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Dutch nature conservation objectives from a European perspective

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werkdocumenten

WOt
Wettelijke Onderzoekstaken Natuur & Milieu

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Dutch nature conservation objectives from a European perspective

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This document was produced in accordance with the Quality Manual of the Statutory Research Tasks Unit for Nature & the Environment (WOT Natuur & Milieu).

WOt Working Document **310** presents the findings of a research project commissioned by the Netherlands Environmental Assessment Agency (PBL) and funded by the Dutch Ministry of Economic Affairs (EZ). This document contributes to the body of knowledge which will be incorporated in more policy-oriented publications such as the National Nature Outlook and Environmental Balance reports, and thematic assessments.

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Wageningen, December 2012

Abstract
Bouwma, I.M., W.A. Ozinga, T. van der Sluis, A.J. Griffioen, M. van der Veen & B. de Knegt (2012). *Dutch nature conservation objectives from a European perspective.* Wageningen, The Statutory Research Tasks Unit for Nature & the Environment (WOT Natuur & Milieu), WOt-werkdocument 310. 60 p.; 10 Figs.; 8 Tabs.; 40 Refs.; 2 Annexes.

In Dutch policy the European importance of species and habitats is one of the reasons to decide if a species or habitat should become a target species for Dutch policy. This study reviews the different philosophies behind previous studies on the international or European importance of Dutch species and habitats. It furthermore analysis the consequences of changing the criteria or thresholds for determining species of European importance for the number and type of species selected.

Trefwoorden: biodiversity assessment, European importance, international importance

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The Working Documents series is published by the Statutory Research Tasks Unit for Nature & the Environment (WOT Natuur & Milieu), part of Wageningen UR. This document is available from the secretary's office, and can be downloaded from www.wageningenUR.nl/wotnatuurenmilieu

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Preface

The focus of the research reflected in this report has changed considerable during the execution of the project. Originally the project started with the aim of drafting a list of species and habitats of European importance but ended in assessing the consequences of different criteria and thresholds which can be applied while determining 'European importance'.

During the execution of the project both the steering group members as well as the project team members became aware of the many underlying assumptions we ourselves hold on the topic 'species and habitats of European importance' and our ideas on what needs to be protected.

We would like to thank Jaap Wiertz (Environmental Assessment Agency) and Rogier Pouwels (Alterra Wageningen UR) for the interesting discussion held in the course of the project and for their review of this report.

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Inhoud

Summary

Since the 1970's Dutch nature conservation policy has been influenced by international conservation policies. For this policy an important consideration whether or not to include a specific species or habitat in its policy is their 'European importance'. Therefore in the last twenty years several overviews have been developed that indicate the European importance of Dutch species. The aim of this research was not to develop a new list of species of European importance but to review the consequences of applying different criteria and thresholds. In the end this study shows that what is considered of 'European importance' is a political choice as much as a scientific one.

First of all, the study shows that criteria used to assess the European importance of species and habitats are based on three different nature conservation considerations or views that determine what is considered to be of 'European' importance:

1. **Responsibility to avoid extinction**
   A country should protect species or habitats that are threatened, rare or vulnerable globally, Pan-Europe or in the EU. By protecting threatened, rare or vulnerable species or habitats a country is taking its responsibility to avoid that a species or habitat is not going extinct in the world or a specific region.
2. **Legal responsibility**
   In an international treaty or in an EU Directive a country has agreed to protect a specific species or habitat.
3. **Territorial responsibility**
   A country is responsible for protecting a species or habitat for which it has a more than average responsibility as a large part of the population or its range is occurring in the country.

The reviewed studies base the assessment of 'European importance' of species and habitats on:
- threat status (1a. responsibility to avoid extinction);
- rareness (e.g. specific species communities, rare species in European context, type localities) (1b. responsibility to avoid extinction);
- vulnerability (1c. responsibility to avoid extinction);
- species for which the Netherlands is on the border of their distribution range or isolated populations/ habitats (e.g. subspecies) (1d. responsibility to avoid extinction);
- legal protection (2. legal responsibility);
- percentage of the range of a species in the Netherlands (e.g. species which have a more than average presence in the Netherlands or endemic species) (3a. territorial responsibility);
- percentage of the population occurring in the Netherlands (e.g. species which have a more than average presence in the Netherlands or endemic species) (3b. territorial responsibility).

The study also analyzed what the consequences are of varying the criteria or thresholds set on the number of species and habitats selected. Therefore eleven policy options were developed. The policy options were developed on the basis of:
- distribution (based on range or population size);
- threat status (based on existing red list or conservation status as determined in the article 17 Reporting under the Habitats directive);
- legal protection (listed in the Birds or Habitats Directive);
- combinations of these three criteria, using for some criteria different thresholds or threat status.

The study shows that policy options based on a European legal or Pan-Europe or EU threatened status result in a very small number of species selected. If the EU legal status is used as a selection criterion only 0.15% of the Dutch plant species and 6%[1] of the Dutch butterflies are selected. For breeding birds this phenomenon does not occur as all breeding bird species are protected under EU law. However if we consider the number of species for which protected areas need to be established around 20% of the species are selected. For habitats the legal status is arranged in the Habitats Directive, using this criterion results in 51 habitats selected.

Using the Pan-European or EU red list, results in a selection of 8% and 10% of the butterflies (for Pan-Europe, EU respectively) and 3% and 5% of the breeding birds (for Pan-Europe, EU respectively). There are at present no red lists for habitats or plants (either for Pan-Europe or the EU).

Policy options reviewing distribution showed that for the three reviewed regions (Pan-Europe, EU, Atlantic region) an significant increase in the percentage of species or habitats selected occurs between 1 and 10% thresholds of the range or population of a habitat or species.

The overlap between the eleven policy options was limited. This is due to the fact that the criteria underlying the policy options are different thus resulting in different subset of species selected. Overall the species and habitats occurring in most policy options were related to marshland or natural grasslands, open water and coastal systems.

[1] 4% if we consider the species which are present in the Netherlands and have not (recently) disappeared from the Netherlands

Samenvatting

Sinds de jaren zeventig van de vorige eeuw is het Nederlands natuurbeleid meer en meer beïnvloed door internationale beleidsafspraken op het gebied van biodiversiteit. Voor het Nederlandse natuurbeleid is het 'Europees belang' van een soort een belangrijke reden geweest om de soort op te nemen als doelsoort. In de laatste twintig jaar zijn er daarom diverse publicaties verschenen die een inschatting hebben gemaakt van het Europees belang van Nederlandse soorten en ecosystemen.

Dit onderzoek beoogde niet een nieuwe lijst van soorten van 'Europees belang' te ontwikkelen, maar te analyseren wat de gevolgen zijn van variatie in de tot nu toe gehanteerde criteria en de gebruikte grenswaarden. Europees belang wordt immers niet alleen gebaseerd op wetenschappelijk criteria maar is ook gebaseerd op politieke overwegingen.

De analyse laat zien dat bestaande studies het Europees belang baseren op drie overwegingen:

1. **Verantwoordelijkheid om uitsterven te voorkomen**
   Een land dient soorten te beschermen die bedreigd, zeldzaam of kwetsbaar zijn wereldwijd, in Pan-Europa of de EU.
2. **Verantwoordelijkheid om wettelijke afspraken na te leven**
   Een land heeft zich verplicht om een soort of habitat te beschermen door de ondertekening van een internationaal verdrag of EU-richtlijn.
3. **Territoriale verantwoordelijkheid**
   Een land is verantwoordelijk om een soort of habitat te beschermen omdat deze meer dan gemiddeld voorkomt in het land.

Eerder verschenen studies baseerden het 'Europees' belang op:

- internationale bedreigde status (1a. verantwoordelijkheid om uitsterven te voorkomen);
- zeldzaamheid (zoals specifieke habitats of zeldzame soorten) (1b. verantwoordelijkheid om uitsterven te voorkomen);
- kwetsbaarheid (1c. verantwoordelijkheid om uitsterven te voorkomen);
- Nederland ligt op de grens van het verspreidingsareaal of het betreft geïsoleerde populaties (1d. verantwoordelijkheid om (lokaal) uitsterven te voorkomen);
- wettelijke bescherming (2. wettelijke verantwoordelijkheid);
- percentage van het verspreidingsgebied in Nederland t.o.v. met totale verspreidingsgebied in de beschouwde regio (zoals soorten of habitats die meer dan gemiddeld voorkomen in Nederland of endemische soorten) (3a. territoriale verantwoordelijkheid);
- percentage van de populatie die in Nederland voorkomt t.o.v. de populatie in de beschouwde regio (3b. territoriale verantwoordelijkheid).

Tevens is onderzocht wat de gevolgen zijn van variatie in de gehanteerde criteria of grenswaarde waarop Europees belang gebaseerd kan zijn. In het onderzoek zijn elf beleidsopties geformuleerd. De opties zijn gebaseerd op:

- verspreiding (voorkomen of grootte van de populatie);
- bedreigde status (gebaseerd op bestaande internationale rode lijsten en de artikel 17 rapportage onder de Habitat richtlijn);
- wettelijke bescherming (voorkomend op de Annex van de Vogelrichtlijn of Habitatrichtlijn);
- combinatie van deze drie criteria en verschillende grenswaarden.

Het bepalen van Europees belang op basis van Europese wettelijke status of de Pan-Europese of Europees bedreigde status leidt tot een gering aantal geselecteerde soorten. Op basis van een

Europese wettelijke status wordt slechts 0,15% van de Nederlandse plantensoorten en 6%[2] van de Nederlandse vlinders geselecteerd. Onder de Vogelrichtlijn zijn in principe alle vogels beschermd, maar als we kijken voor welke soorten beschermde gebieden aangewezen dienen te worden, dan geld dit slechts voor ongeveer 80% van de broedvogelsoorten. Op basis van de Habitatrichtlijn zijn 51 habitats geselecteerd.

Op grond van de Pan-Europese of Europese rode lijst wordt 8% en 10% van de vlinders (Pan-Europa, EU) en 3% en 5% van de broedvogels (voor Pan-Europa en de EU geselecteerd). Momenteel zijn er nog geen rode lijsten voor habitats of planten.

Beleidsopties gebaseerd op verspreiding laten zien dat in de drie onderzochte regio's (Pan-Europa, EU, Atlantische regio) een significante toename in het aantal geselecteerde soorten optreedt tussen de klassen groter dan 1% en groter dan 10% van het verspreidingsgebied of populatiegrootte van een soort of habitat.

De overlap tussen de elf beleidsopties is laag. Dit wordt veroorzaakt doordat de criteria die aan de basis van de beleidsopties liggen sterk verschillen en leiden tot een andere selectie van soorten. Soorten en habitats die in veel beleidsopties voorkomen zijn soorten en habitats van moeras en natuurlijke graslanden, open water en kustgebieden.

[2] 4% als alleen de soorten die momenteel nog in Nederland voorkomen beschouwd worden

1 Introduction

1.1 Project background

Since the seventies, Dutch nature conservation policy has been more and more influenced by international conservation policies. The Netherlands signed up to several international agreements such as the Ramsar Convention (1971), Bonn Convention (1979) and Bern Convention (1979). The introduction of the Birds (1979) and Habitat Directive (1992) were milestones that marked the increased influence of European Union's policy on Dutch nature policy. An important EU obligation stemming from the Birds and Habitats Directive is to ensure that species falling under the Birds and Habitats Directive remain or are restored to a good conservation status in the Netherlands.

Since the introduction of the Birds and Habitats Directive, Dutch nature conservation policy is determined by both national ambitions as well as a need to fulfill the EU obligations.

Also the process of development of Red list indicating the status of threat for different species groups has influenced Dutch nature conservation policy. On the one hand the available Global and European Red list were considered in setting Dutch conservation targets and on the other hand, at national level Red list were developed.

The national goals set for nature conservation were based amongst others on the need to protect species which are of international importance. National target species were selected based on international importance, decline in national distribution or abundance and rarity-the so called ITZ-criteria. If species met two of the three criteria they were selected as target species for the Dutch national conservation policy (Bal *et al.,* 1995).

Since the end of 2010, as a result of a new government, there is a remarkable change in national ambitions for nature protection. There are severe budget cuts for governmental organizations (f.i. the forest service) as well as limited subsidies for NGOs to undertake nature management.

Besides the spending cuts, also the national ambitions for nature policy are being questioned. The ambition of the government (in 2011) is to ensure that the Netherlands meets EU obligations arising from the Birds and Habitats Directive but does not set additional national goals which go beyond the European legal obligations .

