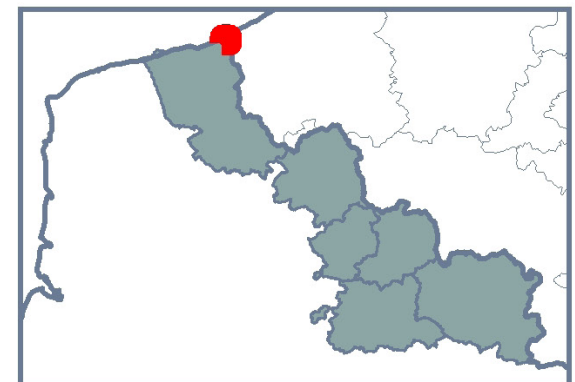
0 400 m Echelle A4 : 1:8 000



LIFE+ Nature FLANDRE
Dune du Perroquet

- Action C2 work completed by 1 March 2020
- Action C3 fences completed by 1 March 2020
- action C4 work completed by 1 March 2020
- Action C5 ponds completed by 1 March 2020
- pre-project grazing area
- Municipal boundaries
- Espace Naturel Sensible
- NATURA 2000 FR3100474
- Walking paths

Localisation



LIFE + 12 NAT/BE/000631



DATE : 16/06/2020
 SOURCES : Département du Nord / PPIGE / IGN / SIGALE / DREAL / Cadastre DGI
 TRAITEMENT : CD59 / Direction Ruralité Environnement / VH / B Lemaire

0 670 m Echelle A4 : 1:13 500

Photographic coverage of the large scale works to restore the natural habitats in the 3 French coastal dune domains.

Removal of scrub on large scale in the 3 French coastal dune domains



With "heavy" equipment ... ©Bénédicte Lemaire



Manually" on the more fragile, relief-rich areas ©Bénédicte Lemaire





Dune slack IA1-26 in "Dune Dewulf" before (17 January 2017) and after (22 March 2017) the removal of scrub



Area IA10-1 in Dune Dewulf before (summer 2017) and after (early spring 2018) the removal of scrub ©Bénédicte Lemaire



Area IA1-27 and IB2-4 in "Dune Dewulf" before (12 September 2017) and after (17 April 2018) the removal of scrub @Bénédicte Lemaire



Placing fences to allow management by grazing (by sheep)
©Bénédicte Lemaire



Introduction of a flock of sheep ©Aline Bué



LIFE+ Nature FLANDRE
Dune Dewulf

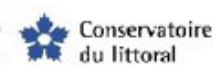
Action C5
Digging of 10 ponds

- Espaces Naturels Sensibles
- Natura 2000 FR3100474
- new ponds
- Pathway MIRRA

Localisation



LIFE + 12 NAT/BE/000631



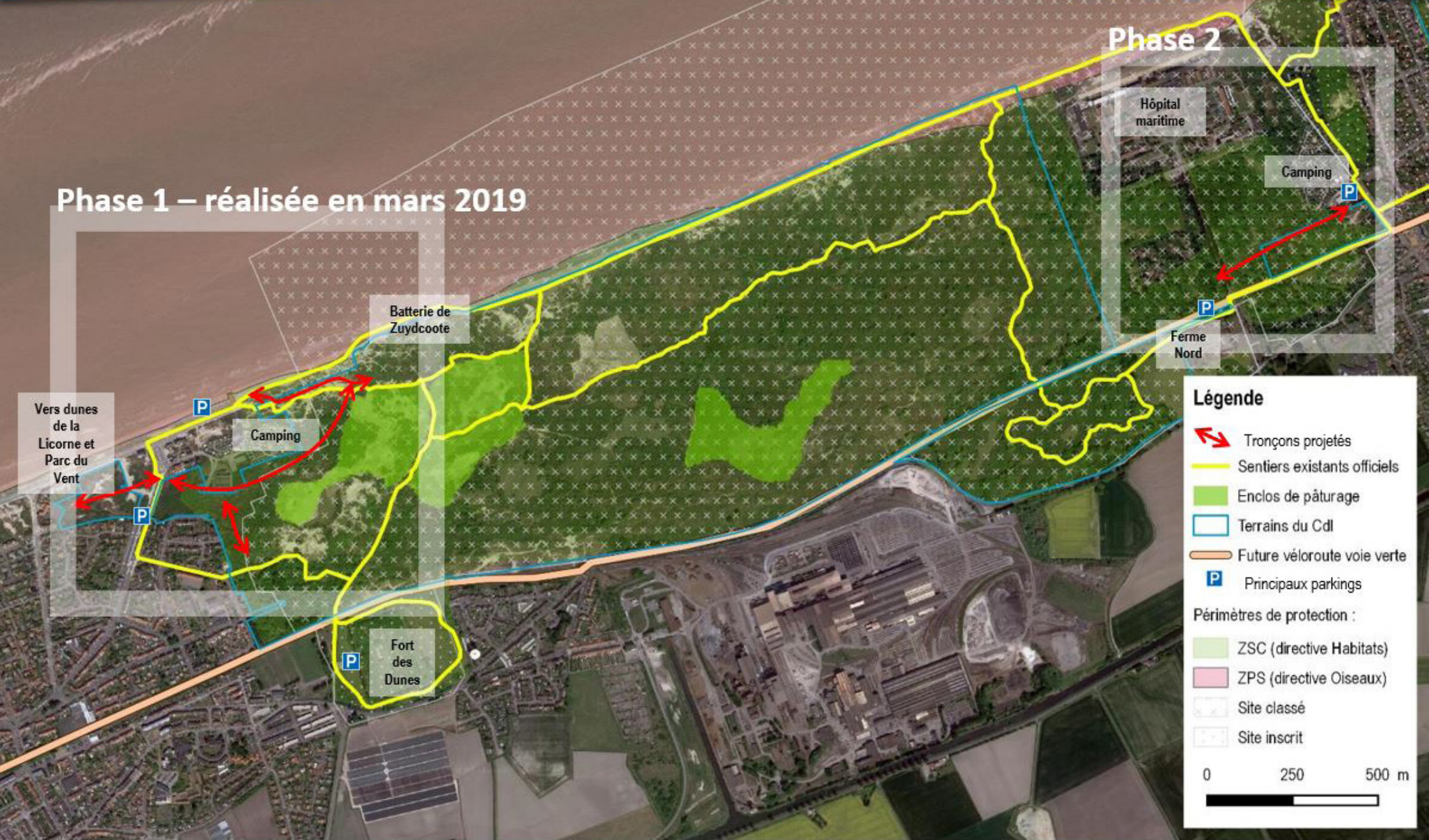
DATE: 22/09/2018

SOURCES: Département du Nord / PPIGE / IGN / SIGALE / DREAL / Cadastre DGI
TRAITEMENT: CGSR / Direction de l'Environnement / JPFY / Bemaire 1



Actions	Location	Type of measure	Period	Implemented superficies / number of pools	Superficies of potentially restored target habitats (ha)						
					2120	2130*	2190	1014	1166 + 6284	other(1)	
C.1 Belgium	Oostvoorduinen	Removal of planted poplar trees and of too nutrient-rich superior layer of soil	2015-2016	2 ha + 3 pools		0.56	1.45				
C.2 France	Dune Dewulf, Marchand & du Perroquet	Removal of scrub mechanically (including litter) and manually	2014-2020	61.06 ha	1,28	46,70	5,77				7,31
C.3 France	Dune Dewulf, Marchand & du Perroquet	Placing of fences to allow management by grazing by sheep, goats and pony's	2018	30.38 ha	1.10	11.85	6.55				10.88
C.4 France	Dune Dewulf, Marchand & du Perroquet	Removal of scrub	2015-2020	2,51 ha				2.51			
C.5 France	Dune Dewulf, Marchand & du Perroquet	Excavation of pools	2017-2019	11 pools						0,13	

(1) other: mix of 2160, 2170, 2180 and 6430 or "no habitat" cf annex I of the European 'Habitat' directive (eg. temporarily bare sand)



Action C6

In the 'Dune Dewulf', the Conservatoire du Littoral set up a 2.2 kilometers long footpath (unpaved) in order to channel the recreational pressure on the vulnerable dune environment and thus limit this pressure.

Action C7 Management of the dune parcels purchased in the frame of action B1

In order to at least preserve or even enhance the biodiversity present at the time of acquisition, urgently needed management measures were taken by the Agency of Nature and Forests. These management measures consisted mainly of:

- mowing with brushcutter or cutter bar of dune grasslands (2130*) and humid dune slacks (2190) that were threatened by overgrowth with high grasses or ingrowth of shrubs;
- removing (mowing, sawing off or even digging out) invasive alien species (I.A.S.) from moss dunes (2130*), dune grasslands (2130*-2190), dune thickets (2160) and wooded dunes (2180);
- Bringing the grazing by cattle or horses from dune meadows (generally reducing stocking densities, excluding supplementary feeding, sometimes limiting the period during which grazing is allowed) into line with the requirements of the target habitats (2130*, 2190) and species (*Apium repens*, 1614).



I.A.S. control - manually digging out with shovel of Prunus serotina, Westhoek @Johan Lamaire

mowing with brushcutters of dune grassland, Simlidiinen @ Guy Vileyn





A total of 1287 man-hours were spent on so-called manual maintenance management (mowing, felling, digging out of I.A.S.-shrubs) of 44 ha 63 a 69 ca from the total area of 63 ha 36 a 27 ca of newly purchased land, this implies a time investment of 28,8 man-hours per hectare. These so-called “manual” maintenance works were either carried out by ANB’s own labor force or outsourced to social employment companies, under supervision of the warden-technicians of the Agency of Nature and Forests. The administrative work and social contacts with livestock farmers needed for the organization of the management by grazing or haymaking of the remaining 18 ha 72 a 58 ca that were purchased in implementation of action B1 are not included in the above mentioned 1287 man-hours.

Cleaning up clippings from mowed dune grasslands with draught horse, Doornpanne ©Guy Vileyn

Cleaning up clippings from mowed dune grasslands with all-terrain vehicle, Oostvoorduinen ©Guy Vileyn





Management of dune meadows by appropriate grazing by Scottish Highland cattle, Oostvoorduinen © Bart Seys

Essential for the evaluation of potentialities to maintain or restore humid dune slack habitat (2190) and biotopes of target species such as Natterjack Toad (1202), Great Crested Newt (1166) and Creeping Marshwort (1614) is the placing of piezometers and monitoring of the groundwater level fluctuations by means of those piezometers. The network of piezometers on the dune sites owned and managed by the Agency of Nature and Forests has provided and will continue to provide vital information for the management plans that have been (action A3) and are being or will be elaborated as well as for the monitoring of the ongoing management.

More far-reaching habitat restoration measures such as large-scale removal of thickets, removal of artificial tree plantations and of topsoil layers, creation of new pools, are foreseen in the above mentioned management plan (action A3) and will be implemented in the 'Oostvoorduinen' and 'Simliduinen' in the near future (2021-2026). For the 'Groenendijk' at Nieuwpoort a management plan is actually being elaborated (GWEN ZaLeG-project: see further § 4.1.1.b and 4.1.4) and should be finalized in 2021.

Placing of a piezometer in a recently purchased part of Belvédèreduinen ©Stijn Loose



C8 Management of the dune parcels purchased in the frame of action B2

The management of the land acquired by the Conservatoire du Littoral under Action B2 has been and will be carried out within the framework of the general partnership agreement binding the Département du Nord to the Conservatoire du Littoral.

Specific management actions that have been executed:

- ➔ the installation of 5 new panels referring to the LIFE FLANDRE project on the new parcels purchased by the Conservatoire du Littoral near the entrances of the sites: 3 panels in 'Dune Dewulf' and 2 in 'Dune fossile de Ghyvelde';
- ➔ placing fences and start of grazing by sheep on several plots in and around the "Dune fossile de Ghyvelde";
- ➔ inventory followed by the grubbing-up of the I.A.S. in the "Dune Dewulf" and "Dune du Perroquet";
- ➔ Manual removal of scrub and export of the cut products (Hippophaë rhamnoides, Clematis vitalba, Ligustrum vulgare, Populus div. spp. ...);
- ➔ mowing grasslands and removing brambles ;
- ➔ felling of poplars to ensure the safety of the sites;
- ➔ Collection of plastic waste.