Furthermore a discussion started that in times of scarcity of funds nature conservation should focus on those species and habitats of European importance for which the Netherlands is really exceptional and has an important role to play. The discussion is fuelled by the Dutch situation in which some BHD-species are in an unfavorable – bad conservations status - in fact almost on the brink of extinction e.g. yellow-bellied toad *Bombina variegata* – but which are more abundant and doing relatively well in some regions outside of the Netherlands, while others species, like the Black-tailed godwit *Limosa limosa* are rapidly declining and in an unfavorable – conservation status. However this species is not protected as a breeding bird and the Netherlands constitutes an important breeding ground. This discussion stems already from the early nineties of last century (Verkaar *et al.,* 1992; Van Beers, 1993; Van der Sluis, 1996).

Therefore the Dutch Environmental Assessment Agency (PBL) wanted to critically review the criteria which have been used to determine European importance in previous studies. Aim of this study is not to develop a new set of criteria for determining species or habitats of European importance but to review the choices which can be made to determine European importance.

This study review what are the consequences of using different criteria or setting different thresholds to determine European importance for the number of species and habitats that are considered? In this study these set of criteria and thresholds form the basis for different policy options and result in a set of species and habitats considered of European importance.

This study focuses on habitats, vascular plants, birds and butterflies. The focus was taken as these species are most frequently used by PBL for their assessments on nature in the Netherlands and also for budgetary reasons.

The data for this study stem from different sources. Part of the data was collected by staff from Alterra. The information on birds and butterflies were provided by two NGOs, the Dutch Birds Research foundation SOVON (Van Roomen *et al.,* 2010), and the Dutch Butterfly Foundation (Van Swaay, 2011)

1.2 Earlier studies on the European importance of Dutch nature

Several studies were already undertaken regarding the European importance of species, habitats and ecosystems of the Netherlands (Siepel *et al.,* 1993a; 1993b; Ozinga & Schaminée, 2005; Janssen *et al.*, 2007;, Schaminée *et al.*, 2010, Knegt *et al.,* 2011).

Originally the project started with the request of the Dutch Environmental Agency to draft a list of species and habitats of 'European importance'. During the project's execution sometimes heated discussions occurred on what should be considered of 'European importance'. During these discussions it became apparent that such a list depends on views why one should protect specific species or habitats the nature protection philosophy one follows. In reviewing the existing studies it became apparent that the criteria used to determine international or European importance are based on underlying views why one should protect specific species or habitats. Overall the criterion are based on three different nature conservation considerations or views that determine what is considered to be of European importance:

1. **Responsibility to avoid extinction**
   A country should protect species that are threatened globally, Pan-Europe or in the EU. Also a species or habitat that is not immediately threatened due to a decline in numbers or surface but rare or vulnerable– thus having a high risk of extinction in case of local disasters- are also included. By protecting threatened, rare or vulnerable species or habitats a country is taking its responsibility to avoid that a species or habitat is not going extinct in the world or a specific region.
2. **Legal responsibility**
   In an international treaty or in case of the EU in a directive a country has agreed to protect a specific species or habitat.
3. **Territorial responsibility**
   A country is responsible for protecting a species or habitat for which it has a more than average responsibility as a large part of the range of its population is occurring in the country.

The different criteria used to define importance in the 'European context' reflect these views such as:
- threat status (1a.responsibility to avoid extinction);
- rareness (e.g. specific species communities, rare species in European context, type localities) (1b. responsibility to avoid extinction);
- vulnerability (1c. responsibility to avoid extinction);
- species for which the Netherlands is on the border of their distribution range or isolated populations/ habitats (e.g. subspecies) (1d. responsibility to avoid extinction);
- legal protection (2. legal responsibility);

- percentage of the range of a species in the Netherlands (e.g. species which have a more than average presence in the Netherlands or endemic species) (3a. territorial responsibility);
- percentage of the population occurring in the Netherlands (e.g. species which have a more than average presence in the Netherlands or endemic species) (3b territorial responsibility).

(Wolff, 1988, in: Van der Sluis, 1996):

The criteria are usually based on the distribution of species, rareness of a species, the level of threat, vulnerability, or a combination of the different criteria. Table 1 shows which criteria were used in the various studies.

Table 1. Criteria to select species and habitats of European importance

Study	**Percentage of the range of a species or habitat in the Nether-lands with regard to the larger distribution area (% often dependent on the location within its entire range)**	**Percentage of the size of the population of a species occurring in the Netherlands**	**Threat – global scale/Europe/ Netherlands**	**Rareness**	**Vulnerable**	**Location of the Netherlands within distribution range**	**Legal protection**
Birds Directive	X		X	X	X		
Habitats Directive			X	X	X		
Van Beers, 1993 (in: Bal *et al.,* 2001)	X						
Siepel *et al.* 1993a, 1993b (in: Bal *et al.,* 2001)	X						
Osieck & Hustings, 1994 (in: Bal *et al.,* 2001)		X	X				
Ozinga & Schaminée, 2005			X	X ('single country endimics')			X
Janssen *et al.*, 2007; Janssen & Schaminée, 2009	Ecosytems: X Plants: X	Ecosystems expert judgement: X	X			X	
De Knegt *et al.,* 2011	X	X					X

Table 2 shows which thresholds were set or which references lists were applied for three of the seven criteria in the various studies in order to determine European importance. The criteria rareness, vulnerability, location of the Netherlands in distribution range were not using specific thresholds or reference lists.

The legal protection as derived from the Birds Directive and Habitats Directive is based on scientific criteria as threat of extinction, vulnerability, rareness and endemic – but was also a result of a negotiation process whilst drafting the Annexes of the Birds Directive. The criteria used in the Birds and Habitats Directive are described in the box below and also indicated in Table 1.

The criteria used in the Birds and Habitats Directive

The Birds directive uses a set of criteria or guidelines for protection of bird species:
- species in danger of extinction;
- species vulnerable to specific changes in their habitat;
- species considered rare because of small populations or restricted distribution;
- other species requiring particular attention for reasons of the specific nature of their habitat.

"Member States shall take similar measures for regularly occurring migratory species not listed in Annex I, [...] as regards their breeding, moulting and wintering areas and staging posts along their migration routes. To this end, Member States shall pay particular attention to the protection of wetlands and particularly to wetlands of international importance."

(Source: art. 4.1 Birds Directive)

Furthermore the Bird Directive follows the criteria of the Ramsar Convention by stating that sites need to be selected for species if the sites contain more than 1% of the individuals in a population of one species or subspecies of migratory water birds or if it regularly supports 20,000 or more water birds.

The Habitats directive considers habitats of Community interest those which
(i) are in danger of disappearance in their natural range;
or
(ii) have a small natural range following their regression or by reason of their intrinsically restricted area;
or
(iii) present outstanding examples of typical characteristics of one or more of the nine following biogeographical regions: Alpine, Atlantic, Black Sea, Boreal, Continental, Macaronesian, Mediterranean, Pannonian and Steppic.

Species of Community interest means species which are:
(i) endangered, except those species whose natural range is marginal in that territory and which are not endangered or vulnerable in the western palearctic region; or
(ii) vulnerable, i.e. believed likely to move into the endangered category in the near future if the causal factors continue operating; or
(iii) rare, i.e. with small populations that are not at present endangered or vulnerable, but are at risk. The species are located within restricted geographical areas or are thinly scattered over a more extensive range; or
(iv) endemic and requiring particular attention by reason of the specific nature of their habitat and/or the potential impact of their exploitation on their habitat and/or the potential impact of their exploitation on their conservation status.

Previous list of species of international importance were based on species selected on different criteria (see Figure 1, Table 1 and 2). In the framework of this research the question was raised what happens if the Dutch nature conservation policy redefines the criteria used to determine whether species and habitats are of European importance: does it reduce the number of species and habitats significantly?

More specifically the following questions were formulated:
1. Would changing the thresholds set for distribution in a region reduce the number of species and habitats considered of European importance significantly?
2. Would changing the region which is taken as a reference reduce the number of species and habitats considered of European importance significantly?
3. Would only using the criterion 'legally protected species' (under EU law) reduce the number of species and habitats considered of European importance significantly?
4. Would only using the criterion 'threated species' (based on Red list or conservation status) reduce the number of species and habitats considered of European importance significantly?

As in previous studies different criteria were often combined also the question is how large the overlap is between species and habitats falling under the different criteria e.g. how many species fulfil more than 1 criterion?.

Table 2. Thresholds or reference for three of the seven criteria used to assess European importance. For the others no thresholds were set.

Study	**Criterion 1: Range/ Distribution**	**Criterion 2: Population size**	**Criterion 3: Threat**
Van Beers, 1993[1]	The species is restricted to Europe and has a central or subcentral distribution	-	-
Siepel *et al.,* 1993a, 1993b[1]	• The Netherlands is situated centrally in the distribution range and species 10% of it's range is in Western Europe • The Netherlands is situated subcentrally in the distribution range and species 25% of it's range is in Western Europe • The Netherlands is situated at the margin of the distribution range and species 50% of it's range is in Western Europe	-	-
Osieck & Hustings, 1994[3]	-	25% van de NWE breeding population for Westpaleartic species	Global
Ozinga & Schaminee 2005	(e): highly characteristic, with > 90% of distribution area in Europe (hc); characteristic, with 50-90% of distribution area in Europe (c); not characteristic, with < 50% of distribution area in Europe (nc); and outside Europe (o)	-	Global or European Red List
Janssen *et al.*, 2007; Schaminée *et al.*, 2010	Three thresholds: ➢ 50% of European range ➢ 10% of European range ➢ 1% of European range	Three thresholds: ➢ 50% of European range ➢ 10% of European range ➢ 1% of European range	Global or European red list
De Knegt *et al.,* 2011	Plant species & butterflies restricted to habitattypes for which the Netherlands has more > 20% compared to the Atlantic region	Birds: Threshold 20% of the Atlantic region	-
Birds Directive		1% of the individuals in a population of one species or subspecies of migratory water birds or if it regularly supports 20,000 or more water birds.	

[3] Used by *Bal et al.,* 1995 to determine international importance of Dutch species

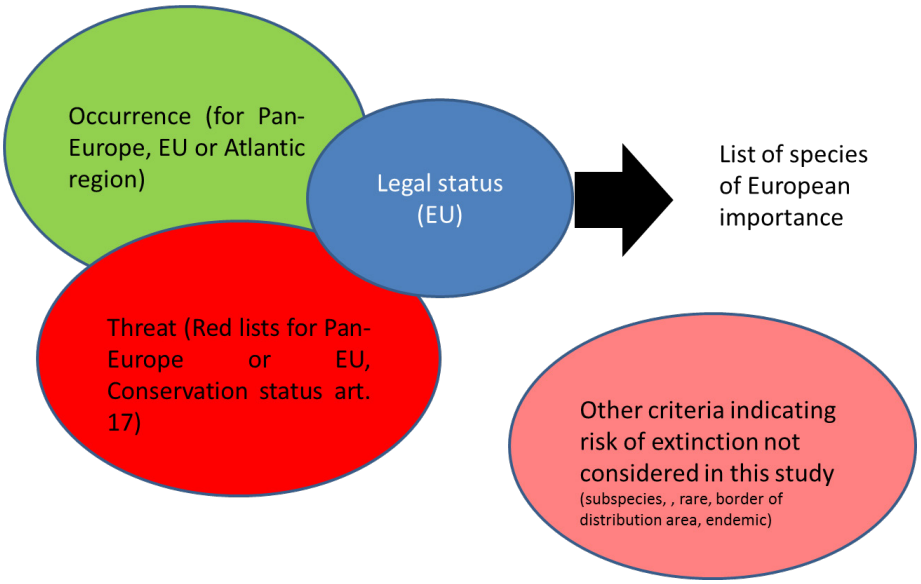


Figure 1. Schematic overview of the different criteria used to determine the European importance of species

2 Methodology and policy options used in this project

2.1 Methodology

2.1.1 General

This study envisaged to build further upon approaches used for the selection of species and habitats which are of importance for conservation. Due to differences in data availability the approaches for birds, butterflies, plants and habitats tend to differ.

We reviewed the availability of information regarding the most commonly used criteria, distribution, threat and rareness of species/habitat.

The different available data sources for the species groups and habitats vary considerably. A general assessment for data availability and quality is presented in Table 3. This table shows in a nutshell that data availability for birds and butterflies is good, for habitats less and for plants poor.

Table 3. Data quality and data availability for different species groups and habitat

	Criterion	**Level of info**	**Birds**		**Butterflies**	**Plants**	**Habitats**
			Breeding	**Migrating**			
Distribution	% of the range of a species or habitat in the Netherlands	Pan-Europe	Available; Birdlife (2004a).	Available; Birdlife (2004a).	Database Butterfly foundation	Atlas Flora europeaa with additions; Ozinga *et al.,* 2007	None
		EU	Available; BirdLife International (2004b)	Available; BirdLife International (2004b)	Database Butterfly foundation	-	Article 17 reporting under Habitats Directive
		Atlantic region	Calculated in the framework of this project	Not relevant (see Chapter 3)	Database Butterfly foundation	Calculated in the framework of this project	Article 17 reporting under Habitats Directive
	% of the size of the population of a species occurring in the Netherlands		Available; BirdLife International (2004b)	Available; BirdLife International (2004b)	Database Butterfly foundation	No info available	None – some info in article 17 but quality poor
Threat/ Vulnerable	Included in Red list EU/ Pan-Europe/ Netherlands		IUCN list (global) Birdlife (2004a). (Europe) Hustings *et al.,* 2004 (Red list Netherlands)	-	Available Swaay *et al.,* 2010	European red list under development, Dutch National list (LNV, 2009)	
	Threat Favourable conservation status FCS		Available; BirdLife International (2004b)	Only species of the Birds directive	Available; Article 17 report; ETC/BD (2008)	Available; Article 17 report; ETC/BD (2008)	Available; Article 17 report; ETC/BD (2008)
Legal		EU	Birds Directive	Birds Directive	Habitats directive	Habitats directive	Habitats directive
Rare			Based on FCS, for BD species only	Based on FCS, for BD species only			

Based on the availability of the information we decided to use as variables for the different policy options three criteria being distribution (preferable size of the population – if this information was not available range), threat (based on IUCN status as well as Art 17 reporting) and legal protection.

The results of the analysis is not only depending on which criteria are considered but also on the different thresholds set. In the research the following thresholds were used for distribution:
A. Dutch distribution area/ population size is more than 50% (> 50%)
B. Same > 25%
C. Same > 10%
D. Same >1%
E. Same >0.5%
F. Same >0.1%

These thresholds were chosen based on the following considerations:
- Surface area of the Netherlands with respect to the 3 reviewed regions (respectively 0.35% for Pan-Europe, 0.9% for the EU and 6% for the Atlantic region). The thresholds reflect the ratio between the surface of the Netherlands and the various regions.
- Thresholds were used in previous studies (Table 2)
- Data availability. For butterflies and birds good data are available which would allow for a division in more categories. But even for these groups fluctuations over longer periods occur and therefore rather broad categories are more suitable. For plants the assessments are mainly based on a visual estimation using maps with biogeographical ranges (see Section 2.1.4). These data do not allow the use of smaller classes.

Of course the thresholds defined will have an impact on the analysis (see Chapter 4 Discussion). Below for each group information is provided on data used and data quality issues (for more details see van Van Roomen *et al.,* 2010; Van Swaay, 2011).

2.1.2 Birds

The data for the analysis of the birds was provided by SOVON (Van Roomen *et al.,* 2010) and Birdlife and is based on:
- Breeding birds;
- Migrant birds;
- Wintering populations.

However, this classification is sometimes mutually exclusive, often categories are overlapping and therefore can be confusing. In fact, if a species population consists both of a breeding bird population and wintering bird population, it should be assessed which population size should be used to determine international importance.

The range is calculated for the breeding birds, based on the Dutch breeding atlas (Van Roomen *et al.,* 2010). The estimate for bird population is based on estimates from both breeding and non-breeding birds.

The share of the Dutch population was calculated based on species numbers and range of species. The data of Birdlife international was made available to Alterra Wageningen UR.

To calculate the share of the Dutch breeding bird populations the average of the total numbers for the 1998-2000 period were compared with the data from the EBCC breeding bird atlas (Hagemeijer & Blair 1997).

Based on the calculation of the share with regard to the Atlantic Region, the species are grouped in the following classes:

A. Dutch distribution area/ population size is more than 50% (> 50%)
B. Same > 25%
C. Same > 10%
D. Same >1%
E. Same >0.5%
F. Same >0.1%

For migratory birds it was decided to review the % of the population that uses Dutch areas of the flyway of which the Netherlands is a part off. The share of the flyway/biogeographical population is based on Wetlands International 2006. In case that more flyway populations of the same species occur, the largest population was used to calculate the share of the flyway population. This calculation only refers to waterbirds.

2.1.3 Butterflies

The data analysis for butterflies was undertaken by the Dutch Butterfly foundation, which has access to the data on butterfly distribution (Van Swaay, 2011). The analysis is based on:

- The resident butterflies species of the Netherlands;
- The irregular resident butterflies, species which reproduce regularly in the Netherlands but thus far never more than 10 years in a row (Van Swaay, 2006).

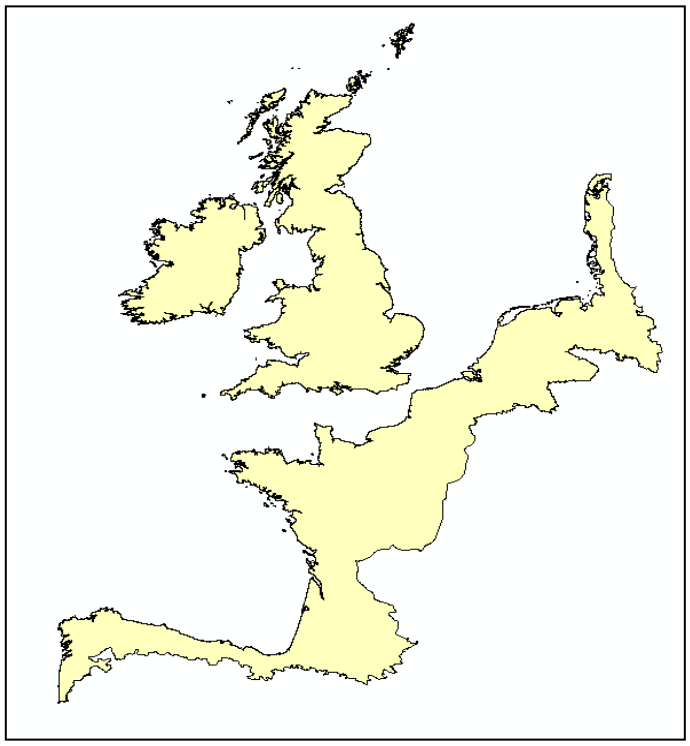


Figure 2. Atlantic biogeographical region

For each species the share of its distribution area in the Netherlands with regard to the entire distribution area within Europe, EU and the Atlantic biogeographical region is calculated. This is based on the data and distribution maps of the Red List (Van Swaay *et al.,* 2010). In the Red List is indicated what the presence is of the species in each country.

For the Atlantic region these data were not available, because the Atlantic region boundaries do not coincide with the national boundaries. Therefore the map of the Atlantic region in the EU is used (as it found on the website of the European Red List http://www.iucnredlist.org/initiatives/europe), in combination with the map of the entire Atlantic region (Figure 2). The share of the Dutch distribution area was calculated as percentage of the entire Atlantic region. In some cases this assessment was based on expert judgement.

For the two moth species distribution data exists only for the EU and the Netherlands.

Based on the calculation of the share, the species are grouped in the following classes:
A. Dutch distribution area/ population size is more than 50% (> 50%)
B. Same > 25%
C. Same > 10%
D. Same >1%
E. Same >0.5%
F. Same >0.1%

2.1.4 Vascular plants

The analysis for vascular plants is based on:
- The native and naturalised vascular plant species of the Netherlands as described in the 'Standard list of the Dutch flora 2003' (Tamis *et al.,* 2004) with a few additions of new species (Van der Meijden, 2005).
- Apomictic 'micro-species' are not included with a few exceptions. This regards species complexes with an 'a-sexual' reproduction leading to complexes of closely related micro-species such as in the genera *Taraxacum*, *Rubus*, *Hieracium* and *Alchemilla*.
- New species from southern areas which may become established in the Netherlands in the near future due to climate change have not been included (Ozinga *et al.*, 2009).

For each plant species the share of its geographical range in the Netherlands with regard to the entire distribution area within Pan-Europe and the Atlantic biogeographical region is assessed. These assessment were mainly based on a visual estimation of maps of Atlas Flora Europeae (Jalas & Suominen, 1972-1991), Atlas of North European vascular plants (Hultén, 1958, 1962, 1971; Hultén en Fries, 1986), and SynBioSys Europe (Hennekens *et al.*, 2001) and on information in Tutin 1964-1980, Meusel *et al.,* 1965-1992, Schaminée *et al.,* 1992, Ozinga & Schaminée, 2005, and Ozinga *et al.,* 2007. These data-sources do not allow setting of very detailed thresholds and therefore category E and F were not applied for plants.

Assessments of the share of the range of plant species relative to subsets of Pan-Europe are less reliable due to the poor resolution of the data and the lack of detailed and comparable data at the level of EU member states. Therefore assessments of the share of geographical ranges in the Netherlands with regard to the European Union are not made for vascular plants.

For the Atlantic region we used a pragmatic approach. For this geographical scale assessments were made only for plant species for which at least 50% of its geographical range covers the Atlantic region. There are many plant species which a large proportion of their range outside the Atlantic region for which the Netherlands are near their range margin. For these species the relative importance of the Netherlands within the Atlantic region is less relevant and due to their relative rarity of in the Atlantic region such assessments would be very sensitive to inaccuracies in the data.

Since the data for most plant species are rather course, we have indicated species for which the assessment is less reliable with a '?' in a separate column. In previous studies (e.g. Janssen *et al.,* 2007; Schaminee *et al.*, 2010) this information is not included.

A revised European Red List for vascular plants is under construction. Unfortunately this information is not yet available and therefore not included in the present study.

2.1.5 Habitats

The information used to assess the status in this research is based on the information available in the Article 17 reporting (ETC/DB, 2008). In the article 17 reporting Member states have provided information on range and surface of the habitats. For determining the amount of habitats in the different categories both range and surface can be used. However, for both parameters not for all EU 25 member states information is available. Overall the data for range are more complete then for surface. Also for the Atlantic region the data are better than for the EU 25. This lack of data would result in an overestimation of the % of area or range in the Netherlands.

Countries have used different methods to indicate range – the European Topic centre has converted the data to a 10 x 10 km grid. These data are also incorporated in the database and have been used for the range estimation.

If for a given habitat the data for EU25 are complete (e.g. no countries missing) this information is used to determine the category. If data are missing the range is reviewed and an assessment is made what the effect of the missing data would be on surface %.

2.2 Policy options reviewed

There is an unlimited number of possible options of criteria and combinations of criteria which can be used to define species relevance for conservation in an European context. In consultation with the steering committee of this project eleven policy options were formulated, based on three different perspectives being Pan-European, EU and Atlantic region.

The policy options were developed on the basis of:
- Threat status (based on existing red list or conservation status as determined in the article 17 Reporting under the Habitats directive);
- Legal protection (listed in the Birds or Habitats Directive);
- Distribution (based on range or population size);
- Combinations of these three criteria, using for some criteria different thresholds.

In the majority of the pre-existing studies the criteria 'threat', 'legal status' and 'distribution' were combined – the advantage of combining 'threat' and 'legal status' is that the 'legal status' does not always reflect the latest information on threat as the updating of the legal status takes time. In the legal status also other criteria related to 'risk of extinction' such as rareness, endemic are considered. By adding the criteria 'distribution' it is ensured that species that are not endangered or protected for which the Netherlands is important given the distribution of a species are also considered.

The options are described below:

Policy options formulated from a Pan-European perspective:

B1: In this policy option 'distribution' is the leading criterion. Dutch nature conservation policy should focus on protecting species or habitats which range/ distribution is exceeding the 1% threshold. This threshold lies considerably above the proportional area of the Netherlands compared to Pan-Europe which is estimated to be < 0.35%.

B2: In this policy option 'threat' is the leading criterion. Dutch nature conservation policy should focus on species that are listed on the Pan-European red list.

Policy options formulated from a European Union perspective:

B3: In this policy option 'distribution' is the leading criterion. Dutch nature conservation policy should focus on protecting species or habitats which range/ distribution is exceeding the 10% threshold. This threshold lies considerably above the proportional area of the Netherlands compared to the EU, which is estimated to be <0.9% ('area ration').

B4: In this policy option 'distribution' and 'threat' are combined. Dutch nature conservation policy should focus on protecting species or habitats which range/ distribution is exceeding the 10% threshold and that are also listed as a Red list species in Europe. This threshold lies considerably above the proportional area of the Netherlands compared to Pan-Europe. which is estimated to be <0.9%.