In total 1976 working hours were spent on the plots of dunes that were newly acquired by the Conservatoire du Littoral. These management works were carried out either by the Département du Nord's own workers, or outsourced to green management companies or to employment associations. These work hours were not accounted for and invoiced within the framework of the LIFE+FLANDRE project.

All the newly acquired plots will be included in the management plans for the (French) Flemish Dunes.

Demolition of a house to restore humid dune slack habitat at the Fossil Dune of Ghyvelde, during and after the works. The land was purchased in 2018 (acquisition nr 10 on location map 6),the works executed in the winter 2019-2020.

©Thomas Raulin



'Outside LIFE'

Not foreseen in the submitted project proposal of LIFE+ FLANDRE, but stimulated by the prioritization of the LIFE+ FLANDRE project area for habitat restoration investments and the availability of the appropriately constituted Belgian part of the LIFE+ FLANDRE team, including a management-expert, a landscape-expert and two technicians-wardens, 14 concrete habitat restoration actions were planned and implemented by the Agency of Nature and Forests during the period 2015-2019 in the Belgian part of the project area, without financial support of LIFE. The working hours spent by the LIFE+ FLANDRE team-members for the planning and implementation of these "Outside LIFE"-actions were not charged to the budget of LIFE+ FLANDRE.

Common seals (1365) resting on tidal mudflats at the Yzer estuary ©Luc David



"Outside Life": Removal of dredging sludge dump at the Yzer estuary to restore tidal mud flats (1130) and salt marsh (1310-1330) ©Stijn De Ruyter

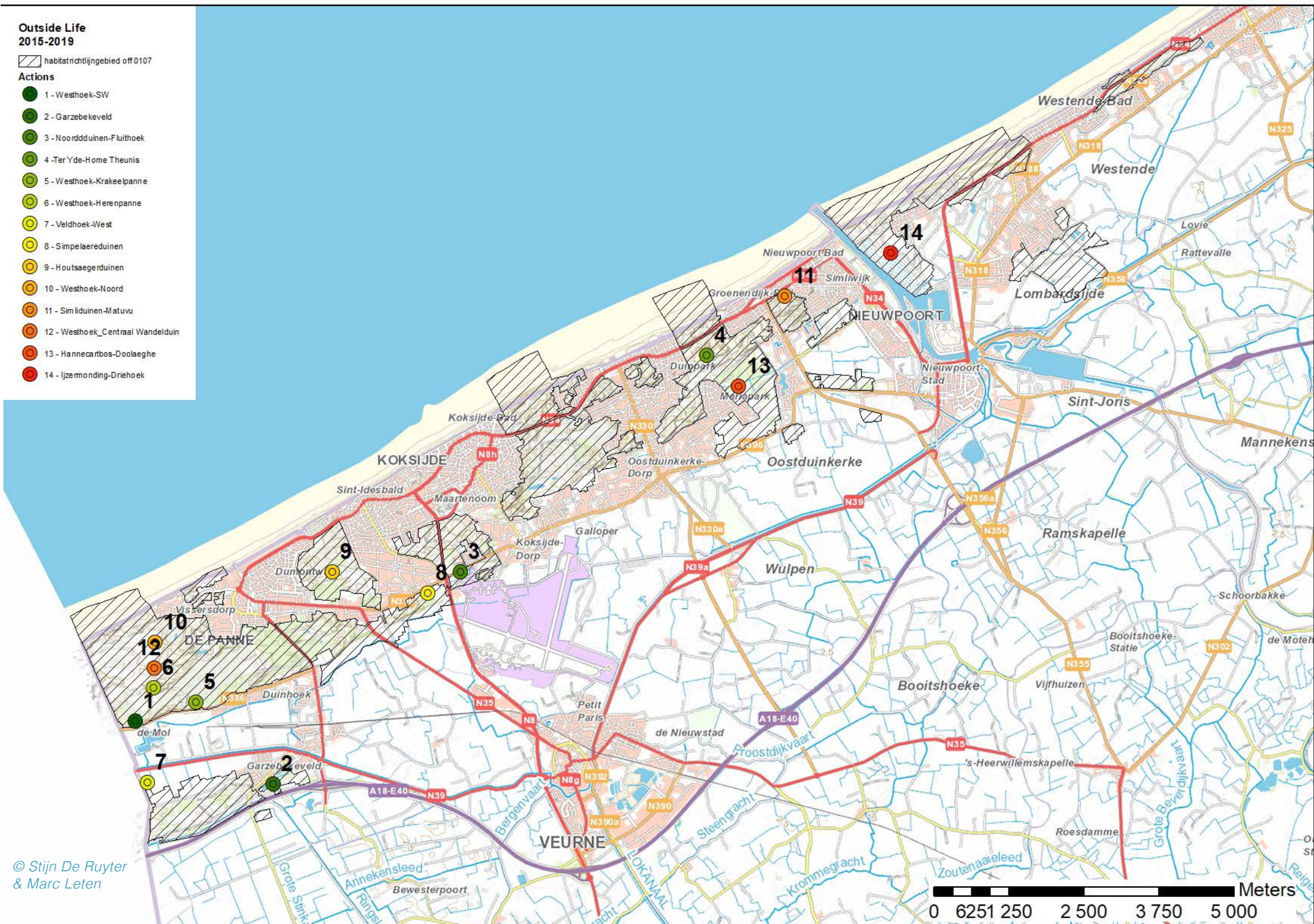


Outside Life
2015-2019

▨ habitatrichtlijngebied off 0107

Actions

- 1 - Westhoek-SW
- 2 - Garzebekeveld
- 3 - Noordduinen-Fluithoek
- 4 - Ter Yde-Home Theunis
- 5 - Westhoek-Krakeelpanne
- 6 - Westhoek-Herenpanne
- 7 - Veldhoek-West
- 8 - Simpelaerduinen
- 9 - Houtsaegerduinen
- 10 - Westhoek-Noord
- 11 - Simluiduinen-Matuvu
- 12 - Westhoek_Centraal Wandelduin
- 13 - Hannecartbos-Doolaeghe
- 14 - Ijzemonding-Driehoek



Nr	Location	Type of measures	period	Superficies of potentially restored target habitats (ha)					
				1310-1380	2120	2130*	2160	2180	2190
1	Westhoek-SW	Removal of exotic poplars and other trees	2015			0.83	1.28		0.05
2	Garzebekeveld	Removal of trees and sludge + profiling lakeshore + excavation of pools	2015			0.84		0.30	0.69 + Epidalea calamita 0.06
3	Noordduinen-Fluithoek	Removal of topsoil + excavation of 1 pool	2015			0.40			0.60
4	Ter Yde-Theunisvlakte	Sieving topsoil (rubble and vegetation)	2015		4.05				
5	Westhoek-Krakeelpanne	Removal scrub and topsoil, excavation of pools	2016			0.29			0.60
6	Westhoek-Herenpanne	Removal of scrub and topsoil	2016			0.07			0.60
7	Veldhoek-west	Excavation of pools and wet depressions	2016						Epidalea calamita 0.31
8	Belvedèrduinen	Demolition of constructions	2017			0.05			
9	Houtsaegerduinen	Removal of scrub, trees and topsoil, excavation of pools	2018			4.45		1.00	0.73
10	Westhoek-Noord	Removal of scrub, trees and topsoil	2015			2.89			3.38
11	SimlidiuinenMatuvu	Removal of constructions, exotic scrub and topsoil	2018						0.59
12	Westhoek-Centraal loopduin	Manual removal of Seabuckthorn	2018			1.19			
13	HannecartbosDoolaeghe	Removal of artificial tree plantation and topsoil	2018			0.10			1.00
14	Yser-rivermouth	Removal of dredging sludge dump	2019	1.80		0.23			
Total superficies potentially restored habitats				1.80	4.05	11.34	1.28	1.30	8.24 + 0.37

2.6.6 Monitoring

The experience of previous ecological restoration projects (eg. LIFE96 NAT/B/003032 ICCI and LIFE02 NAT/B/008591 FEYDRA along the Belgian Westkust) learned that after the initial restoration measures (eg Removal of scrub or of superior soil layer) have been carried out, it takes at least 5 to 10 years of evolution of the natural environment under recurrent management to achieve a “fully mature” state of development of the targeted coastal dune habitats. All concrete habitat restoration works (C-actions) in the frame of the LIFE+ FLANDRE project were carried out in the period 2015-2020. This implies that on most locations where restoration works have been executed, the target-habitats are still in an early stage of development, characterized by the reappearance of mainly pioneer species and plant species with long lived seed banks in the soil and the temporary strong presence of disturbance indicators.

In the Belgian part of the project area the results of the restoration action C1 was monitored separately between 2015 and 2019 in the frame of the monitoring action D1&2 and the effects of action C7 and of the ‘Outside LIFE’-actions were monitored in the frame of the two consecutive monitoring studies for all dune domains managed by the Agency of Nature and Forests along the whole Belgian coast “Permanente Inventarisatie Natuureservaten Kust II” (PINK II, 2012-2014) and “Beheer Evaluatie Kust” (BEK, 2014-2018), that were implemented by the Institute for Nature and Forestry Research (INBO) on behalf of the Agency for Nature and Forests (action D3).

In the French part of the project area, the impacts of the large scale habitat restoration works in the frame of the actions C2, C3, C4 and C5 on the dune vegetations (action D4 and D5) and populations of the target species Narrow Whorl Snail (1014) (action D6) and Great Crested Newt (1166) (action D7) was monitored by the Conservatoire Botanique National de Bailleul and the scientific consultancy Biotope on behalf of the Département du Nord. The botanical monitoring allowed an assessment of the recurrent management efforts that are and will be needed to obtain and maintain on the restored sites the targeted habitats “2190 Humid dune slacks”, “2130* Grey dunes” and “2120 White dunes” in a favorable state of conservation.



monitoring the population of Narrow Whorl Snail (Vertigo angustior) by collecting samples © Bénédicte Lemaire

The monitoring study D6 shows that the population of Narrow Whorl Snail (*Vertigo angustior*) has suffered a slight decline in the period 2015-2019 also in areas where no vegetation was removed, but expects that, once the targeted habitat '6430 Hydrophilous tall herb fringe communities of plains' (which is the biotope of the Narrow Whorl Snail) will have developed to maturity on the treated sites, the population of that mollusk will expand again.

The monitoring study D7 shows that out of the 11 new pools dug out between 2017 and 2018 in the French dunes in implementation of action C5, in 2019 3 pools were already colonized by adult Great Crested Newt (*Triturus cristatus*) and 8 pools by Natterjack toad (*Epidalea calamita*). In 2020 all the 11 new pools contained tadpoles of the Natterjack toad. Although in the 65 pools that already existed before the LIFE+ FLANDRE project started, a decrease of the number of observed adult Great Crested News was found, due to the drought which caused many of the "old" pools to dry out.

In addition to monitoring biodiversity, the impact of the LIFE FLANDRE project on the local economy and ecosystem services was also investigated (action D1&2). This study was commissioned by the Agency for Nature and Forests and the Conservatoire du Littoral and carried out by a consortium consisting of the Flemish Institute for Technological Research (VITO), the INBO and the University of Antwerp. One of the most important ecosystem services that benefits from a positive impact of the LIFE FLANDRE project is the tourist attractiveness of the dune area. A survey of visitors and other stakeholders shows that the majority of people find the open and dynamic dune landscape more attractive than the densely overgrown dune landscape.



First results: appearance in newly dug out pool in "Dune Dewulf" of Chara div. spp and larvae and subadult Epidalea calamita



©Bénédicte Lemaire



©Thierry Tancrez **39**

2.6.7 Dissemination and exchange of experience and knowledge

Participation and public support: advisory committee

In order to increase public support for the project and to benefit from the knowledge of scientists, municipal authorities and other Flemish and French authorities and NGOs, an advisory committee was set up, which met annually to monitor the progress of the project and its implementation on the ground.