B5: In this policy option 'legal status' is the leading criterion. Dutch nature conservation policy should focus on protecting species or habitats which are legally protected under EU law. As all birds species are protected the policy option reviews the species listed on Annex I or for which sites have been designated.

B6: In this policy option 'legal status' and 'threat' are combined. Dutch nature conservation policy should focus on protecting species or habitats which are legally protected under EU law and listed on the EU Red list. As all birds species are protected the policy options reviews the species listed on Annex I or for which sites have been designated.

B7: In this policy option 'legal status' and 'threat' are the leading criterion. Dutch nature conservation policy should focus on protecting species or habitats which are legally protected and have an unfavourable status in the EU or Atlantic region.

Policy options formulated from the Atlantic regional perspective:

B8: In this policy option 'distribution' is the leading criterion. Dutch nature conservation policy should focus on protecting species or habitats which range/ distribution is exceeding the 25% threshold in this region. This threshold lies considerably above the proportional area of the Netherlands compared to the Atlantic region which is estimated to be <5-6%.

B9: In this policy option 'distribution' and 'threat' are combined. Dutch nature conservation policy should focus on protecting species or habitats which range/ distribution is exceeding the 25% threshold for the Atlantic region and that are also listed on the Red list.

B10: In this policy option 'distribution' and 'threat' are combined. Dutch nature conservation policy should focus on protecting species or habitats which range/ distribution is exceeding the 25% threshold for the Atlantic region and that have an unfavourable conservation status in the Atlantic region or at the EU level (for birds).

B11: In this policy option 'distribution' and 'legal status' are combined. Dutch nature conservation policy should focus on protecting species or habitats which range/ distribution is exceeding the 25% threshold for the Atlantic region and that are legally protected. As all birds species are protected the policy options reviews those species listed on Annex I or for which sites have been designated.

The policy options are depicted in Figure 3 .

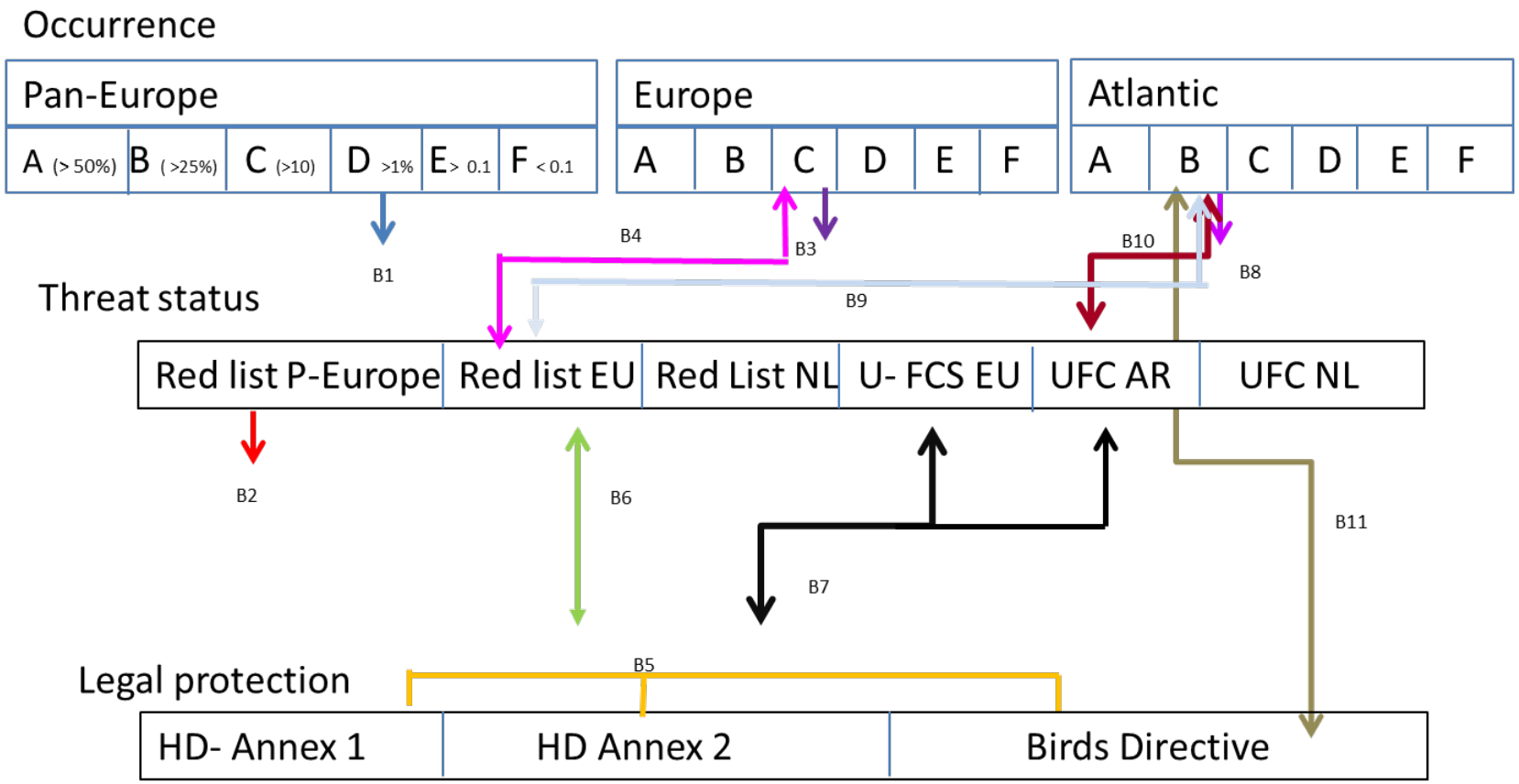


Figure 3. Policy options to select species and habitats

3 Results

3.1 Policy options: results of the analysis

3.1.1 Distribution (occurrence) (PO 1)

The relative importance of the distribution of a species or habitat in the Netherlands is an important criterion used in almost all studies. The distribution is calculated as the range of the Dutch population with regard to the range of the species/ habitat in Pan-Europe, the EU-27 and the Atlantic Region.

Figure 4 show the distribution of species and habitats based on the different regions under consideration (e.g. the Pan-European, EU-27 and Atlantic region for resp. plants, butterflies, birds and habitats) in absolute numbers (e.g. species or habitats) and % of species.

There are distinct differences between the importance of the Netherlands for the reviewed species groups. For only a very small percentage of the Dutch plant species, the Netherlands covers a significant part of their range (5% of the species exceeds the 1% threshold in the Atlantic region and 7% of the species exceeds the 1% threshold in Pan-Europe (cat D)). The Netherlands has no endemics and in general the vascular plants occurring in the Netherlands have a wide distribution range.

For butterflies, breeding birds and habitats the importance of the Netherlands is comparable. The importance of plants is lowest compared to the other species groups.

Of the butterflies species 6%, 30% and 41% exceed the threshold of > 1% for Pan-Europe, EU and Atlantic region respectively. After the intensification of agriculture in the previous century most butterfly species became restricted to protected areas and nature reserves. In Pan-Europe the intensification of agriculture had less impact than in the Netherlands, and butterflies are therefore much more common there. It explains why the share of most of the Dutch populations is so small. Exceptions are Dusky large blue (*Phengaris nausithous*) and the Cranberry fritillary (*Boloria aquilonaris*) .

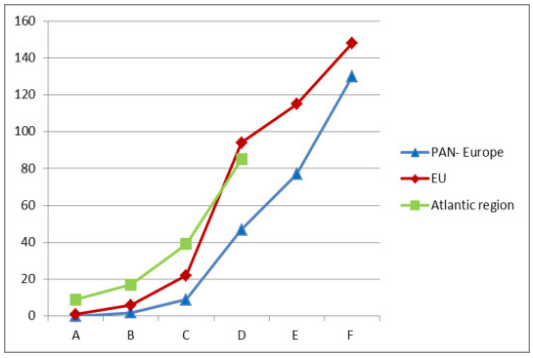
The share of species of Dutch breeding birds exceeding the 10% threshold is 5%, 11% and 19% for Pan-Europe, EU and Atlantic region respectively. For habitats the number of habitats exceeding the 1% threshold is 8% and 27% for Pan-Europe and Atlantic region respectively.

In the final phase of the project it was decided not to undertake the comparative assessment for the different region for non-breeding bird species. Due to the migratory nature of the birds a comparison of the population in the Atlantic region with EU and Pa-Europe would lead to wrong interpretation of the importance of the Netherlands for the non-breeding birds. For non-breeding birds only the share of the flyway population was calculated, since this is more appropriate than the Atlantic region (Table 4).

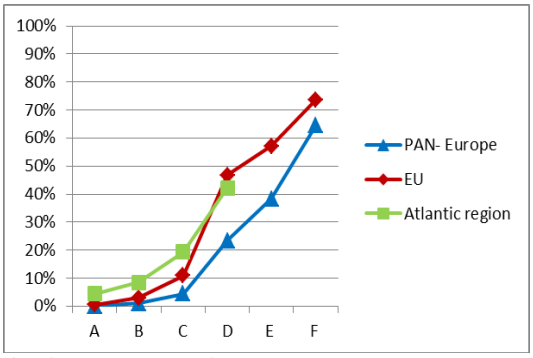
Table 4. Number of non-Breeding birds occurring in the Netherlands for the respective flyway

Category	Flyway	%
A > 50	10	4
B > 25	26	11
C > 10	47	20
D > 1	73	31
E > 0.5	79	34
F > 0.1	94	40

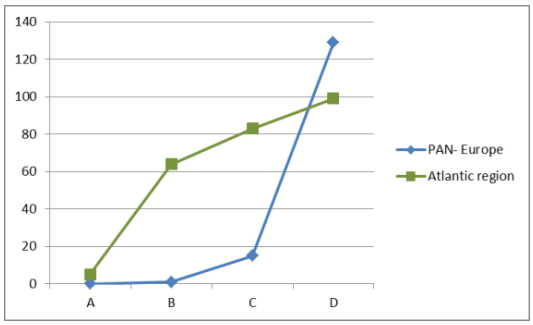
If we assess the effect of changing the criterion region of reference or threshold, Figure 4 shows the following.



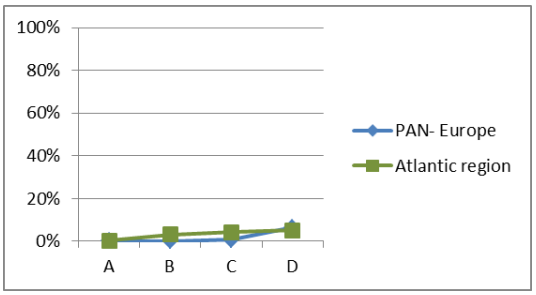
Breeding Birds – absolute numbers



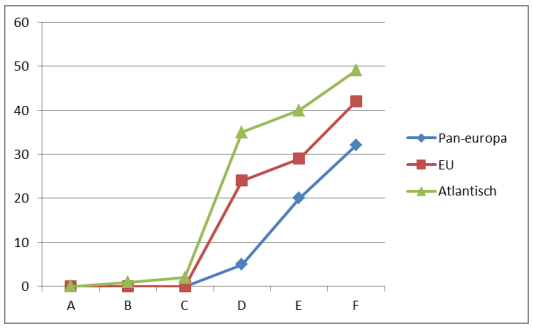
% of total number of Dutch breeding birds



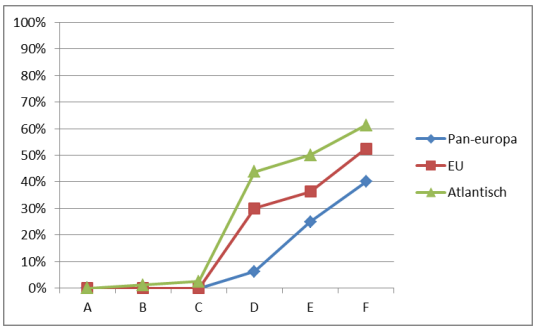
Plants – absolute numbers



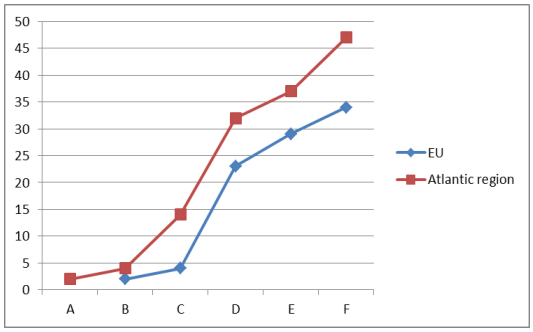
% of total number of Dutch plants



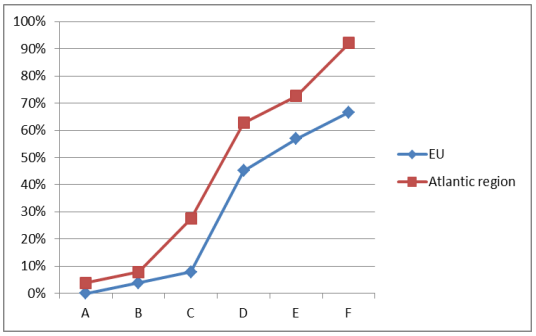
Dutch Butterflies – absolute numbers



% of total number of Dutch Butterflies



Habitats – absolute numbers



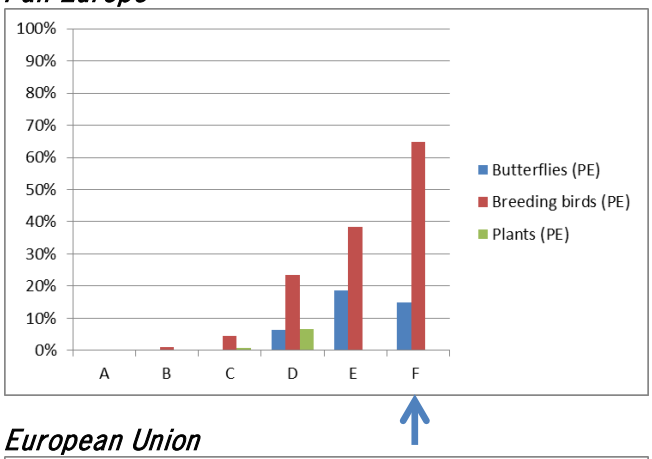
% of total number of Dutch Habitats

Figure 4. Absolute number of species or habitats (left) and % of total number of species occuring in the Netherlands (right) for each category. Explanation legend x-ax: A=> 50%, B=> 25%, C= > 10%, D= > 1%, E=> 0.5%, F= > 0.1%

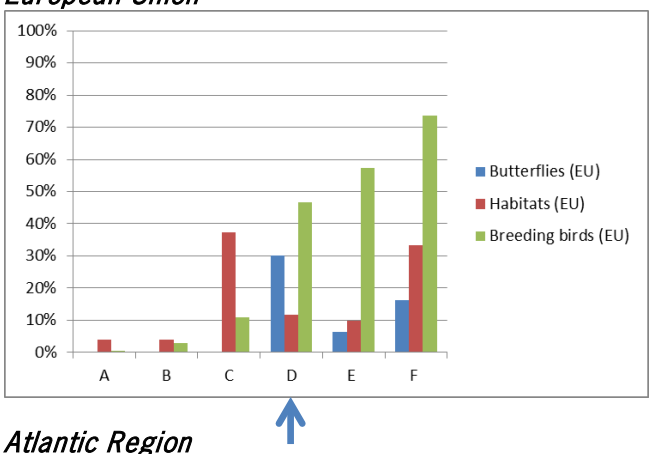
The effect of changing the thresholds values within a region

The sharp increase in the percentage of species or habitats to be protected in all three regions usually occurs between category C (> 10%) and D (> 1%) (see Figures 4 and 5). If thresholds values are set above 10% distribution in the region the % of species or habitats selected decreases fast in Pan-Europe or the EU. In the Atlantic region a less steep decrease is noted for habitats, plants and birds. In Figure 5 the blue arrow indicates the class that corresponds with the surface of the Netherlands with respect to the three reviewed regions (respectively 0.35% for Pan-Europe- class F, 0.9% for the EU class D and 6% for the Atlantic region- class C/D). For all regions a threshold value of 10% result in a sharp decrease. This corresponds with an area ratio (area of the Netherlands/ area of Pan-Europe) of 28 for Pan-Europe. For the EU, the threshold value of 10% corresponds with an area ratio of 10. In the Atlantic region the threshold value of 10% corresponds with an area ratio between 1 and 2.

Pan-Europe



European Union



Atlantic Region

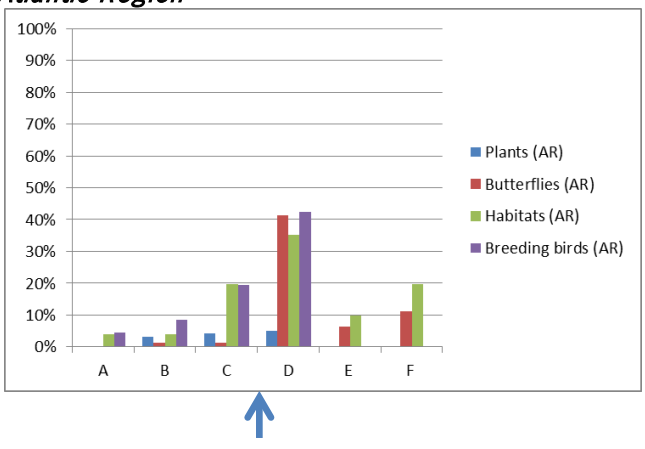


Figure 5. Sum of percentage of species and habitats falling into a category for each of the regions. The blue arrow marks the category in which the area ratio Netherlands/ specific region is located.

Changing the regions but maintaining the threshold values

The effect of choosing a different region but maintaining the same threshold can be seen in Figure 4. In most cases reducing the region under consideration (e.g for Pan-Europe, to EU to Atlantic) will lead to a higher number of species or habitats in the category. The only exception is for plants for category D (< 1%).

In the other figures the green line (Atlantic region) is above the red line (EU) and the red line (EU) above the blue one (Pan-Europe).

Changing both the region as well as the threshold

Figure 6 shows the effect of changing both the region as well as the threshold.
In the figure three different policy options are depicted with increasing thresholds:

- Pan-Europe a threshold of 1%;
- EU a threshold of 10%;
- Atlantic region a threshold of 25%.

If we change both the threshold as well as the region the results really depend on the species group under consideration. This can also be seen in Figure 4 as the steepness of the lines between the different categories varies per species group.

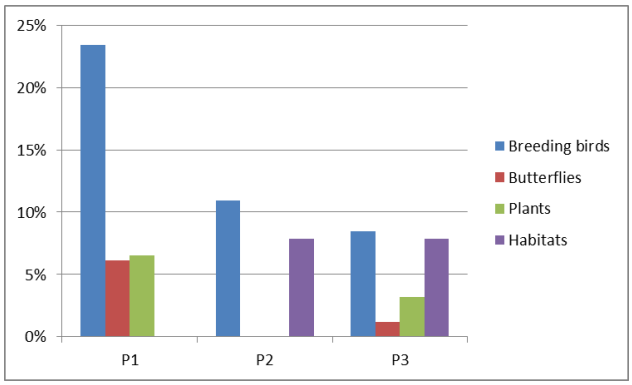


Figure 6. Percentage of Dutch species protected for butterflies, breeding birds and plants in the policy options P1 (Pan-Europe> 1%), P2 (EU > 10%) and P3 (Atlantic region > 25%)

3.1.2 Legal protection

Legal protection of species and habitats can be implemented at different levels. Here we focus on: national (country) level, European Union i.e. under the Birds and Habitats Directive or Pan-European or international.

Table 5 presents the number of species protected under EU and national law.

If we use international legislation as a selection criterion it results in a sharp decrease of species considered of European importance for plants and butterflies (0.15 and 6[4]% respectively). For birds this phenomenon does not occur if we consider legal protection as all bird species are protected under EU law, however if we consider the number of species for which protected areas need to be established around 20% of the species are considered.

For habitats no effect occurs as they are as such under EU legislation and not under national legislation. Countries do protect habitats in 'Reserves' though, such as the Dutch 'Natuurreservaat', with similar intentions (protection of rare habitats).

[4] 4% if we consider the species which are present in the Netherlands and have not (recently) disappeared from the Netherlands

*Table 5. Number of species and habitats included in the Birds- and Habitats Directive. *= There is overlap as species listed on Annex 2 can also be listed on Annex 4.*

Category	Butterflies	Plants	Habitats	Breeding Birds	Migratory Birds
Habitats directive – Annex 1	-	-	51 (100 %)		
*Habitats directive – Annex 2**	4[5] (5%)	3(0.15%)	-	-	-
*Habitats directive – Annex 4**	5[6] (6%)	3 (0.15%)	-	-	-
Birds directive (SAC designation)	-	-	-	44	64
Total number of species/ habitats on EU legislation	**4**	**3**	**51**	**44[7]**	**64**
Dutch national legislation	26	102	0	All	All
Total of reviewed species	80	1942	51	201	231

3.1.3 PO 2: European threat status as leading

The status of species on the European Red List (IUCN criteria CR, EN and VU) was reviewed as a criterion for assessing European importance. Whether a species occurs on the Red list is to a large extent depending on the development of its distribution or numbers, and thus on whether it is being threatened. The methodology which is applied was developed by the IUCN, and is described in IUCN Red List Categories and Criteria: Version 3.1 (IUCN 2001). Countries have also applied this methodology but there are slight deviations, the changes for the Dutch approach were described e.g. by Van Swaay (2006). Table 6 presents the overview of species listed on European and Dutch Red lists. Overall we can see that the number of species occurring on the Dutch Red list is higher than on the EU or Pan-European red list.

Table 6 shows that the criterion 'threat' leads to a sharp decline in number of species considered for birds and butterflies. For plants the EU list is under preparation but a similar effect is expected here.

As part of the obligatory monitoring of the conservation status of species under the Habitats Directive all countries have reported on the conservation status of species and habitats. Based on the national reporting the EU member states have made an assessment of the conservation status of each species and habitat in the biogeographical region. This information is also presented for species and habitats which occur in the Netherlands and have a bad conservation status in the Atlantic region.

Taking the threat resulting from the conservation status of the Article 17 reporting as a criterion results in a further decrease in number of species.

A comparison of the Dutch conservation status with the one in the Atlantic region shows that for around 50% of species and habitats the conservation status is similar (Figure 7). For the majority of species and habitats with an unfavorable- bad conservation status in the Netherlands, the status in the Atlantic region is also unfavorable -bad. For only a few species the situation in the Netherlands is worse than in the Atlantic region (5%). For about 40% of the species and habitats the situation in the Netherlands is better than in the Atlantic region.

If only the species and habitats with an unfavorable- bad conservation status in the Atlantic region are considered of European importance then the number is reduced to 31% of the Dutch habitat types (16), 67% of the Dutch Habitats Directive butterflies (2) and 67% (2) of the Dutch plants listed on the Habitats Directive. (Table 6).

[5] Including one species that has disappeared from the Netherlands
[6] Including two species that have disappeared from the Netherlands
[7] SOVON (2005)

Table 6. Overview of species listed on European and Dutch Red lists

Category		Butterflies	Plants	Habitats	Breeding Birds
Red list	*Pan-Europe*	6 (8%)	No list available	No list available	6 (3%)
	EU	8 (10%)	No list available (exp. 2011)	No list available	10 (5%)
	The Netherlands	49	497	No list available	78
Conservation Status unfavorable – bad	*EU*	- [8]	-		77
	Atlantic region	2	6[9]	16	-
	The Netherlands	3 (2 also listed as U2 in Atlantic region)	2	18	

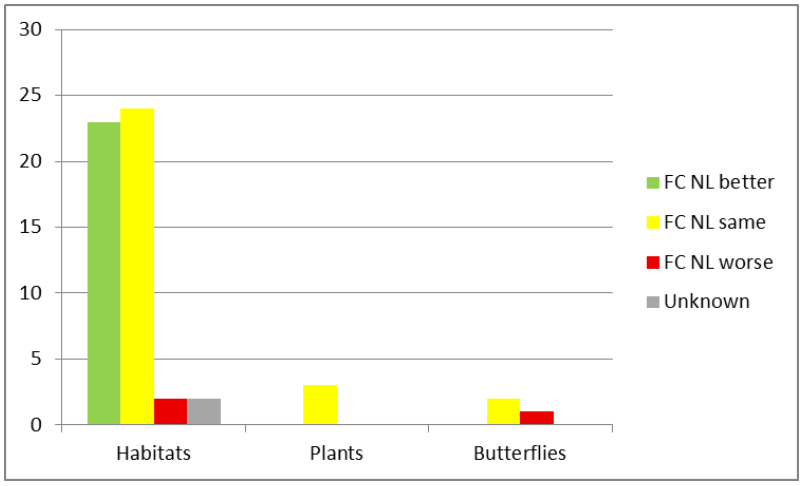


Figure 7. Overview of the Dutch conservation status of species compared to the conservation status in the Atlantic region. Green colors indicate that the Conservation status is better in the Netherlands then in the Atlantic region, yellow that the conservation status is the same, red that it is worse in the Netherlands compared to the Atlantic region.