During the implementation period of the LIFE+ Nature project FLANDRE 2013-2020, the advisory committee held each year a meeting and a field visit.

Participation to networking events

Members of the transnational LIFE+ FLANDRE project team participated to several international networking events and presented on those occasions the objectives and achievements of the project with special attention for cross border cooperation:

- ECCC conference 'Integrated Management of Coastal Dunes in Europe' at Merlimont (France), from the 17th to the 19th June 2014;
- LIFE Sand Dune platform meeting of 13-15 June 2016 at Zandvoort (Netherlands);
- Atlantic region Workshop of the Natura 2000 Biogeographical Process of October 2016 at Ennistymon (Ireland);
- Littoral 2017 conference at Liverpool (United Kingdom) 5-9 September 2017;
- SER Europe – conference 'Restoration in the era of climate change' at Reykjavik (Iceland) on 13 September 2018;
- Interlife Benelux 11-12 September 2019 at Ossendrecht (Netherlands) Grenspark Kalmthoutse Heide – De Zoom.

Advisory Committee: Indoor meeting at Bray-Dunes © Bart Bollengier



Field visit to the habitat restoration works in Dune du Perroquet © Hélène Hoffmann

International workshop on the management of coastal dunes and sandy beaches

On 12, 13 and 14 June 2018, the LIFE FLANDRE partnership, with the support and participation of the Université du Littoral Côte d'Opale (ULCO) - Laboratoire d'Océanologie et de Géoscience, organized an international workshop on the management of coastal dunes and sandy beaches in Dunkirk, with the participation of 143 experts from 13 European countries. Attention was paid to problems such as the urbanization of the coasts and the fragmentation of the dune area, climate change and rising sea levels, as well as, and above all, nature-based solutions to these problems.

A site visit was also made to the dune complex "De Westhoek - Dunes du Perroquet - Dune fossile de Ghyvelde - Domein Cabour" which forms the heart of the cross-border project area "Westkust - Dunes de Flandre". The exceptional nature of the various dune formations, the ecological connections (to be restored) and the various forms of nature management were particularly addressed.

International workshop: field trip to Westhoek-Dune du Perroquet-Dune fossile de Ghyvelde-Cabour © Reinhardt Strubbe

International workshop: indoor session © Rik De Vreese



2.6.8 Raising public awareness

Information boards

In order to inform visitors, large, richly illustrated notice boards with explanations in 4 languages (French, Dutch, English and German) were placed at the entrances to the dune areas where large-scale nature restoration works were to take place.

Website www.lifeflandre.be

The website presenting the LIFE+ FLANDRE project, the project area, its objectives, its progress and achievements, was visited between the 4 November 2013 (date that it was put 'on line') and the 1 March 2020 (initial end date of the project) 33.880 times, which implies an average number of 446 visits per month.

Travelling exhibition and leaflet

On 27 February 2015, the traveling exhibition was inaugurated and the information leaflet was presented at the Provincial Visitor Centre 'De Nachtegaal' (since 2019 called 'Duinpanne' at De Panne) in the presence of around a hundred interested persons. In the following years, the exhibition and the accompanying leaflets in 4 languages travelled all over the cross-border region: Bray-Dunes, Leffrinckoucke, Zuydcoote, Mallo-Les Bains, Dunkerque, Nieuwpoort, Koksijde, Middelkerke and outside the region "Dunes de Flandre - Westkust": the guardhouses of the town ramparts of Gravelines, the Provinciehuis Boeverbos in Bruges, the Hôtel des Services départementaux in Lille ... During those 5 years, the number of visitors of the exhibition was estimated at 100.000.

Information boards about the habitat restoration works at the Dune Dewulf (France) and the Oostvoorduinen (Belgium)





Guided walks

In the different dune areas, 30 guided walks were organized on the French and Belgian sides by the Département du Nord and Natuur en Bos to explain the nature restoration works. A total of around 450 people took part in these visits.

During the LIFE+FLANDRE project, 23 “nature work camps” with 440 participants were also organized, during which the public (high school students, volunteers, associations), once composed of 97 students from the Agricultural High School of Dunkirk, mowed or uprooted regrowth of shrubs and invasive alien species: active participation of the local population in the management of the dunes !

Guided visit to the “Dune du Perroquet” (France), explanation about grazing management with Haflinger pony’s, October 2015 ©St. Mesmin



Guided visit to the “Oostvoorduin” (Belgium), explanation about the purpose of the newly excavated pool, July 2017 ©Guy Vileyn



Students and other volunteers being briefed by the warden and at work on the field ! ©Bénédicte Lemaire



International Natura 2000 & LIFE Days 2017, 2018 and 2019

The European Habitats Directive and the European financial instrument LIFE were created on 21 May 1992. On 21 May 2017, 2018 and 2019, the anniversary of “Natura 2000 and LIFE” was celebrated with public thematic guided walks in the cross-border dune area “De Westhoek – Dune du Perroquet”, the “Oostvoorduin” and the “Hannecartbos” in Oostduinkerke

and finally the cross-border “fossil” dune belt of Adinkerke-Ghyvelde. The total participation in these three thematic “birthday walks” was about 100 people. All of the above-mentioned guided tours were announced in the press, so LIFE FLANDRE has received media attention on many occasions.

Illustration: start of the guided evening walk to the cross border fossil dunes of Adinkerke-Ghyvelde on 21st May 2019 ©Reinhardt Strubbe



3 Swot Analysis of the 'dunes de Flandre – Westkust' at the end of the project

STRENGTHS

- 1) The natural coastal environment itself, consisting of a geomorphological sequence of sand banks in the shallow sea, wide sandy beaches, an estuary, tidal mudflats, tidal salt marshes, sand dunes, polder plains and 'old' decalcified dunes and being a hot spot of biodiversity linked to that geomorphological sequence.
- 2) Memorandum of understanding: guarantees that cross-border cooperation will continue indefinitely and that the partnership will be extended to include other key stakeholders in the area, resulting in the creation of a cross border protected "European" nature park "Dunes de Flandre –Westkust".
- 3) Masterplan: offers for the first time in history for the entire cross border coastal dune belt between Dunkerque and Westende a coherent approach and scientifically based set of recommendations to maintain and strengthen the natural processes, habitats and species during the next 15 years, including suggestions for spatial planning to allow the expansion of nature areas. The Masterplan should also be an inspirational source for the implementation of the Memorandum of understanding.
- 4) Management plan for the Belvédère, Schipgatduinen, Doornpanne, Hoge Blekker, Hooge Duynen, Spelleplekke, Oostvoorduinen, Plaatsduinen, Ter Yde-Oost, Simliduinen en Sint-Laureinsduinen offers a strong frame for the management in the coming 23 years of 295 hectare of publicly owned dunes managed by the Agency of Nature and Forests and benefitting from the legal status 'nature reserve'.
- 5) Management field teams of Agency of Nature and Forests and Département du Nord. The fact that most of the publicly owned dune area in the cross border dune belts is managed by 2 public authorities in a close partnership (cfr Memorandum of Understanding), more precisely by the entities in charge of site management of both the Agency of Nature and Forests and the Département du Nord, who have built up a strong knowledge, experience and good cooperation both in management planning and in management execution of coastal dunes, guarantees the continuity of an effective management of the cross border site aimed at the implementation of the European "Habitat" directive.

WEAKNESSES

- 1) On Belgian side: more than 328 ha (on a total superficies of 2200 ha: 15 %) of dunes in the project area within the SAC BE2500001 are still privately owned, with an extremely fragmented ownership structure. The largest part of the privately owned dune parcels constitutes spatial enclaves and cutouts in the publicly owned dunes, complicating the management of these publicly owned dunes. The private dune areas are mostly composed of numerous small plots of land, each of which is individually owned by most often undivided parties. The extremely fragmented ownership structure makes that stimulating private owners to provide an adequate management to their properties would in this case be pointless. The only practically possible way to achieve complete and manageable spatial entities of dunes is by systematically purchasing the remaining privately owned parcels in order to integrate them in the public domain of the Flemish region. The systematic purchase of hundreds of parcels of dunes needs a deployment of staff that will no longer be available once the LIFE project FLANDRE is completed.
- 2) Presence along the French-Belgian border, on French territory, of a campsite with hard infrastructure (roads and parking lots) and scattered buildings, dividing the coastal dune belt that was continuous until the years 1960 into two separate dune sites, the "Dune du Perroquet" on French territory and the "Westhoek nature reserve" on Belgian territory. The presence of the campsite that cuts through the dune system across its entire width from North Sea beach to polder plain constitutes an obstacle not only to the migration of organisms but also to the natural sand drift dynamics of the dunes. From a recreational and touristic point of view this campsite is also a nuisance because its presence blocks the cross border passage for hikers between the French 'dune du Perroquet' and the Belgian nature reserve 'de Westhoek'. Also on Belgian territory, two unlicensed campsites at Koksijde and Lombardsijde-Bad, (both property of the Belgian Ministry of Defense) affect the spatial integrity and ecological functioning of legally protected dunes.
- 3) The transition between coastal dunes and the maritime polder plain is either built up or designated as agricultural areas in the frame of spatial planning. The few remaining transition areas from dunes to polder should offer possibilities to ecologically connect the different parts of the coastal dune belt that are separated from each other by the built up areas of the coastal resorts. But the quite intensive agricultural activity in the dune to polder transition areas, especially fertilization, drainage and use of biocides, leaves little or no possibility to restore or develop natural habitats.



Dune Pansy (*Viola curtisii*) @Marc Leten

WEAKNESSES

- 4) Lack of consciousness of the importance and vulnerability of the coastal dune ecosystem, always expecting more and new forms of recreational use of the dunes (e.g. mountain biking), asking for more paved paths that would further fragment the already limited nature areas and sometimes even supporting real estate development at the expense of unbuilt space and nature.
- 5) Different languages (French versus Dutch) on both sides of the border make cross border communication and exchange of information more difficult. Communication in simultaneously both languages and the translation of documents (reports, papers ...) require additional effort and/or costs.
- 6) Different attitudes of the conservation and management authorities towards the recreational use of the coastal dunes and beaches, e.g. in France strong presence of hunting, in Belgium a more tolerant attitude towards "new" forms of recreation (e.g. mountain biking, horse riding), leads to different regulations of accessibility of the public dunes in France and Belgium.
- 7) Different methods of scientific management planning and monitoring on both sides of the border.
- 8) Insufficient coordination and cooperation of the authorities responsible for the implementation of the European "Habitat" and "Birds" directive on land and at sea, both in France and in Belgium, resulting in an insufficient integral (not to be confused with integrated) approach of the management of the coastal protected areas.

OPPORTUNITIES

- 1) Development of a cross border “European” protected nature park
- 2) Possibility to expand the cross border “European” protected nature park to the maritime component of the concerned coastal area SAC’s in France and Belgium
- 3) Possibility to ecologically connect the present day coastal dunes of De Panne with the fossil dunes of Adinkerke by nature development measures in the central ‘polder’ plain
- 4) Integrated coastal defense involving nature based solutions
- 5) Touristic attractivity providing an important economic incentive for investing in the restoration and management of coastal nature habitats.
- 6) Fine-tuning of scientific monitoring in general and of species in particular on both sides of the border, e.g. by using similar methods of mapping (polygons), intensifying the mapping of invasive alien species on the French side.