3.1.4 PO 4: Combinations of different criteria

In most studies species are selected if they fulfil at least one of the criteria. In Table 8 and Figure 8 the 11 analysed policy options are presented (for the description of the policy options see Chapter 2 and Figure 2). Some of the policy options defined are based on 1 criterion (B1, B2, B3, B5, B8), others policy options require that species fulfil more than one criterion (B4, B6, B7, B9-B11).

In order to review the effects of variation in the different criteria used in this study (distribution, threat and legal status) two indicators are relevant:

1. The total number of species and habitats which are considered of European importance for the different options (Table 8);
2. The overlap of species and habitats between the different options (Figure 8).

[8] No Conservation status was defined for the entire EU (pers. comm. D. Evans, ETC-Paris)
[9] Included are two plant species that disappeared in the Netherlands

Overall the different policy options have only a few species in common (Figure 8, see Annex 1 and 2 for the list of species and habitats). This shows that the different criteria are not closely interrelated. For instance the overlap between the legal protection and the two different threat statuses (e.g on the red list of the EU or an unfavourable conservation status in the Atlantic region) is 15% and 22% respectively. This might seem surprising but the species protected on the Habitats and Birds directive were not only selected based on their threat status (see box in Chapter 2).

Furthermore given the limited number of Dutch species on the red list of Pan-Europe or the EU also the overlap between Red list and the various options considering distribution is low (Figure 7). Figure 8 shows that the different criteria have remarkably little overlap and thus seem to be of a different order. Table 7 list the species that occur in more than three policy options. Not surprisingly the majority of these species are protected under the Birds or Habitats Directive. The majority of the species are related to marshland or natural grasslands, open water and coastal systems.

Table 7. Species that occur in at least four policy options

Species Group	**Dutch name**	**Latin name**
Breeding bird	Grote Stern	*Sterna sandvicensis*
Breeding bird	Kievit	*Vanellus vanellus*
Breeding bird	Zwarte Stern	*Chlidonias niger*
Breeding bird	Kleinst Waterhoen	*Porzana pusilla*
Breeding bird	Kluut	*Recurvirostra avosetta*
Breeding bird	Purperreiger	*Ardea purpurea*
Breeding bird	Grutto	*Limosa limosa*
Breeding bird	Lepelaar	*Platalea leucorodia*
Butterflies	Pimpernelblauwtje	*Phengaris teleius*
Butterflies	Donker pimpernelblauwtje	*Phengaris nausithous*
Plant	Drijvende waterweegbree	*Luronium natans*
Plant	Kruipend moerasscherm	Apium repens

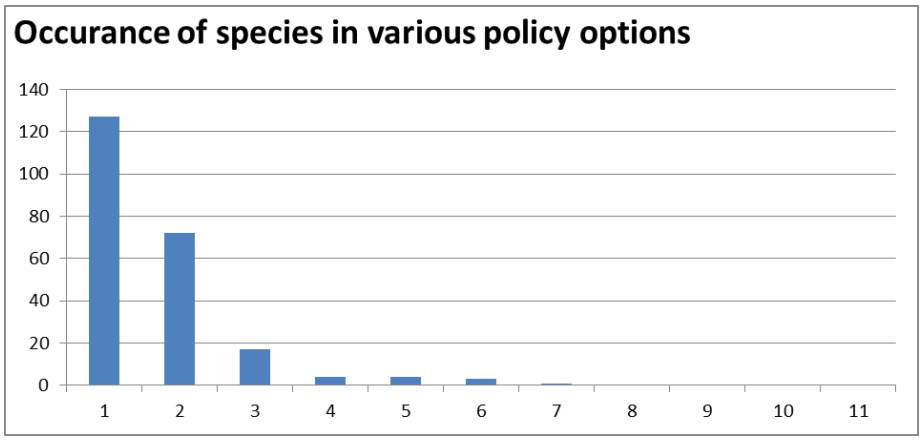


Figure 8. Number of times species are occurring in the eleven policy options presented.

Table 8. Overview of species and habitats targeted by the different policy options.

Policy options	B1 > 1% distribution	B2 Red list Pan-Europe	B3 occurance > 10%	B4 occurance > 10% and on Red list of Europe	B5 legal status	B6 legal status and on red list	B7: legal status and bad conservation status	B8 distribution> 25%	B9 distribution > 25% and on red list	B10 distribution >25% ? and bad conservation status	B11 distribution> 25% threshold Atlantic region and legal status
Butterflies	5	4	0	0	6	3	2	1	0	1	1
Breeding birds	47	6	22	4	41	2	9	17	2	4	9
Plants	127	na	na	na	3	0	2	62	0	1	0
Total	179	10	22	4	52	5	13	80	2	6	10
Habitats	na	na	4	na	51	na	18	4	na	3	4

3.2 Relationship policy options with major ecosystem types

In order to assess which ecosystems the different policy options are targeting the species and habitats of each policy options were linked to the ecosystems in which they occur. A simplified classification distinguishing 13 broad ecosystem classes was used for the species. The habitats were clustered based on the existing major groups of the Habitats Directive.

In Figure 9 the major ecosystems groups addressed by the policy options for habitats are depicted. For habitats, coastal habitats are selected in the majority of the policy options.

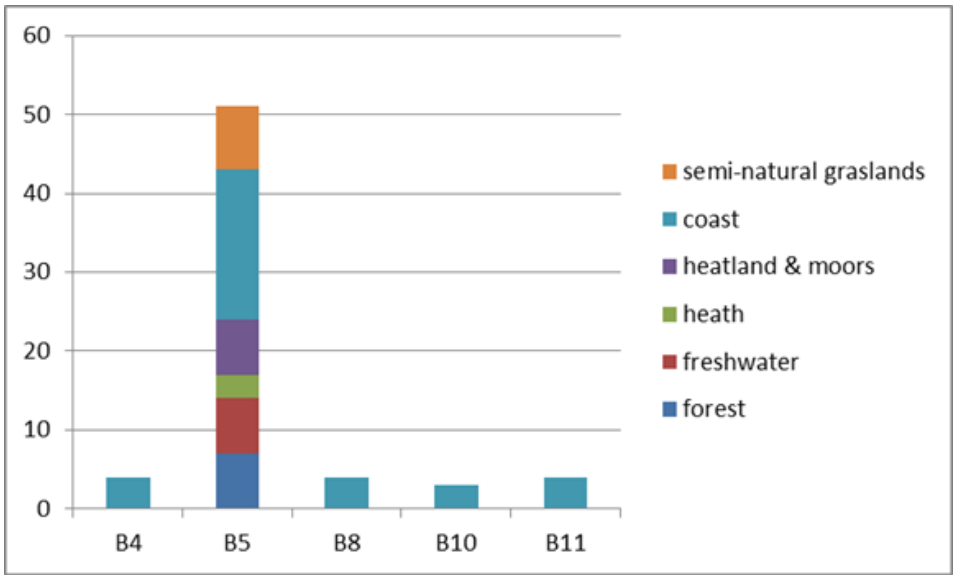


Figure 9. Main ecosystems types for habitats under each option

Figure 10 shows the ecosystem preference for the species selected in the various policy options. Overall species selected in most options have an preference for marshland and fens, open water and coast. However these results are strongly determined by the birds species given the numbers in which they occur in the policy options.

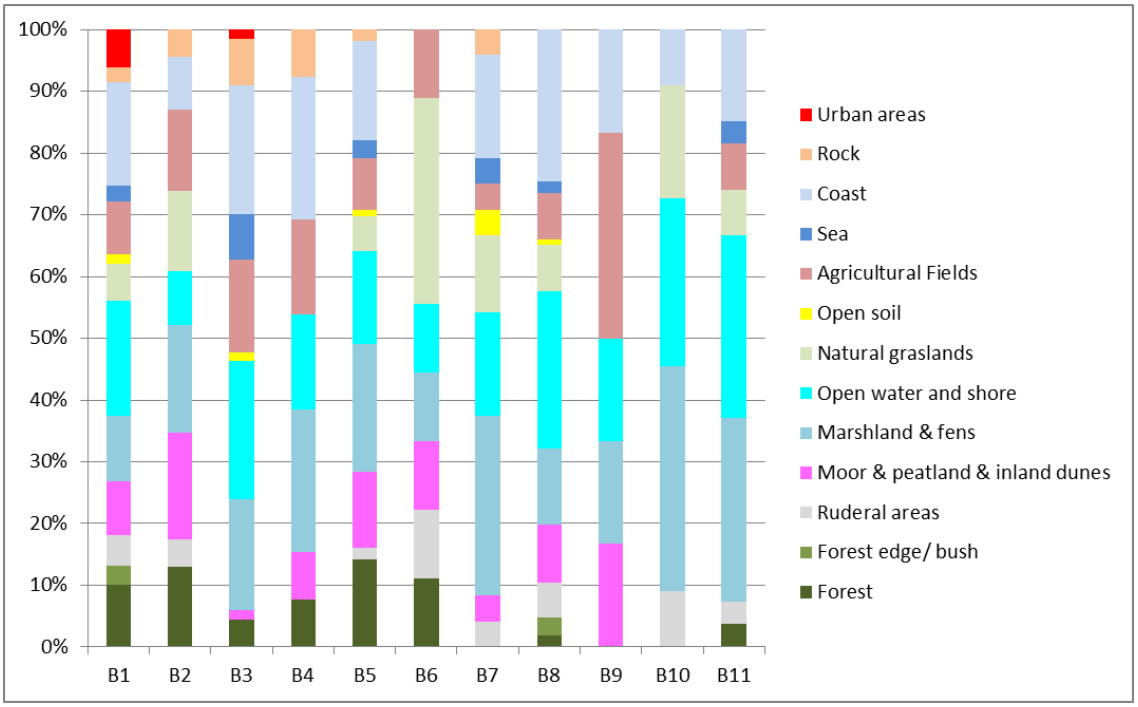


Figure 10. Major ecosystem types of selected species under each policy option.

4 Discussion

4.1 Conservation criteria

The choice which species and habitats should be considered of European importance and thus should be part of the Dutch nature conservation policy can be taken on various grounds. In this study we reviewed what the consequences are for the number of species and habitats if we base an assessment of 'European importance' on 3 different considerations namely the share of distribution area (related to a specific region), threat and international legal protection.

But what is the underlying reasoning to choose these or any criterion to select species of habitats of European importance. Below the reasoning to choose criterion distribution, threat and legal protection are shortly described.

- *Threat.*
  Since the introduction of the system of Red lists by IUCN in 1963 global and regional[10] list of threatened species have been developed. By focusing nature conservation on these species extinction of species in the wild should be avoided. If these species occur in a given country then this country has a higher responsibility for ensuring that this species is conserved and that extinction is avoided.
- *International legal protection.*
  Existing European legislation is a very logical ground for a species or habitat to be considered of 'European importance'. For the EU this holds for all species and habitats which have been included in the Annexes of the Birds and Habitats Directive. If a quantitative approach based on distribution would show that the species may have less priority for protection, nevertheless the legislation forms a reasons to maintain its status as a species of European importance.
- *Distribution.*
  The philosophy behind this criterion is that countries that have agreed to protect biodiversity are responsible for maintaining the species and habitats occurring in their territory. In principle this consideration holds for all species or habitats in the area. However if a country holds more than a proportional share of the population of a species than the country has a higher responsibility for ensuring that this species is conserved. Therefore often species are considered of European importance if a country holds more then it's proportional share.

Besides the three criteria used in this study (distribution, threat and legal protection) there are also other considerations to decide which species and ecosystem require protection. Considerations stated in various publications refer to issues as

- *Public appeal*: species which have been symbols for conservation for many years may be protected, for no other reasons than that people care about them. A good example is the grey seal in the Waddensea, which was in decline as a result of water pollution and hunting, later due to a virus infection. At present the population size has increased again but efforts to safe young grey seals still continue.
- *Ethical obligations* would apply to all species. This is also the founding principle of the Fauna legislation (Flora en Faunawet, 1998), which protects for example all mammal species (three species are exempted). The law confirms that all species with no direct benefit to man have an intrinsic value, thus have a right to exist.