THREATS

- 1) Spatial fragmentation. Urbanization has fragmented the original coastal and fossil dune belts into several isolated sites.
 - 1.a) The lack of ecological connectivity between the remaining dune sites results in the isolation of population of target species (e.g. Great Crested Newt (*Triturus cristatus*) and Natterjack Toad (*Epidalea calamita*), numerous species of invertebrates and plants) and a significant increase in the risk of local extinction of these species.
 - 1.b) The presence of buildings and roads limits the possibilities for large scale natural processes such as sand drift and marine breaches through the foredunes.
 - 1.c) The fact that the remaining dune sites are surrounded by suburban areas (houses with gardens) facilitates infiltration of the dune sites by Invasive Alien (plant-) Species escaping from gardens and implies a strong predation on wildlife by domestic cats.
 - 1.d) The intensive recreational use of the beaches in front of the coastal resorts implies (mechanical) beach cleansing preventing the development of embryonic dunes (habitat 2110) and interrupting possible ecological connections between different dune sites.
- 2) The transition between coastal dunes and the maritime polder plain is either built up or designated as agricultural areas in the frame of spatial planning. The few remaining transition areas from dunes to polder should offer possibilities to ecologically connect the different parts of the coastal dune belt that are separated from each other by the built up areas of the coastal resorts. But the quite intensive agricultural activity in the dune to polder transition areas, especially fertilization, drainage and use of biocides, leaves little or no possibility to restore or develop natural habitats. In several places the land use of the dune-polder transition zones is evolving from cattle breeding to horticulture, more specifically the cultivation of asparagus and strawberries, to the detriment of dune grasslands.
- 3) Drainage of groundwater of the coastal dunes via the watercourses of the polders (especially Langgeleed, Ringsloot and Waterlooop-zonder-Naam on the Belgian side) which cause a lowering of the groundwater table and the desiccation of humid dune slacks (habitat 2190, reproductive biotope of Great crested newt and Natterjack toad).



Marsh helleborine (*Epipactis palustris*) @Marc De Vos

THREATS

- 4) Atmospheric nitrogen deposition (caused by human pollution)
 - 3.a) Increases the biomass production and the encroachment of the dune habitats by nitrophilous competitive grasses
 - 2.b) accelerates the decalcification of the superior layers of soil Together with climate change and spatial fragmentation: extinction of natural dynamics (sand drift), fixation of landscape, decalcification of superior layers of soil: threat for calcareous habitats
- 5) Climate change
 - => changes in groundwater levels: desiccation in summer, flooding in spring
 - => need of larger area for ground-waterdependent species and habitats to survive between too dry and too wet
 - => proliferation of IAS
 - => possible/probable regional decline or even extinction of indigenous species that were adapted to a cool climate
- 6) Sea level rise, for the long term: worst possible scenario cf IPCC: + 295 cm in 2100: coastal squeeze, loss of habitat, especially tidal mud and sand flats, tidal salt marshes, embryonic dunes and seafront-dunes

4 After-life conservation plan objectives and actions

4.1 Objectives

4.1.1 Implementation of the masterplan

The master plan recommends, among other things, restoring the sand drift dynamics of the dunes where possible, strengthening the Natura 2000 network by interconnecting the various Natura 2000 sub-areas through development of new habitat in the intermediate areas and restoring the natural water balance of the dunes as much as possible.

Several actions are already undertaken or will be undertaken to implement these recommendations:

4.1.1.a. Reactivating aeolian sand drift dynamics:

In the nature reserve 'de Westhoek' 7 ha of formerly mobile dunes that have recently spontaneously got fixed by the vegetation (Marram grass and Seabuchthorn) will be laid bare by mechanical removal of the vegetation to submit the bare sand to the wind again. These works will be carried out with European financial support of the INTERREG V project "VEDETT". The reactivated sand drift should influence a total area of about 20 ha, as the drifting sand will be blown by the wind over a larger surrounding area.

4.1.1.b. Restoring/Improving ecological connectivity and enhancing the water balance: 2 areas have been identified as priorities:

- The Lenspolder at Nieuwpoort between the 'fossil' beach plain 'Groenendijk' and the medieval dune belt 'Zandhoofd', through which the dune brook 'Watercourse Without a Name' flows from the 'Ter Yde' - dunes into the Yser-rivermouth (and the sea): ongoing study 'GWEN ZaLeG' Geïntegreerde visie voor duurzaam Waterbeheer, natuurontwikkeling En Natuurgerichte recreatie: Integrated vision for water management, nature development and nature-oriented recreation in the site 'Zandhoofd-Lenspolder-Groenendijk', including a management plan for the properties of the Agency for Nature and Forests
- The central plain between the actual coastal dunes of 'De Westhoek' and the 'Old' or 'fossil' dunes of the 'Cabour domain' at Adinkerke (De Panne) and the brooks 'Langgeleed' and 'Ringsloot' that drain groundwater from both dune belts towards the sea.

Well developed embryonic dunes and seafront-dunes, "Dune du Perroquet" (France) © Bénédicte Lemaire



In both cases the main objective is to combine a more durable management of the fresh water reserves with the development of wet or humid natural habitats (e.g. alkaline fens, alluvial forest ...) in those dune-polder-transition zones taking into account the impact of climate change on the availability of water (adaptation to climate change).

In both cases 4 steps have to be set:

- ➔ 1st step: developing a more concrete perspective on nature development and water management in the concerned areas
- ➔ 2nd step: spatial planning process to change the zoning of the concerned sites from agricultural areas to nature development areas
- ➔ 3rd step: purchase of the still private owned land necessary to realize the ecological connections and the water storage areas
- ➔ 4th step: planning and execution of the (large scale) works on the field
- ➔ It should be possible to implement the first 2 steps within the timeframe of 2020-2025.

4.1.1.c Extension of the perimeter of the National Nature Reserve “Dune Marchand”

After having escaped in the 1960s, to the appetite of property developers, the Dune Marchand was classified as a National Nature Reserve by ministerial order of 11 December 1974 on a surface area of 20 ha.

The perimeter of the Reserve was enlarged in 1990 to 83 ha, part of a dune site with a total superficies of 115 ha.

This quite large dune ecological complex, typical of the Flemish dunes, is home to a mosaic of constantly changing environments. Thus, white dunes with Marram grass, temporarily flooded dune slacks, locally called “pannes”, or wooded dunes and shrubs shelter a flora and fauna of a formidable diversity.

The “Dune Marchand” National Nature Reserve, as we know it today, is indeed the fruit of the will of men and organizations who had a strong vision and determination to preserve it. The Conservatoire du Littoral ensures the legal protection of the land (first acquisition in 1980) and has delegated the management to the Département du Nord by convention for the preservation of the Sensitive Natural Spaces (ENS).

Today, the objective is to enlarge the perimeter of the Nature Reserve from 83 to 120 ha (depending on future arbitrations) to improve the ecological coherence of the site, to perpetuate management and to standardize regulations throughout the site. The extension is part of action 35 of the Biodiversity Plan of the French State, which states the desire to create or extend 20 National Nature Reserves (RNN) with a view to achieving the 2022 objective.

The “Dune Marchand” National Nature Reserve extension project will be submitted to the National Commission for Nature Protection on 29 September 2020 for a finalization of the file by June 2022 (after public consultations and writing of the ministerial decree).

4.1.1.d Project of extension of the Natura 2000 site SAC « FR3100475 Dunes Flandriennes décalcifiées de Ghyvelde »

This is a project in concertation with State services, the Conservatoire du Littoral, the Département du Nord and local partners. The objective is to enlarge the perimeter of the SAC FR3100475 zone to the east of the municipality of Ghyvelde with about 35 to 40 ha. This concerns both plots already acquired by the Conservatoire for 20 ha and 15 to 20 ha of additional plots to be acquired according to opportunities.

An initial characterization study of the natural habitats and heritage species under the European Habitat Directive was carried out by the Conservatoire Botanique de Bailleul in order to draft a case study for the State services.

4.1.1.e Work on the land-sea interface to stimulate the formation of embryonic dunes (2110) and 'white seafront' dunes (2120)

The mechanical cleansing of the beaches removes not only the plastic and metallic litter but the whole flood-mark, including the natural deposits (algae, ...), preventing a pioneer flood-mark vegetation with annual plants such as *Cakile maritima*, *Salsola kali* and *Honkenya peploides* to develop and so also preventing the spontaneous formation of embryonic dunes with *Elymus farctus* (habitat 2110). At the beginning of the 21st Century, a successful awareness raising campaign towards the municipalities has stimulated the manual and selective cleansing of the beaches laying in front of legally protected dune sites, allowing on some of those beaches the natural development of embryonic dunes that subsequently grew into higher "white dunes with *Ammophila arenaria*".

However in more recent years, especially on the Belgian side, the efforts of some municipal services towards a more nature friendly beach management seems to have faded. The expected acceleration of sea level rise as result of climate change (cfr IPCC-reports) only increases the importance of the formation of dunes on the beaches as an essential part of the coastal defense against marine flooding (ecosystem service), not only in front of existing protected nature areas, but also in front of urbanized areas. The development of dunes in front of dikes could also enhance the ecological connectivity between dune sites that are separated from each other by urban areas. The partners ANB, Conservatoire du Littoral, Département du Nord and DREAL in collaboration with other public authorities that are competent for coastal defense will promote through a new awareness-raising campaign towards the public and municipal authorities a more nature based approach of beach-management.

4.1.1.f. Initiate the setting up of a shared project with Communauté Urbaine de Dunkerque, Département du Nord, Conservatoire du Littoral, EPFL and DREAL for the retreat of the northern part of the camping du Perroquet, adjacent to the French-Belgian state border.

To restore the spatial and ecological coherence and geomorphological dynamics of the cross-border dune site "Dune du Perroquet – De Westhoek" and to facilitate the cross-border passage for hikers, the consultation of all competent and concerned public authorities should result in a consensus to obtain a retreat of the northern part of the camping site from the seafront dunes. In a next phase, the implementation of that consensual position of all competent public authorities will also need negotiations with the owner of the camping site.



Formation of embryonic dunes (2110) with *Cakile maritima* © Marc Leten

4.1.2 Defining and granting of the status of cross border 'European' nature park and installation of a governance structure

Implementation of the memorandum of understanding for cross-border cooperation for the conservation and management of dune areas from Dunkirk to Westend that was signed on the 14 February 2020:

- examine the possibilities for extending the partnership with other important public dune owners, dune managers and competent authorities on both sides of the border and integrating these stakeholders into the partnership;
- examining the possibility of extending the scope of the agreement to the SAC's in the marine environment (Flemish sandbanks in the shallow sea);
- choose a more legally binding cross-border cooperation framework: an existing or a new EGTC or a new Local Partnership for Cross-border Cooperation (in the frame of the "Brussels Agreement") ?
- agree and define an organizational structure with a decision-making and an operational level and rules of procedure;
- Identify and agree on the deployment of specific staff, operating resources and financial resources.

4.1.3 Implementation "on the field" of the management plans:

4.1.3.a For the dune domains of ANB (plan elaborated in implementation of action A.3)

Preparation and execution on the field of the prescribed large scale 'habitat restoration' works, such as removing of scrub and of artificial poplar and pine plantations, excavations (of pools), placing fences to allow grazing management etc.: Preparing and submitting permit applications, elaboration of specifications for the tendering of the works, award of the works to contractors, directing and supervising the execution of the works ... Those landscaping works will be phased over time per distinct site within the management plan area:

- **2020-2021:** Oostvoorduinen at Oostduinkerke (Koksijde)
- **2021-2022:** Simliduinen at Nieuwpoort
- **2022-2023:** Sint-Laureinsduinen at Westende (Middelkerke)
- **2023-2024:** Belvédèreduinen at Koksijde
- **2024-2025:** Schipgatduinen – Doornpanne – Hoge Blekker at Oostduinkerke-Koksijde

4.1.3.b. For the dune domains of the Conservatoire du Littoral

Most of the habitat restoration works executed in the frame of the actions C2, C3, C4 and C5 gave implementation to the approved management plans of the Dune Dewulf, Dune Marchand and Dune du Perroquet. See for the recurrent maintenance management § 4.1.6 and the overview table in annex.

4.1.4 Updating of existing management plans

In the Flemish Region of Belgium the management plans of the nature reserves have to be updated all 10 years. During the period 2020-2025 an update of the existing management plans for the nature reserves “Yzer Estuary” (Nieuwpoort), “Noordduinen” (Koksijde), “Ter Yde - partim IWVA and Hannecartbos” (Koksijde-Oostduinkerke) is foreseen (action 4a).

For the very recently purchased dune domain ‘Groenendijk’ at Nieuwpoort (acquired during the winter 2017 - 2018) a new management plan is actually being elaborated in the frame of the GWEN ZaLeG-project: see also § 4.1.1.b) and should be finalized in 2021-2022. All the dune parcels that have been acquired by the Agency of Nature and Forests in the frame of action B.1 but more recently than November 2017 will be included in the above mentioned updating of the management plans.

In France, the scheduling of works and management of dune sites is governed by 2 types of framework documents: management plans (one per dune domain) and DOCOB (document of objectives) one for each Natura 2000 site.

The new management plan for the “Dune fossile de Ghyvelde” will be finalized in 2021 and the management plans for the 3 coastal dune domains “Dune Dewulf”, “Dune Marchand” and “Dune du Perroquet” (2015-2024) will be subject to a mid-term evaluation in 2020-2021. This will allow the integration into these management plans of all the plots that were newly acquired by the Conservatoire du Littoral in the frame of action B.2 (action 4b).

The renewal of the 2 DOCOB for the sites “FR3100474 Dunes de la Plaine Maritime Flamande” and “FR3100475 Dunes Flandriennes décalcifiées de Ghyvelde”, are scheduled for the period 2022-2024 (action 4c). Of course the recommendations of the masterplan for the “Westkust – Dunes de Flandre” that was elaborated as implementation of action A.1&2 will be inspiring for the management choices to be made in the updates of management plans and DOCOBS on the French as well as on the Belgian side of the border.

4.1.5 Continuation of the land purchase

Belgium:

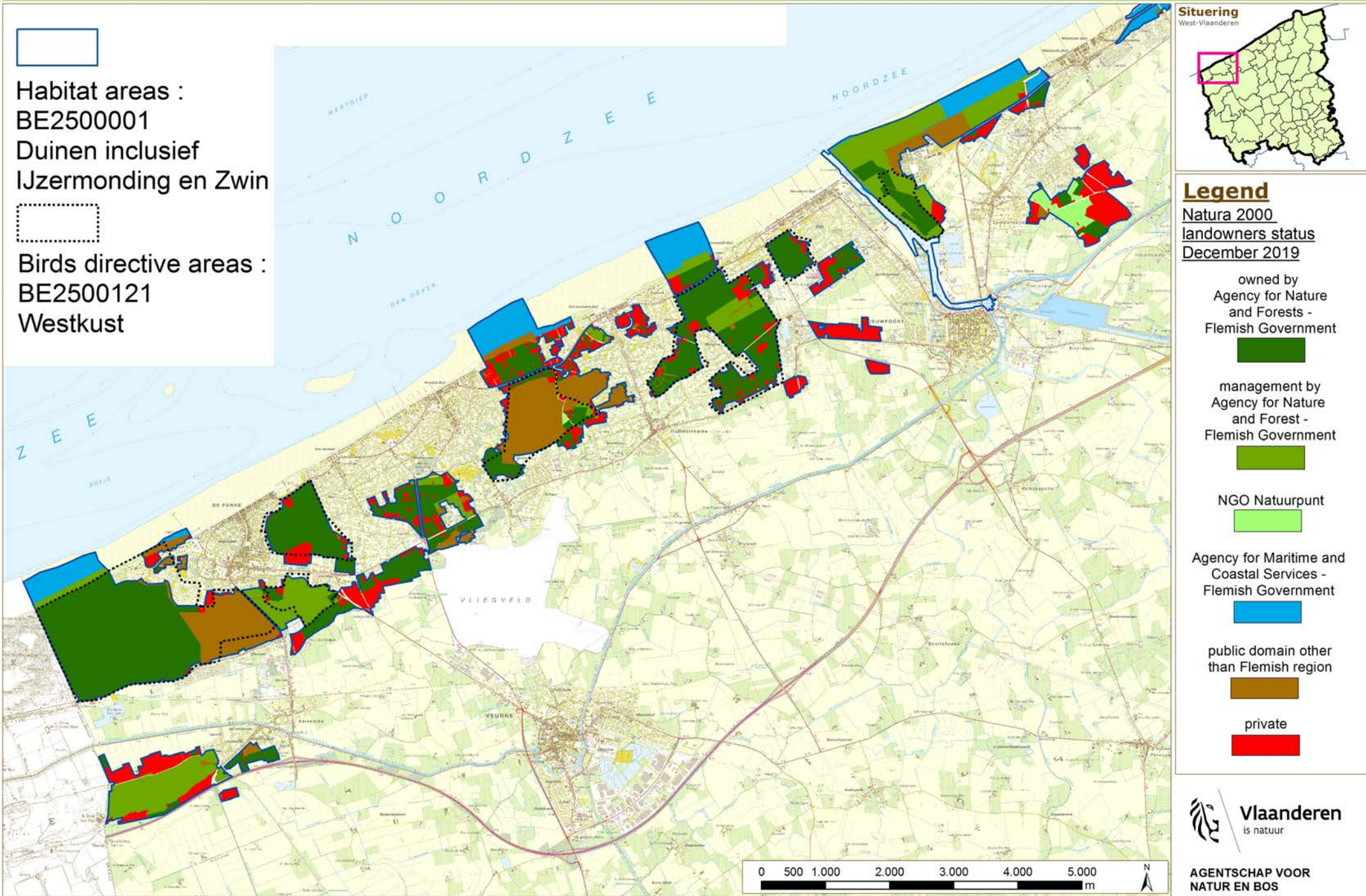
328 ha of privately owned dunes and 80 ha of possibly to be decommissioned military domain within the Natura 2000 network have still to be acquired by the Flemish region to complete the publicly owned and managed nature reserves at the Westkust (action 5b).

To spatially and ecologically connect separate parts of the SAC ‘BE2500001 Duingebieden inclusief IJzermonding en Zwin’ according to the Masterplan at least 350 ha of land outside the Natura 2000 network have to be purchased (action 5c).

During the 6 full years of the LIFE+ FLANDRE project, 63 ha of dunes were purchased, which is more than twice the original objective of the

project application (action B1), but also implies an average purchase rate of only 10.5 ha per year. This despite the part-time deployment of 2 staff members (1 project coordinator and 1 administrative assistant). After the completion of the project there will no longer be a staff member specifically charged with the purchase of coastal dunes within ANB. A purchase rate of only 10.5 ha per year also means that the acquisition of the more than 328 ha of private dunes within the Natura 2000 network between the French-Belgian border and Westende-Bad would take about 31 years.

In order to speed up the acquisition rhythm and thus make the acquisition of the essential dune sites feasible within a period of 15 years (which corresponds to the time horizon of the master plan), an acquisition plan will be drawn up (action 5a) and a dune acquirer should be included in ANB’s personnel plan. As a temporary solution in the short term (2020-2022), a service assignment for negotiations with the (too) numerous dune owners could be entrusted to external professional negotiators (action 5a).



Habitat areas :
 BE2500001
 Duinen inclusief
 IJzermondig en Zwin

Birds directive areas :
 BE2500121
 Westkust



Legend
 Natura 2000
 landowners status
 December 2019

- owned by
 Agency for Nature
 and Forests -
 Flemish Government
- management by
 Agency for Nature
 and Forest -
 Flemish Government
- NGO Natuurpunt
- Agency for Maritime and
 Coastal Services -
 Flemish Government
- public domain other
 than Flemish region
- private

Map 8: ownership structure of the dunes on the Belgian West Coast within Natura 2000: the plots of land still privately owned are colored red © Rudi Longueville



France:

Planned land purchases by the Conservatoire du Littoral in the period 2020-2025 (action 5d):

- Acquisition in the Dune du Perroquet at Bray-Dunes, in execution of the Declaration of Public Utility (D.U.P.) "Dune du Perroquet" (action B.2), of 37 ha of dunes, adjacent to the French-Belgian border, property of the Communauté Urbaine (C.U.D.) de Dunkerque but with usufruct belonging to the private owner of the nearby camp site;
- Acquisition in the Dune Marchand at Zuydcoote of 1,5 ha, property of Syndicat Intercommunal Dunes de Flandre
- Acquisition in the dune Marchand at Zuydcoote of 0,8 ha, property of the Communauté Urbaine de Dunkerque (C.U.D.)
- Acquisition of 1 ha of unbuild land belonging to a camp site at Zuydcoote
- Acquisition in Dune Dewulf of 8 ha, property of the City of Dunkerque and the C.U.D. - Acquisition nearby Dune fossile de Ghyvelde of 3,5 ha of dune meadow, private property Total superficies to be acquired and definitely protected: 51,8 ha.

Assignment to the Conservatoire du Littoral of 3 ha of the Domaine Public Maritime (upper beach and embryonic dunes) at Bray-Dunes and Zuydcoote, known in the land register at Bray-Dunes/Zuydcoote

Extensions of the scope of intervention of the Conservatoire du Littoral are currently being developed (action 5e):

- for the acquisition of 8 ha, property of the city of Dunkerque;
- Dewulf Dune east of the Maritime Hospital: 47 ha. These 47 ha are owned by the Maritime Hospital or by private owners



4.1.6 Further development and maintenance of the target habitats of the restoration actions (C-actions of LIFE+ FLANDRE) by recurrent management of the treated areas.

The areas that have been submitted to concrete conservation actions in the frame of LIFE+ FLANDRE and Outside LIFE (removal of poplar trees, removal of superior soil layer, removal of scrub, excavation of pools, removal of dredging sludge dump, removal of buildings) are being and will be submitted in the future to recurrent management measures such as:

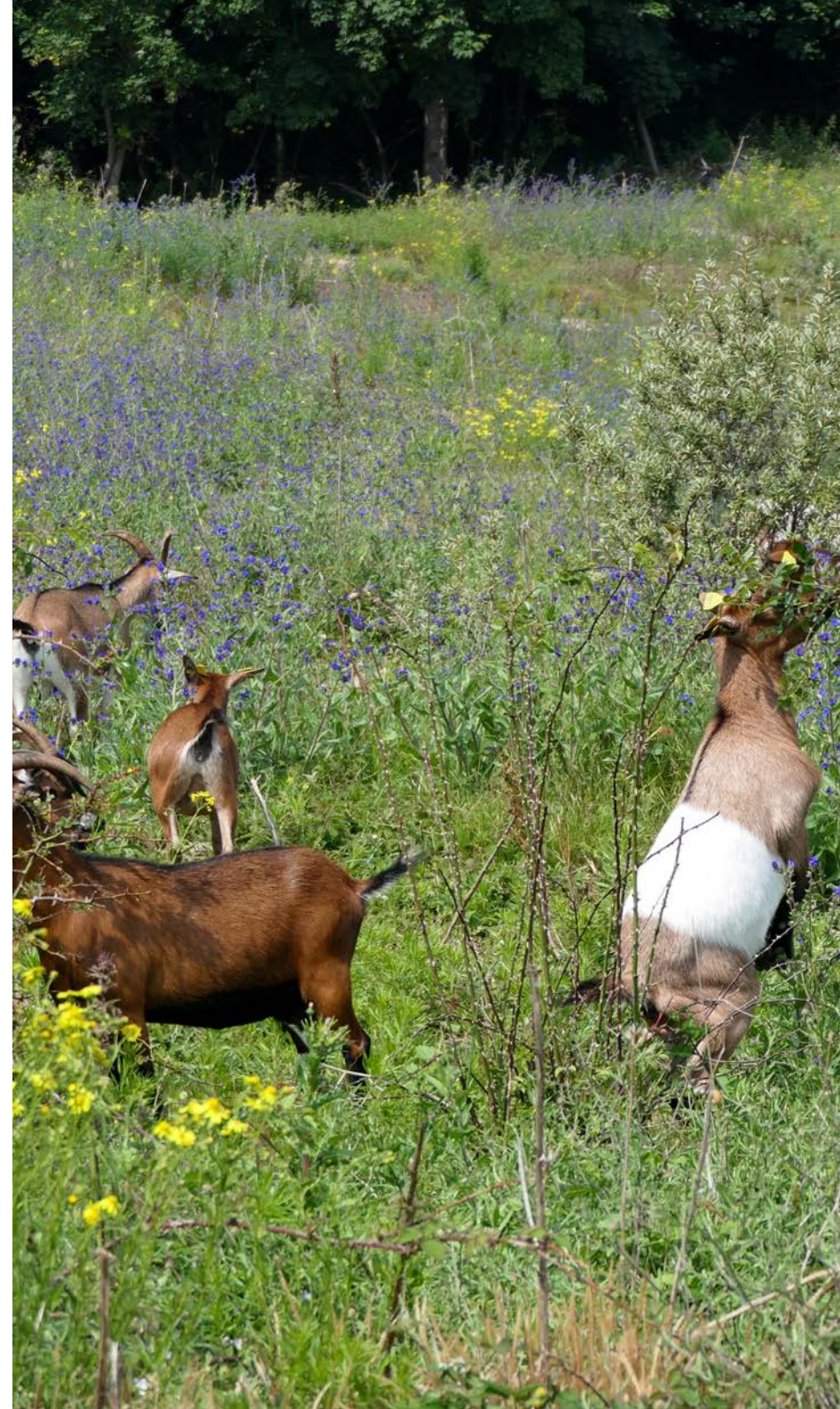
- ➔ seasonal mowing in late summer or the autumn with export of the mowed biomass;
- ➔ seasonal mowing in late summer followed by seasonal grazing by cattle, sheep or ponies during the autumn and winter;
- ➔ all-year round grazing ...