[10] Regionally in the sense of (parts of) specific continents for instance Pan-European

- *Ecosystem health* relates to the biodiversity concept: each species is part of a larger food web. The whole is more than the sum of its parts. Prioritising species, and thereby opting out species for protection for various reasons, would result in a less stable ecosystem. Under current conditions, with all additional stress factors like climate change, this may result in irreversible ecosystem changes, once a tipping point is past. There have been important examples, like in acquatic ecosystems (Scheffer *et al.*, 2012).
- *Genetical diversity* is part of 'biodiversity (see box). Small and rare Dutch sub-populations may be very different from populations abroad, and its adaptation to Dutch conditions makes the species of particular importance. In the case of sub-species this is very obvious, however, also a species like the moor frog show genetical differentiation related to the landscape history, which has important scientific value (Arens *et al.,* 2007).
- *Reference ecosystems* also refers to the biodiversity concept,and is closely related to ecosystem health. It is considered that complete ecosystems are of importance for scientific reasons.

In this study we also reviewed the impact of setting various thresholds based on recent information (last 10-25 years) regarding distribution. However other threshold could also be considered following an alternative reasoning:

- *Historic reference*: In the Netherlands and the EU many species have experienced a dramatic decline in the last century or have even gone extinct. Thresholds for the distribution of species could also be based on historic reference of distribution of species in Europe. Examples are for instance *Limosa limosa* is species that was much more abundant in the EU in the past which has suffered a significant decline.
- *Sustainability of species populations*. In order to assess the effect of fragmentation of natural habitats for species, several studies have estimated the size of minimum viable populations (MVP). The idea behind this concept is that if a population is above the value of an MVP, the chance of local extinction would be less than 5% in 100 years.
  However if we compare the majority of the estimates for minimum viable populations (MVP) with present species numbers the present population sizes are much higher than the thresholds set for a MVP. Using this threshold would mean a considerable decrease in the abundance of species and thus overall biodiversity loss.

In the last decennia Dutch nature conservation policy and EU biodiversity policies has strongly focussed on protecting species and habitats. Also the analysis undertaken in this report was focussed on this particular aspect of biodiversity conservation. In doing so the wider context of species protection and conservation might be missed. After all, the end goal is not only to protect a single species or habitat, but maintaining biodiversity. Biodiversity is described as the variety and richness of life forms (see text box, next page). Here the approach is the larger 'whole', maintaining the completeness of life forms, which is very different from a single species or habitat focus as followed in this study. The goal of the Convention on Biological Diversity as well as of the EU Biodiversity Action Plan explicitly to halt further loss of biodiversity.

What is Biodiversity?

It has become a widespread practice to define biodiversity in terms of genes, species and ecosystems, corresponding to the three fundamental and hierarchically related levels of biological organization (WCMC 1992).

- Genetic diversity: The heritable variation within and between populations of organisms.
- Species diversity: The number of species in a site or habitat. This is also called species richness
- Ecosystem diversity: The diversity of ecosystems. Since there is no unique definition and classification of ecosystems at the global level, it is difficult to assess ecosystem diversity other than on a local or regional basis and then only largely in terms of vegetation.

Biodiversity at populations/species level incorporates demographic parameters like abundance, density, cover or importance value, richness, commonness and rarity etc of keystone species or umbrella species, and health parameters (Noss *et al.,* 1997). The number of species present in an area could be a measure, to define its ecological value. However, it is an arduous task to list all species of different species groups and taxa. Diversity indices where developed to determine relative diversity of a community.

The biodiversity at ecosystem level entails ratios of native to exotic species, species richness, of selected taxa, abundance of groups particularly sensitive to environmental stressors (for example, amphibians, fishes, or butterflies), habitat structure variables, and index of biotic integrity.

Under biodiversity at landscape level we include factors like the frequency distribution of seral stages (age classes) of sample forests, patch size frequency, patch perimeter, fractal dimension in sample landscapes, fragmentation indices, interpatch distance in sample landscapes, physical connectivity of patches, road density, fire regime (frequency, patch size, intensity, etc.), frequency of major flooding, human population growth, human land-use trends, deforestation, afforestation, total area and distribution of protected areas in various categories, regionally and nationally, and Gross national product (Noss *et al.,* 1997).

"Biodiversity has been seen as the total … complexity of all life, including not only the great variety of organisms but also their varying behaviour and interactions. From this viewpoint, no single objective measure of biodiversity is possible, only measures relating to particular purposes or applications." (http://www.nhm.ac.uk/science/projects/worldmap/diversity/index.html).

(Van der Sluis, 2005)

4.2 Difference with previous studies

Earlier studies already listed which species and habitats should be considered given their 'European importance'. This paragraph briefly summarises the main differences between the approach of this study and previous ones.

The first and most important difference is that this study reviews different options without answering the question 'what is of European importance'. Previous studies were aiming to develop lists of important species, European ecosystems or habitats while this study is concerned with reviewing what happens if different criteria are applied.

As a result the thresholds set in the policy options in paragraph 3.1.4. are overall much higher than in previous studies. In the study of Janssen *et al.* (2007; 2009) 1% was mostly used as the lowest threshold – everything above that was considered of European importance and therefore included in the analysis.

Beers (1993) set no thresholds for plants and Siepel *et al.* (1993a & 1993b) set different thresholds depending on the location of the range. Osieck *et al.* (1994) used a 25% threshold. Knegt *et al.* (2011) used a 20% threshold.

Another important difference is that following the division used by the Habitat Directive the contribution of species populations of the Netherlands with regard to the Atlantic region was reviewed. With the exception of the study of Knegt *et al.* (2011) all other studies reviewed 'European importance' based on the territory of the EU or Pan-European region.

Another important additional criteria applied in this study is the conservation status of Habitats and species as assessed in the Article 17 reporting.

A few criteria applied in other studies have not been used in the assessment in this report (Janssen *et al.,* 2007). Most prominent criteria not used are the following:

- *Situation of Dutch area with regard to range/ outpost*[11]: applying this criteria leads to addition of species which have low population numbers or a small range in the Netherlands. For plants this would have resulted in inclusion of four additional species.
- *Subspecies*: the importance of the Root vole (*Microtus oeconomus ssp. arenicola*) and Large copper (*Lycaena dispar ssp. batava*) is underlined in most publications as the Netherlands holds subspecies for both species and the species are included in the Annex of the Habitats Directive.
- *Division in sub-habitat types*. For habitat types a large number of sub-habitat types are recognised for the habitat directives. The recognition of sub-habitat types leads to an increase in the number as many of the sub-habitat types are typical or exclusively occurring in the Netherlands.

The method developed by Knegt *et al.* (2011) for assessing European importance for butterflies and plants is very different from the approach developed in this and the other studies described in this report. It bases its assessment of European importance on:

- an assessment of how far the occurrence of a species is restricted to a habitat types of the Habitat Directive ('trouwgraad'- fidelity);
- the importance of the Netherlands for the specific habitat types.

Only for plant species linked to coastal habitats the results are similar – for all other plant species and butterfly species not. Most plausible explanation for the differences found is that outside of the Netherlands the species are not restricted to the same habitat types. However, if the ecosystem preferences of the species selected in this study is compared with the nature types selected in de study of Knegt *et al.* (2011) the same groups of broad ecosystem types are selected (see Section 3.2, Figure 10, policy option 8).

4.3 Data quality

Caution is required in drawing conclusions on the European importance of species and habitats on the basis of this and previous analysis. The data reliability varies for each species groups. One reason is that the efforts in monitoring biodiversity in the different EU countries and species groups varies considerably – as a result the quality of the data between the countries vary and in particular for rare species there are gaps in knowledge. Also data has not always been collected in a similar or systematic way in the various countries. If the same approach would be used for taxa not included in this study many more problems would be encountered due to limited detailed knowledge of the distribution area and historical trends (e.g. fish, mushrooms, amphibians)

Furthermore amongst species groups there are differences which stem from the monitoring data, but also specific species behaviour. This is in particular the case for the bird data, which are available for breeding birds, non-breeding birds and water birds. For each of these groups current

[11] An 'outpost', ('voorpost' in Dutch) is the presence of a species in the Netherlands at least 100 km from its continuous distribution area

legal protection differs, but also the way the data is collected. Furthermore which data is used may sometimes be arbitrary. E.g. are average population numbers or minimum or maximum population size used in the view of annual fluctuations, and which period is chosen as reference?

Overall bird data is reliable for breeding birds and common water birds: several countries have good coverage and a large volunteer network that contributes with observation data. However, the more rare water birds, sea birds and other non-breeding birds are less well known, in particular for the population numbers and trends. Generally data for birds are reliable enough to define the relative importance of these species. For butterflies the monitoring system is slightly less complex, with resident butterflies and irregular residents. Recent EU efforts have increased data coverage and reliability of butterfly data considerable (Van Swaay *et al.,* 2010).

In addition to the taxonomic groups included in the present study (birds, butterflies, vascular plants) it might be useful to consider the inclusion of other taxonomic groups with different ecological requirements since these groups provide complementary information. In addition to plants and animals, fungi for example represent an own kingdom and they give important information on soil biodiversity and associated ecosystem services. Fungi are already included in a formal Red List and in the Network Ecological Monitoring (NEM).However no European data are available for fungi.

4.4 Dutch targets – a matter of politics

The aim of this research was not to develop a new list of species of European importance but to review the consequences of applying different criteria and thresholds. In the end what is considered of European importance is a political choice as much as a scientific choice. Founded on scientific insights the Ramsar Convention and the Annexes of the Habitats directive and Bird directive now have become well established policy targets and the species protected under these directives are therefore *de facto* of European importance.

However these directives are also undergoing change. In 2012 a start will be made with the review of the Annexes of the Birds and Habitats directives. Furthermore the question for policy makers is not only what is of European importance but also what happens if we do not take action – is a species endangered in our country or even within a specific region of the country?.

Also in prioritizing the scarce nature conservation resources the issue of cost effectiveness and the likelihood that conservation efforts will improve the status of a species needs to be reviewed.

5 Conclusions

The review in this project showed that earlier list on species of European importance have been drafted based on three dominant nature conservation considerations:

1. Responsibility to avoid extinction e.g. a country is taking its responsibility that a species or habitat is not going extinct in the world or a specific region.
2. Legal responsibility: a country has agreed to protect a specific species or habitat under international law.
3. Territorial responsibility. A country is responsible for protecting a species or a habitat for which it has a more than average responsibility as a large part of the range or its population is occurring in the country.

The criteria used in the past to determine European importance in different studies reflect these considerations.

Overall the studies use similar criteria with slight variations. The criteria used are:

- Threat status (category 1a).
- Rareness (e.g specific species communities, rare species in European context, type localities) (category 1b).
- Vulnerability (category 1c).
- Species for which the Netherlands is on the border of their distribution range or isolated populations/ habitats (e.g subspecies) (category 1d).
- Legal protection (category 2).
- Threshold levels for the range of a species in the Netherlands (e.g. species which have a more than average presence in the Netherlands or endemic species); (category 3a).
- Threshold levels for the population occurring in the Netherlands (e.g. species which have a more than average presence in the Netherlands or endemic species) (category 3b).

Most studies consider a species or habitat of 'European importance' if they fulfil one of the above mentioned criteria. The analysis into the effect of changing criteria and thresholds for 'distribution', 'threat' and 'legal protection' provided the following answer to the questions posed:

1. *Would changing the thresholds set for distribution in a region reduce the number of species and habitats considered of European importance significantly?*
   A sharp increase in the percentage of species or habitats to be protected based on the distribution in all 3 regions usually occurs between category C (> 10%) and D (> 1%). If thresholds values are set above 10% distribution in the region the percentage of species or habitats considered as European important drops fast in Pan-Europe or the EU. In the Atlantic region a much less steep distribution is noted for habitats, plants and birds.

2. *Would changing the region which is taken as a reference reduce the number of species and habitats considered of European importance significantly?*
   A decrease in size of the region reviewed (e.g from Pan-Europe, EU to Atlantic region) leads to an increase in the number of species and habitats considered of European importance for all groups.

3. *What is the combined effect of changing the region as well as the threshold?*
   The effect is difficult to assess as the result for the different species groups vary. For some species groups this would lead to an increase, for others a decrease.

4. *Would using only the criterion 'legally protected species' (under EU law) reduce the number of species and habitats considered of European importance significantly?*
   Due to the limited number of Dutch plant and butterfly species protected under EU-legislation the number of species considered of European importance decreases compared to the criterion 'distribution'. Only 6%[12] of Dutch butterfly species are protected under EU legislation and only 0.15% of Dutch plants species. For breeding birds this phenomenon does not occur as all bird species are protected under EU law, however if we consider the number of breeding birds for which protected areas need to be established 20% of the species are considered.
   For habitats no effect occurs as they are identified only under EU legislation and not in national legislation.