The mowing and grazing management will be organized and implemented by the managers of the concerned dune sites, the site management entities of the Agency of Nature and Forests in Belgium, and of the Département du Nord in France.

*Present-day and future management of the areas cleared from scrub consists often of all-year round grazing combined with the periodical pulling and digging out of re-growing shoots, IA1-27 in "Dune Dewulf", September 2018, the Lycée Agricole in action
© Aline Bué*

In order to guarantee the maintenance of the areas cleared as implementation of the actions C2 (61,06 ha) and C4 (2,51 ha) of the LIFE+FLANDRE project and the return in those areas of the target habitats and species (2130, 2190 and 1014), the Département du Nord has put in place the following measures and means:

- Increase in contracts for employment associations: since the 2016-2020 public tender contract, there is 1 additional person in each team (resulting in 3 teams of 7 people in all) and the overall volume of working hours has increased by 30 days for each association to reach a total of 310 days per year for the “Dune Dewulf” and the “Dune du Perroquet” and 80 days for the “Dune Marchand”. The new contract for 2020-2024 keeps the same terms and conditions.
- Installation of a new fence in the “Dune Marchand” containing an area with a superficies of about 7 ha and a perimeter of 1.100 m for the maintenance by grazing of the cleared areas IA1-8, part IA1-9 and IC1-10 in the Dune Marchand. This work is planned for 2021.
- Acquisition in 2019 of a new equipment for brush clearing and mowing for an amount of 101 653 € TTC, it is the tool carrier, a small tractor adapted to steep and difficult terrain.



Summary overview table of the planned recurrent management of the treated areas

Action	Site name	Treated sub-area – code on maps	Restoration measure (2014-2020)	Target habitats/ species	Superficies (ha) realized	Recurrent management (2021-2026)
C1	Ter Yde	Oostvoorduinen-oost Former arable fields Karthuizerstraat	Removal of rows of poplar cv + of superior soil layer + excavation of pools + placing fences	2130*	0.56	All year round grazing
				2190	1.45	Mowing in late summer followed by grazing in autumn & winterscrub
C2	Dune du Perroquet	IA1-1	Mechanical and manual removal of scrub	2130*	2.72	Mowing in summer and specific actions on Clematis and ligneous plants
		IA1-2	Manual removal of scrub	2130*	0.36	Mowing in late summer/ autumn
		IA1-3	Manual removal of scrub	2130*	8.70	Specific action against Clematis and regrowth of Hippophaë and Acer pseudoplatanus
		IA1-4	Manual removal of scrub	2130*	4.49	Mowing in late summer/ autumn every 2 years
		IA1-5	Manual removal of scrub	2130*	3.48	Mowing in late summer/ autumn every 2 years
		IA1-6	Manual removal of scrub	2130*	2.37	Mowing in late summer/ autumn
		IA1-7	Mechanical and manual removal of scrub	2130*	2.20	All year round Grazing Cutting pasture refusal (ligneous plants that are not or not enough being suppressed by grazing) every 3 to 5 years
		IB2-1			2190	0,00

Action	Site name	Treated sub-area – code on maps	Restoration measure (2014–2020)	Target habitats/ species	Superficies (ha) realized	Recurrent management (2021–2026)
		IB2-2	Mechanical and manual removal of scrub	2190	2.00	Mowing in late summer/ autumn
C2	Dune Marchand	IA1-8	Mechanical and manual removal of scrub	2130*	1.04	Mowing in summer and then grazing all year round since 2021 or 2022 when the new fence will have been placed
		IA1-9	Manual removal of scrub	2130*	1.69	Mowing in late summer/ autumn
		IA1-10	Manual removal of scrub	2130*	0.82	Specific action against Clematis and regrowth of Hippophaë and Acer pseudoplatanus
		IA1-11	Manual removal of scrub	2130*	0.14	Mowing in late summer/ autumn every 2 years
		IA1-12	Mechanical and manual removal of scrub	2130*	1.12	Mowing in late summer/ autumn every 2 years
		IA1-13	Manual removal of scrub	2130*	0.12	Mowing in late summer/ autumn
		IA1-14	Mechanical and manual removal of scrub	2130*	1.17	All year round Grazing Cutting pasture refusal (ligneous plants that are not or not enough being suppressed by grazing) every 3 to 5 years

Action	Site name	Treated sub-area – code on maps	Restoration measure (2014–2020)	Target habitats/ species	Superficies (ha) realized	Recurrent management (2021–2026)
		IA1-15	Mechanical and manual removal of scrub	2130*	3.21	Mowing in summer and specific actions on Clematis, and ligneous plants
		IB2-3	Manual removal of scrub	2190	0.06	Mowing in late summer/ autumn
C2	Dune Dewulf	IA1-16	Manual removal of scrub	2130*	0.15	Mowing in late summer/ autumn
		IA1-17	Manual removal of scrub	2130*	0.11	Mowing in late summer/ autumn
		IA1-18	Manual removal of scrub	2130*	0.20	Mowing in late summer/ autumn
		IA1-19	Manual removal of scrub	2130*	6.57	Specific action against Clematis and regrowth of Populus div. spp. and Hippophaë
		IA1-20	Manual removal of scrub	2130*	0.16	All year round Grazing
		IA1-21	Manual removal of scrub	2130*+2190	0.37	All year round Grazing
		IA1-22		2130*	0.00	Not relevant
		IA1-23	Manual removal of scrub	2130*	0.35	All year round Grazing Cutting pasture refusal (ligneous plants that are not or not enough being suppressed by grazing) every 3 to 5 years
		IA1-24	Manual removal of scrub	2130*	3.84	Mowing in late summer/ autumn
		IA1-25	Mechanical and manual removal of scrub	2130*	0.74	All year round Grazing Cutting pasture refusal (ligneous plants that are not or not enough being suppressed by grazing) every 3 to 5 years
		IA1-26	Mechanical and manual removal of scrub	2130*	2.73	All year round Grazing

Action	Site name	Treated sub-area – code on maps	Restoration measure (2014-2020)	Target habitats/ species	Superficies (ha) realized	Recurrent management (2021-2026)
						Cutting pasture refusal (ligneous plants that are not or not enough being suppressed by grazing) every 3 to 5 years
		IA1-27 ; IB2-4	Mechanical removal of scrub	2130* + 2190	3,41	2130* : All year round grazing 2190 : seasonal grazing (autumn & winter) Cutting pasture refusals (ligneous plants that are not or not enough being suppressed by grazing)
		IA1-37	Manual removal of scrub	2130*	0,05	All year round grazing. Cutting pasture refusals (ligneous plants that are not or not enough being suppressed by grazing) every 3 to 5 years
		IA10-1	Mechanical removal of scrub	2130* + 2190	3,55	2190 : manual uprooting of woody regrowth (willows, privet,...) 2130 mowing early summer
		IB2-5	Manual removal of scrub	2190	0.31	All year round grazing. Cutting pasture refusals (ligneous plants that are not or not enough being suppressed by grazing) every 3 to 5 years
		IB2-6	Manual removal of scrub	2190	0.11	All year round grazing. Cutting pasture refusals (ligneous plants that are not or not enough being suppressed by grazing) every 3 to 5 years
		IB2-7	Manual removal of scrub	2190	0.06	All year round grazing. Cutting pasture refusals (ligneous plants that are not or not enough being

Action	Site name	Treated sub-area – code on maps	Restoration measure (2014–2020)	Target habitats/ species	Superficies (ha) realized	Recurrent management (2021–2026)
						suppressed by grazing) every 3 to 5 years
		IB2-8	Manual removal of scrub	2190	0.04	All year round grazing.Cutting pasture refusals (ligneous plants that are not or not enough being suppressed by grazing) every 3 to 5 years
		IB2-9	Manual removal of scrub	2190	0.14	All year round grazing.Cutting pasture refusals (ligneous plants that are not or not enough being suppressed by grazing) every 3 to 5 years
		IB2-10	Manual removal of scrub	2190	0.07	All year round grazing.Cutting pasture refusals (ligneous plants that are not or not enough being suppressed by grazing) every 3 to 5 years
		Additional area	Mechanical removal of scrub	2130*	2.42	Mowing in early summer
C3	Dune du Perroquet	IB4-2	Establishment of grazing units by placing fences	2130* + 2190	3.17	All year round grazing
		IA5-2	Establishment of grazing units by placing fences	2130* + 2190	3.49	All year round grazing
C3	Dune Dewulf	IA5-8	Establishment of grazing units by placing fences	2130* + 2190	7.24	All year round grazing
		IA5-9	Establishment of grazing units by placing fences	2130* + 2190	9.13	All year round grazing
		IA5-10	Establishment of grazing units by placing fences	2130* + 2190	7.34	2130 : All year round grazing 2190 : seasonal grazing in autumn-winter

Action	Site name	Treated sub-area – code on maps	Restoration measure (2014-2020)	Target habitats/ species	Superficies (ha) realized	Recurrent management (2021-2026)
C4	Dune du Perroquet	IC1-1 / IC1-2 / IC1-3/ IC1-4a-b/ IC1-5	Restoration of tall herb fringes by removal of scrub	1014 + rough edge of forest	0.1+0.26+0.07+0.28+0.05 = 0.76	Mowing every 2 years in autumn to suppress scrub regrowth
C4	Dune Marchand	IC1-6 / IC1-7 / IC1-8/ IC1-9/ IC1-10	Restoration of tall herb fringes by removal of scrub	1014 + 6430 + rough edge of forest	0.19+0.29+0.13+0.11+0.20 =0.92	Mowing every 2 years in autumn to suppress scrub regrowth. IC1-9/ IC1-10 : grazing all year round from 2021-2022
C4	Dune Dewulf	IC1-14 / IC1-15 / IC1-16/ IC1-17/ IC1-18	Restoration of tall herb fringes by removal of scrub	1014 + rough edge of forest	0.25+0.14+0.15+0.14+0.15 =0.83	Mowing every 2 years in autumn to suppress scrub regrowth
C5	Dune du Perroquet	DP17L / DP18L / DP19L/ DP20L / DP21L	Excavation of new pools	1166 + 1202	64+66+132+144+64= 470 m2	Annual manual extraction of seedlings of willow, maple, etc. The pools intended for Epidalea calamita (pioneer species): partial rejuvenation of the pool after 8 or 10 years by mechanical removal of accumulated dead organic material from the bottom of those pools
C5	Dune Dewulf	DD24L / DD25L / DD26L / DD27L / DD28L / DD29L	Excavation of new pools	1166 + 1202	60+75+77+368+35+240 = 855 m2	Annual manual extraction of seedlings of willow, maple, etc. The pools intended for Epidalea calamita (pioneer species): partial rejuvenation of the pool after 8 or 10 years by mechanical removal of accumulated dead organic material from the bottom of those pools
C6	Dune Dewulf	From Leffrinckoucke to Zuydcoote	Creation of a walking path to control public access	Protecting coastal dune habitats 2120, 2130*, 2160, 2180 and 2190 against disturbance by visitors	2,210 kilometers	Keeping the path open by removal with brushcutters of regrowth of scrub and manual removal of trash left by visitors. Maintenance of signaling infrastructure.
C7	Schipgat-Doornpanne, Ter Yde, Hooge Duynen, Simlidiunen ... at Koksijde and Nieuwpoort	1, 3, 5 -> 46	Urgent maintenance measures + placing of piezometers	2120 + 2130* + 2160 + 2170 + 2180 + 2190	41.6149	Restoration measures followed by recurrent management according to approved management plan (LIFE+ FLANDRE action A3)

Action	Site name	Treated sub-area – code on maps	Restoration measure (2014-2020)	Target habitats/ species	Superficies (ha) realized	Recurrent management (2021-2026)
	De Westhoek and Houtsaegerduinen at De Panne	2 & 4	Manual removal of I.A.S. – periodic mowing of dune grassland	2130* + 2160	3.5117	Implementation of existing management plan for nature reserve ‘Duinen en Bossen van De Panne’ (approved in 2013)
	Groenendijk at Nieuwpoort Belvédèrduinen at Koksijde ...	47 -> 59	Urgent maintenance measures + placing of piezometers	2120 + 2130* + 2160 + 2170+ 2180 + 2190	17.8277	elaboration of new management plans + after formal approval: implementation of these new management plans
C8	Dune Dewulf	Zuydcoote AA34 (pp) Leffrinckoucke : AE 35, 36, 37,41 AA 114, 117, 118, 162,163, 594,595,817 , 116pp, 119pp, 120pp, 144pp et 145pp	Manual removal of I.A.S and urgent maintenance measures.	2130* + 2160 + 2170 + 2180 + 2190	9.09	The newly acquired plots will be integrated into the dune management plans in 2021-2022 that will consecutively be implemented. In the meantime, they will be managed within the framework of the partnership agreement CDL/CD59 and continued to be maintained by mowing by the associations of employment or managed by grazing as the case may be.
	Dune du Perroquet	Bray-Dunes : AE 11,12,38 AH 3,6,7	Manual removal of I.A.S and urgent maintenance measures.	2120,2130* + 2160 + 2170 + 2180 + 2190	4.12	
	Dune Fossile de Ghyvelde	Ghyvelde AH 26, 27 ZI 6pp,8pp,39pp	Manual removal of I.A.S and urgent maintenance measures.	2130* + 2160 + 2170 + 2180 + 2190	10.39	
	Dune Fossile de Ghyvelde	Ghyvelde, 216	Demolition of a house and excavation of a pool	2190 + 2130*	1.09	

Action	Site name	Treated sub-area – code on maps	Restoration measure (2014–2020)	Target habitats/ species	Superficies (ha) realized	Recurrent management (2021–2026)
OUTSIDE LIFE (Belgium)						
1	Duinen en Bossen van De Panne Nature Reserve	Westhoek-SW	Removal of exotic poplars and other trees	2130* + 2160 + 2190	0.83 + 1.28 + 0.05 = 2.16	annual removal of re-growing shoots with brushcutters + seasonal grazing in autumn and winter
2	Duinen en Bossen van De Panne Nature Reserve	Garzebekeveld	Removal of trees and sludge + profiling lakeshore + excavation of pools	2130* + 2180 + 2190 & 6284	0.84 + 0.30 + 0.69 = 1.83	Annual removal of re-growing shoots with brushcutters + seasonal grazing in autumn and winter + periodic (all 10 years) cleaning of the pools
3	Noordduinen Nature Reserve at Koksijde	Noordduinen-Fluithoek	Removal of topsoil + excavation of 1 pool	2130* + 2190	0.40 + 0.60 = 1.00	Mowing in late summer, followed by seasonal grazing in autumn and winter. Periodic (all 10 years) cleaning of the pool
4	Ter Yde Nature Reserve at Koksijde (Oostduinkerke)	Ter Yde – Theunisvlakte	Sieving topsoil (rubble and vegetation)	2120	4.05	Periodic sieving of topsoil (all 5 years) to maintain or reactivate aeolian sand drift
5	Duinen en Bossen van De Panne Nature Reserve	Westhoek – Krakeelpanne	Removal scrub and topsoil, excavation of pools	2130* + 2190	0.29 + 0.60 = 0.89	All-year-round grazing + manual removal of seedlings of Hippophae + periodic (every 10 years) cleaning of pools
6	Duinen en Bossen van De Panne Nature Reserve	Westhoek- Herenpanne	Removal of scrub and topsoil	2130* + 2190	0.07 + 0.60 = 0.67	All-year-round grazing + manual removal of seedlings of Hippophae + periodic (every 10 years) cleaning of pools
7	Duinen en Bossen van De Panne	Veldhoek-West	Excavation of pools and wet depressions	2190 & 6284	0.31	Mowing in late summer + seasonal grazing in autumn and winter + periodic (all 10 years) of pools
8	Belvédèrduinen Nature Reserve at Koksijde	Belvédèrduinen-Oost	Demolition of constructions	2130*	0.05	Seasonal grazing (autumn and winter)
9	Duinen en Bossen van De Panne Nature Reserve	Houtsaegerduinen	Removal of scrub, trees and topsoil, excavation of pools	2130* + 2180 + 2190	4.45 + 1.00 + 0.73 = 6.18	Removal with brushcutters of regrowing shoots + year round grazing + periodic cleaning (all 10 years) of pools
10	Duinen en Bossen van De Panne Nature Reserve	Westhoek-Noord	Removal of scrub, trees and topsoil	2130* + 2190	2.89 + 3.38 = 6.27	Removal with brushcutters of regrowing shoots + all-year-round grazing
11	Simlidiuinen Nature Reserve at Nieuwpoort	Simlidiuinen-Matuvu	Removal of constructions, exotic scrub and topsoil	2190	0.59	Annual mowing in late summer or autumn
12	Duinen en Bossen van De Panne Nature Reserve	Westhoek – Centraal Loopduin	Manual removal of Sea-Buckthorn	2130*	1.19	Annual manual removal of new seedlings of Sea-Buckthorn
13	Ter Yde Nature Reserve at Koksijde (Oostduinkerke)	Hannecartbos-Doolaghe	Removal of artificial tree plantation and topsoil	2130* + 2190	0.10 + 1.00 = 1.10	Annual mowing in late summer + seasonal grazing in autumn and winter
14	Yzer-estuary Nature Reserve at Nieuwpoort	Yzer-rivermouth	Removal of dredging sludge dump	1310 + 1330 + 2130*	1.80 + 0.23 = 2.03	Seasonal grazing in autumn and winter

Grazing, all year round or seasonal, is an important tool for the recurrent management.



Konik horses on humid dune slack (2190) in De Westhoek © Marc Leten



Sheep on tidal Atlantic salt marsh (1310-1330) in the Yzer Estuary ©Marc Leten



Scottish Highland cattle around a pool in De Westhoek ©Marc Leten



Sheep on 'grey dune' (2130) in Dune Dewulf ©Aline Bué



©Aline Bué



©Hans Vansteenbrugge



Periodic (mostly annually in autumn) mowing with removal and export of the clippings remains an important tool to control regrowth of shrubs (*Hippophaë rhamnoides* and others) and to keep a flower-rich aspect of some dune slacks ©Hans Vansteenbrugge

4.1.7 **Monitoring**

The Agency of Nature and Forests and the Département du Nord will conceive together with the Institute for Nature and Forestry Research (INBO) of the Flemish regional authority and the Conservatoire National Botanique de Bailleul a joined scientific monitoring study of the public dune domains of the cross-border coastal area between Dunkirk and Westende-Bad that will provide an assessment of the state of conservation in the year 2025 of at least the areas that have been treated in implementation of the actions C1, C2, C3, C4 and C5.

As a complement to this joint 5-year assessment in 2025, the Département du Nord, together with the Conservatoire National Botanique de Bailleul, is setting up a sampling monitoring (understand vegetation recordings in permanent quadrata) of all French Flemish dunes with a field survey every 2 years in which the new quadrata for the zones that have been “treated” in the frame of the actions C2 and C4 will be integrated.

4.1.8 **Networking and exchange of knowledge**

Information about developments in the cross border area ‘Dunes de Flandre – Westkust’ is being and will continue to be disseminated through the Beach and Dune Network managed by EUCC (European Union for Coastal Conservation) Deutschland: <https://www.eucc-d.de/beach-and-dune-network.html> and the website of EUCC France: www.euccfrance.fr

The operational team installed by the Memorandum of Understanding for the protection and management of the cross-border dune belts between Dunkirk (France) and Westend (Belgium) will continue to regularly send a delegation to international conferences, workshops and other professional meetings about the ecology, restoration and management of the coastal natural environment and of European protected nature sites (Natura 2000 network).

4.1.9 **Raising public awareness by:**

- ➔ Regularly organized activities such as guided visits and management work camps e.g. on the annual Natura 2000 & LIFE day on the 21st May
- ➔ Guided visits to the yards of the (new) nature development or restoration works (eg works implementing the management plan (action A3)) - Continuation of the website

4.2 Action Plan

Code	Objectives & actions	When	What / where	Who	Source of finances	Needed finances	Priority
1a	Implementation Masterplan: reactivating sand drift dynamics	2020-2021	One time removal of vegetation + Recurrent management (each year) Nature reserve 'de Westhoek' at De Panne	ANB	Own budget ANB + INTERREG	€€	***
1b	Implementation Masterplan: Restoring/Improving ecological connectivity and enhancing the water balance	2020-2035: 1 ongoing study 1 study to be started in 2021	Nieuwpoort: Zandhoofd-Lenspolder-Groenendijk Adinkerke: de Westhoek – Cabour	ANB	Own budget ANB	€€€	****
1c	Implementation Masterplan: extension of the perimeter of the national nature reserve "Dune Marchand"	2020-2022	Zuydcoote and Bray-Dunes. Administrative procedure and public consultation	CdL + Dép Nord + DREAL	Own budgets, CdL, Dép Nord & DREAL	€	****

Code	Objectives & Actions	When	What/where	Who	Source of finances	Needed finances	Priority
1d	Implementation Masterplan: project of extending the SAC FR3100475 Dunes Flandriennes décalcifiées de Ghyvelde	2020-2025	Ghyvelde. Purchase of land, completing the inventories of fauna and flora, administrative procedure, public consultation	CdL + Dép Nord + DREAL	Own budgets, CdL, Dép Nord & DREAL	€€	***
1e	Implementation Masterplan: Work on the landsea interface to stimulate the formation of embryonic dunes (2110) and 'white seafront' dunes (2110) in relation to climate change and sea-level rising	2020-2025	Awareness raising of the public, both holidaymakers and locals, and of the municipalities. In Belgium cooperation with the Coast Division of the Agency for Maritime Services, competent for coastal defense	CdL + DREAL + ANB	Own budget of CdL / DREAL / ANB	€€	***
1f	Implementation Masterplan: Initiate the setting up of a shared project with CUD, Département du Nord, CDL, EPFL and DREAL for the retreat of the northern part of the camping du Perroquet that is adjacent to the French-Belgian state border	2020-2035	Developing a common approach of all public bodies and negotiating with the owner of the camping site	CdL + DREAL	Own budget of CdL / DREAL / ...	€€€	****
2a	Implementation MOU: Defining and granting of the status of cross border 'European' nature park and installation of a governance structure	2020-2025	Coastal area between Dunkirk (Fr) and Westend (B)	ANB + CdL + Dép Nord + DREAL	Own budgets ANB, CdL, Dép Nord & DREAL	€€	****
2b	Implementation of MOU: Improving exchange of knowledge and information on both sides of the French-Belgian border by compulsory translation of important reports and other documents: framework assignment to be contracted out to a translation agency	2020-2025	Coastal area between Dunkirk (Fr) and Westend (B)	ANB + CdL + Dép Nord + DREAL	Own budgets ANB, CdL, Dép Nord & DREAL	€	***

Code	Objectives & Actions	When	What/where	Who	Source of finances	Needed finances	Priority
3a	Implementation of the management plan for the dune domains of ANB	2020-2021 2021-2022 2022-2023 2023-2024 2024-2025	Oostvoorduin Simliduin St.Laureinsduin Belvédèreduin Schipgatduin	ANB	Own budget ANB	€€€	****
3b	Implementation of the management plans for the dune domains of CdL	2020 à 2025	Dune Dewulf, Marchand et Perroquet, Dune fossile de Ghyvelde	Département du Nord	Own budget Dép Nord	€€	****
4a	Belgium: Update of the existing management plans for the nature reserves "Noordduinen", "Ter Yde partim IWVA & Hannecartbos" and "Yzer estuary"	2020-2025	Noordduinen (Koksijde), Ter Yde partim IWVA & Hannecartbos (KoksijdeOostduinkerke) and Yzer estuary	ANB	Own budget ANB	€	****
4b	France: Mid-term evaluation of management plans	2020-2021	Dune Dewulf, Marchand et Perroquet	Département du Nord	Own budget Dép du Nord	€€	****
4c	France: Renewal of the 2 DOCOBs	2022-2024	SAC FR3100474 SAC FR3100475	Département du Nord	Own budget Dép du Nord	€€	****
5a	Continuation land purchase in Belgium: elaboration of a new acquisition plan + assignment for purchase negotiators	2020-2022	Westkust	ANB	Own budget ANB	€	****
5b	Continuation land purchase in Belgium: completion public domain within Natura 2000 (363 ha)	2022-2035	Within SAC 'BE2500001 Duingebieden'	ANB	Own budget ANB + eventual new LIFE project	€€€	****
5c	Continuation land purchase in Belgium: improving connectivity Natura 2000 (350 ha)	2022-2035	interconnecting different parts of SAC 'BE2500001 Duingebieden' by land purchase outside Natura 2000	ANB	Own budget + eventual new LIFE project	€€€	****

Code	Objectives & Actions	When	What/where	Who	Source of finances	Needed finances	Priority
5d	Continuation land purchase in France: Planned acquisition of 51,8 ha of dunes + assignation of 3 ha of the DPM to the CdL	2020-2025	Strengthening the publicly owned and managed dune domains of "Dune du Perroquet", "Dune Marchand", "Dune Dewulf" and "Dune fossile de Ghyvelde"	CdL	Own budget CdL	€€	****
5e	Continuation land purchase in France: extensions of the scope of interventions of the Conservatoire du Littoral: 47 ha domain of the Maritime Hospital	2020-2025	Strengthening the publicly owned and managed dune domain	CdL	Own budget CdL	€€	****
6	Further development and maintenance of the target habitats of the restoration actions (Cactions of LIFE+ FLANDRE) by recurrent management of the treated areas (see separate table under § 4.1.5)	2020-2025 Annual mowing + seasonal grazing vs all-year-round grazing	Managed public domains 'Dune Dewulf', 'Dune Marchand', 'Dune du Perroquet' (France) and 'Oostvoorduinen-Oost' (Belgium)	Dép Nord / ANB	Own budget of Département du Nord & ANB	€€	****
7	Scientific monitoring of the dune domains managed by ANB and Département du Nord	2020-2025	All dune sites within Natura 2000 between Dunkirk (Fr) and Westend (B), with particular attention for the areas 'treated' in the frame of the C-action of LIFE+ FLANDRE	Dép Nord + ANB	Own budget of Département du Nord & ANB	€€	**
8	Networking & exchange of knowledge	2020-2025	Dissemination through Beach & Dune networks + active participation to (international) meetings of coastal managers	ANB + Dép Nord + CdL	Own budget of ANB / Dép Nord / CdL	€	*
9	Raising public awareness	2020-2025	Activities & website the whole year	ANB + Dép Nord + CdL	Own budget of ANB / Dép Nord / CdL	€	***
Budget: €€€ = large €€ = medium € = low				Priority: **** = highest *** = high ** = medium * = lower			

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List of reports of actions executed in the frame of LIFE+ FLANDRE

Action A.1&2 Masterplan and legal bases for the protection and management as a cross-border nature park of the Vlaamse Westkust - Dunes de Flandre

Cosyns E., Bollengier B. & Provoost S. 2019. Masterplan en juridische basis voor grensoverschrijdende samenwerking en bescherming als een transnationaal natuurpark van de duinen tussen Dunkerque (Frankrijk) en Westende (België). Partim Masterplan. / Masterplan et base juridique pour la coopération et la protection comme parc naturel transnational des dunes entre Dunkerque (France) et Westende (Belgique). Partim Masterplan. Rapport in opdracht van Agentschap Natuur en Bos, Conservatoire de l'espace littoral et des rivages lacustres, Conseil Général Département du Nord. 253 pp. (NL versie) / 265 pp. (version Fr)

De Smedt, P. , Cliquet, A., Queffelec, B., Houthuys, A., Inizan, M. & McClelland, V. (2020). Juridische basis voor de grensoverschrijdende samenwerking en bescherming als een transnationaal natuur-park van de duinen tussen Dunkerque (Frankrijk) en Westende (België) / Base juridique pour la coopération et la protection comme parc naturel transnational des dunes entre Dunkerque (France) et Westende (Belgique), LDR Advocaten – UGent – Université de Bretagne Occidentale (UBO), 136 pp.

Action A.3 Management plan for recently acquired domains of ANB

Cosyns E., Jacobs, M., Lambrechts J., Provoost S. & Zwaenepoel A. 2018. Beheerplan voor de Belvédère, Schipgatduinen, Doornpanne, Hoge Blekker, Hooge Duynen, Spelleplekke, Oostvoorduin, 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).

Action D.1&2 Assessment of the impact on the local economy and population and the ecosystem services

De Nocker Leo, Broekx Steven, Demeyer Rolinde, Simoens Ilse, Turkelboom Francis, Provoost Sam, Van der Biest Katrien. 2020. Evaluation of the socio economic impact of the FLANDRE project on the local economy, population and restoration of ecosystem services. Report of VITO, INBO and University of Antwerp, ordered by Agentschap Natuur en Bos and Conservatoire du Littoral, 98 pp. + annexes

Action D.3: Scientific monitoring of the management of the nature reserves along the Belgian coast

Provoost, S., Van Gompel, W., Vercruyse, E., Packet, J. en Denys, L. (2015). Permanente Inventarisatie van de Natuurreservaten aan de Kust. PINK II. Eindrapport periode 2012-2014. Rapport van het Instituut voor Natuur- en Bosonderzoek 2015 (8890955). Instituut voor Natuur- en Bosonderzoek, Brussel.

Provoost, S., Van Gompel, W. en Vercruyse, E. (2020). Beheerevaluatie Kust. Eindrapport 2015-2019. Rapport van het Instituut voor Natuur- en Bosonderzoek 2020. Rapporten van het Instituut voor Natuur- en Bosonderzoek, Brussel.

Action D.5 Botanical monitoring

Cudennec, N., Blondel, C., Debruyne, R. & Toussaint, B. (2015). Accompagnement à la mise en place des opérations de débroussaillage dans le cadre du programme Life+ 12 NAT/BE/000631 "FLANDRE" (Flemish And North french Dunes REstoration). Centre Régional de Phytosociologie agréé Conservatoire Botanique National de Bailleul, 1 vol., 26 p. + annexes. Bailleul.

Monein, C., Blondel, C. & Debruyne, R. (2020). Premier suivi après les opérations de restauration dans le cadre du programme Life + 12NAT/BE/000631 "FLANDRE" Flemish And North french Dunes REstoration) – Action D5. Conservatoire Botanique National de

Bailleul, 1 vol., 38 p. + annexes. Bailleul.

Action D.6 Monitoring of the impact of the actions C.2 and C.4 on the *Vertigo angustior* populations

Tapko, A., Cucherat, X. (2015). Action D6 du projet LIFE + Nature 12 NAT/BE/000631 FLANDRE : évaluation de l'impact des actions de débroussaillage et de gestion sur les populations de *Vertigo étroit* (*Vertigo angustior*) – Etude avant travaux. BIOTOPE, 1 vol., 35 p. Rinxent.

Chruslinski, H., Faure, B. (2020). Évaluation de l'impact des actions de débroussaillage et de lisières sur les populations de *Vertigo angustior*. Étude après travaux LIFE+ 12NAT/BE/000631 "FLANDRE". BIOTOPE, 1 vol., 54 pages. Rinxent.

Action D.7 Monitoring of the impact of the actions C2, C4 and C5 on Great Crested Newt (*Triturus cristatus*)

Faure, B., (2015). Suivi de l'impact des actions de débroussaillage et de creusement de mares sur les populations de Triton crêté. Action D7 du projet LIFE+ 12 NAT/BE/000631 FLANDRE. Etude avant travaux. BIOTOPE, 1 vol., 83 p. Rinxent.

Dufrenne, E., Faure, B. (2020). Suivi de l'impact des actions de débroussaillage et de creusement de mares sur les populations de Triton crêté. Action D7 du projet LIFE+ 12 NAT/BE/000631 FLANDRE. Etude après travaux. BIOTOPE, 1 vol., 132 p. Rinxent.

Action E.5 International Workshop about the management of coastal dunes and sandy beaches

De Vreese, R. (BOS+), Battiau-Queney Y. (EUCC France), Ruz M. (ULCO-LOG), Herrier J.-L. (Agentschap voor Natuur en Bos), Provoost S. (Instituut voor Natuur- en Bosonderzoek). 2018. International Workshop on Management of Coastal Dunes and Sandy Beaches. 12 to 14 June 2018, Dunkirk (France). Book of Abstracts—Livre des Résumés. BOS+, Gontrode, Belgium.

Herrier J.-L. (Agentschap voor Natuur en Bos), Lemaire, B. (Département du Nord), Ruz M. (ULCO-LOG), Battiau-Queney Y. (EUCC France), Leten, M. (Agentschap voor Natuur en Bos), Helin, V. (Département du Nord), Strubbe, R. (Agentschap voor Natuur en Bos), De Vreese, R. (BOS+). 2018. International Workshop on Management of Coastal Dunes and Sandy Beaches. 12 to 14 June 2018, Dunkirk (France). Excursion Guide—Livret d'Excursion. BOS+, Gontrode, Belgium.

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Action E.8 Layman's Report

Herrier, J.-L. (ANB), Vanallemeersch, R. (ANB), Lemaire, B. (Département du Nord), Méléneq, G. (Conservatoire du Littoral), Dubaille, E. (Conservatoire du Littoral) & Hélin, V. (Département du Nord). 2020. Dunes of Flanders without border. Layman's Report of the LIFE+ Nature project 'Flemish And North-French Dunes Restoration. Published by the Agency of Nature and Forests of the Flemish Government. Responsible publisher: Evenepoel, M.

Action F.5 AfterLIFE Conservation Plan

Herrier, J.-L. (ANB), Vanallemeersch, R. (ANB), Lemaire, B. (Département du Nord), Strubbe, R. (ANB), Méléneq, G. (Conservatoire du Littoral), Dubaille, E. (Conservatoire du Littoral), Hélin, V. (Département du Nord). 2020. After LIFE Conservation Plan of the LIFE+ Nature project 'Flemish And North-French Dunes Restoration. Published by the Agency of Nature and Forests of the Flemish Government. Responsible publisher: Evenepoel, M.



Sea Holly (*Eryngium maritimum*) ©Marc Leten

colophon

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Maps

VLM-AGUR, Happy Day, Natura 2000 viewer EC, Wvi, Bénédicte Lemaire (Département du Nord), Rudi Longueville (ANB), Conservatoire du Littoral – Délégation Manche-Mer du Nord

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