5. *Would using only the criterion 'threatened species' (based on Red list or conservation status) reduce the number of species and habitats considered of European importance significantly?*
   Due to the limited number of Dutch plant and butterfly species listed on Pan-Europe or EU red list the number of species considered of 'European importance' decreases compared to the criterion 'distribution'. Under this definition of European importance only 8% and 10% of the butterflies species are listed on the Pan-European and EU Red list for butterflies. Three procent of the breeding birds is listed on the Pan-European Red list and 27% on the EU Red list.

6. *Does only considering species or habitats with a bad conservation status in the Atlantic region as priority species reduce the number significantly?*
   Around 31% of the Dutch habitat (16), 67% of the Dutch Habitats Directive butterflies presently occurring (3) and 67% (2) of the Dutch HD-plants have a bad conservation status. However for the majority of species and habitats with an unfavourable - bad conservation status in the Netherlands, the status in the Atlantic region is also unfavourable-bad.

   Some of the policy options reviewed in this study and reflected upon in the conclusions have a very narrow interpretation of what can be considered as the highest priority policy goals for nature protection or biodiversity protection. They do not reflect the goals set in the Convention on Biological Diversity that seeks to "anticipate, prevent and attack the causes of significant reduction or loss of biological diversity at source because of its intrinsic value and because of its ecological, genetic, social, economic, scientific, educational, cultural, recreational and aesthetic value."

   As such, the Netherlands has obliged itself to take all efforts to stop the loss of biodiversity, to develop national strategies as framework for practical conservation. The general status of several species groups like butterflies, grassland birds or amphibians in the Netherlands is quite alarming. Focussing nature conservation efforts only on the European legal status and European threat status of species will most likely further deteriorate the situation of many species and habitats that are threatened .

[12] 4% if we consider the species which are present in the Netherlands and have not (recently) disappeared from the Netherlands

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Annex 1 Overview of species selected in the eleven policy options

[1] = disappeared in the Netherlands

Group	Dutch Name	Latin name	P 1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
Breeding bird	Aalscholver	*Phalacrocorax carbo*	x		x								
Breeding bird	Baardman	*Panurus biarmicus*								x			
Breeding bird	Bergeend	*Tadorna tadorna*	x		x								
Breeding bird	Blauwborst	*Luscinia svecica*					x			x			x
Breeding bird	Blauwe Kiekendief	*Circus cyaneus*					x						
Breeding bird	Blauwe Reiger	*Ardea cinerea*	x										
Breeding bird	Boomkruiper	*Certhia brachydactyla*	x										
Breeding bird	Boomleeuwerik	*Lullula arborea*					x						
Breeding bird	Bosrietzanger	*Acrocephalus palustris*	x										
Breeding bird	Brandgans	*Branta leucopsis*	x		x								
Breeding bird	Bruine Kiekendief	*Circus aeruginosus*	x				x						
Breeding bird	Buidelmees	*Remiz pendulinus*								x			
Breeding bird	Casarca	*Tadorna ferruginea*		x	x	x							
Breeding bird	Dodaars	*Tachybaptus ruficollis*	x										
Breeding bird	Draaihals	*Jynx torquilla*					x						
Breeding bird	Duinpieper	*Anthus campestris*					x						
Breeding bird	Dwergmeeuw	*Larus minutus*								x			
Breeding bird	Dwergstern	*Sterna albifrons*	x				x		x				
Breeding bird	Fuut	*Podiceps cristatus*	x										
Breeding bird	Geoorde Fuut	*Podiceps nigricollis*				x							
Breeding bird	Grauwe Gans	*Anser anser*	x		x								
Breeding bird	Grauwe Kiekendief	*Circus pygargus*					x						
Breeding bird	Grauwe Klauwier	*Lanius collurio*					x						
Breeding bird	Grote Canadese Gans	*Branta canadensis*	x										
Breeding bird	Grote Stern	*Sterna sandvicensis*	x		x		x		x				

Group	Dutch Name	Latin name	P 1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
Breeding bird	Grote Zilverreiger	*Casmerodius albus*					x			x			x
Breeding bird	Grutto	*Limosa limosa*	x	x	x	x				x	x		
Breeding bird	Havik	*Accipiter gentilis*	x										
Breeding bird	Heggemus	*Prunella modularis*	x										
Breeding bird	Holenduif	*Columba oenas*	x		x								
Breeding bird	Houtduif	*Columba palumbus*	x										
Breeding bird	IJsvogel	*Alcedo atthis*					x						
Breeding bird	Kauw	*Corvus monedula*	x										
Breeding bird	Kemphaan	*Philomachus pugnax*					x	x	x				
Breeding bird	Kievit	*Vanellus vanellus*	x	x	x	x							
Breeding bird	Klein Waterhoen	*Porzana parva*					x			x			x
Breeding bird	Kleine Karekiet	*Acrocephalus scirpaceus*	x		x								
Breeding bird	Kleine Mantelmeeuw	*Larus fuscus*	x		x		x						
Breeding bird	Kleinst Waterhoen	*Porzana pusilla*					x		x	x		x	x
Breeding bird	Kluut	*Recurvirostra avosetta*	x		x		x			x			x
Breeding bird	Knobbelzwaan	*Cygnus olor*	x										
Breeding bird	Kokmeeuw	*Larus ridibundus*	x		x								
Breeding bird	Korhoen	*Tetrao tetrix*					x						
Breeding bird	Krakeend	*Anas strepera*	x		x					x			
Breeding bird	Kuifeend	*Aythya fuligula*	x										
Breeding bird	Kwartelkoning	*Crex crex*					x						
Breeding bird	Lepelaar	*Platalea leucorodia*	x		x		x		x	x		x	x
Breeding bird	Meerkoet	*Fulica atra*	x		x								
Breeding bird	Merel	*Turdus merula*	x										
Breeding bird	Nachtzwaluw	*Caprimulgus europaeus*					x						
Breeding bird	Noordse Stern	*Sterna paradisaea*					x						
Breeding bird	Oeverzwaluw	*Riparia riparia*					x						
Breeding bird	Paapje	*Saxicola rubetra*					x						
Breeding bird	Patrijs	*Perdix perdix*		x									
Breeding bird	Porseleinhoen	*Porzana porzana*					x						
Breeding bird	Purperreiger	*Ardea purpurea*	x				x		x	x		x	x

Group	Dutch Name	Latin name	P 1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
Breeding bird	Rietgors	*Emberiza schoeniclus*	x										
Breeding bird	Rietzanger	*Acrocephalus schoenobaenus*					x						
Breeding bird	Roerdomp	*Botaurus stellaris*					x		x				
Breeding bird	Roodborsttapuit	*Saxicola rubicola*					x						
Breeding bird	Scholekster	*Haematopus ostralegus*	x		x					x			
Breeding bird	Slobeend	*Anas clypeata*	x		x					x			
Breeding bird	Snor	*Locustella luscinioides*					x						
Breeding bird	Sperwer	*Accipiter nisus*	x										
Breeding bird	Spreeuw	*Sturnus vulgaris*	x										
Breeding bird	Strandplevier	*Charadrius alexandrinus*	x				x		x				
Breeding bird	Tapuit	*Oenanthe oenanthe*					x						
Breeding bird	Tjiftjaf	*Phylloscopus collybita*	x										
Breeding bird	Torenvalk	*Falco tinnunculus*	x										
Breeding bird	Tureluur	*Tringa totanus*	x		x								
Breeding bird	Velduil	*Asio flammeus*					x						
Breeding bird	Visdief	*Sterna hirundo*	x		x		x						
Breeding bird	Waterhoen	*Gallinula chloropus*	x										
Breeding bird	Waterral	*Rallus aquaticus*	x										
Breeding bird	Wespendief	*Pernis apivorus*					x						
Breeding bird	Wilde Eend	*Anas platyrhynchos*	x		x								
Breeding bird	Winterkoning	*Troglodytes troglodytes*	x										
Breeding bird	Witoogeend	*Aythya nyroca*		x			x	x					
Breeding bird	Woudaapje	*Ixobrychus minutus*					x						
Breeding bird	Wulp	*Numenius arquata*	x										
Breeding bird	Zilvermeeuw	*Larus argentatus*	x		x								
Breeding bird	Zomertaling	*Anas querquedula*								x	x		
Breeding bird	Zwarte Specht	*Dryocopus martius*					x						
Breeding bird	Zwarte Stern	*Chlidonias niger*					x		x	x		x	x
Breeding bird	Zwarte Wouw	*Milvus migrans*		x			x						
Breeding bird	Zwartkopmeeuw	*Larus melanocephalus*					x			x			x
Butterflies	Donker pimpernelblauwtje	*Phengaris nausithous*					x		x	x		x	x

Group	Dutch Name	Latin name	P 1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
Butterflies	Tijmblauwtje*	*Phengaris arion*		x			x	x					
Butterflies	Groot dikkopje	*Ochlodes sylvanus*	x										
Butterflies	Groot koolwitje	*Pieris brassicae*	x										
Butterflies	Grote vuurvlinder	*Lycaena dispar*					x						
Butterflies	Kleine vos	*Aglais urticae*	x										
Butterflies	Kleine vuurvlinder	*Lycaena phlaeas*	x										
Butterflies	Moerasparelmoervlinder[1]	*Euphydryas aurinia*[1]					x						
Butterflies	Oranje zandoogje	*Pyronia tithonus*	x										
Butterflies	Pimpernelblauwtje	*Phengaris teleius*		x			x	x	x				
Butterflies	Veenhooibeestje[1]	*Coenonympha tullia*[1]		x									
Butterflies	Zilverstreephooibeestje[1]	*Coenonympha hero*[1]		x			x	x					
Plant	Aalbes	*Ribes rubrum*	x*							x			
Plant	Aardbeiganzerik	*Potentilla sterilis*	x*										
Plant	Akkerandoorn	*Stachys arvensis*	x*										
Plant	Beenbreek	*Narthecium ossifragum*	x							x			
Plant	Bitter barbarakruid	*Barbarea intermedia*	x*										
Plant	Blauw kweldergras	*Puccinellia fasciculata*	x							x			
Plant	Blauwe zeedistel	*Eryngium maritimum*	x							x			
Plant	Bleekgele hennepnetel	*Galeopsis segetum*	x*										
Plant	Blonde zegge	*Carex hostiana*	x*										
Plant	Brede eikvaren	*Polypodium interjectum*	x*										
Plant	Brede orchis	*Dactylorhiza majalis*	x										
Plant	Buntgras	*Corynephorus canescens*	x*										
Plant	Canadees hertshooi	*Hypericum canadense*	x							x			
Plant	Deens lepelblad	*Cochlearia danica*	x*							x			
Plant	Driedelige waterranonkel	*Ranunculus tripartitus*	x*										
Plant	Drienervige zegge	*Carex trinervis*	x							x			
Plant	Drijvende waterweegbree	*Luronium natans*	x				x			x			x
Plant	Duinkruiskruid	*Senecio jacobaea s. dunensis*	x										
Plant	Duinviooltje	*Viola curtisii*	x							x			
Plant	Duinwespenorchis	*Epipactis helleborine*	x*										

Group	Dutch Name	Latin name	P 1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
Plant	Duinzwenkgras	*Festuca arenaria*	x*							x			
Plant	Duizendknoopfonteinkruid	*Potamogeton polygonifolius*	x							x			
Plant	Dunstaart	*Parapholis strigosa*	x*							x			
Plant	Dwergrus	*Juncus pygmaeus*	x										
Plant	Eenbloemige zeekraal	*Salicornia pusilla*	x*										
Plant	Engels slijkgras	*Spartina anglica*	x							x			
Plant	Fijne kervel	*Anthriscus caucalis*	x*										
Plant	Fraai hertshooi	*Hypericum pulchrum*	x*										
Plant	Gele hoornpapaver	*Glaucium flavum*	x*										
Plant	Gelobde melde	*Atriplex laciniata*	x*										
Plant	Geoord helmkruid	*Scrophularia auriculata*	x*										
Plant	Geschubde mannetjesvaren	*Dryopteris affinis*	x*										
Plant	Gesteeld glaskroos	*Elatine hexandra*	x*										
Plant	Gewone dophei	*Erica tetralix*	x							x			
Plant	Gewone waternavel	*Hydrocotyle vulgaris*	x*										
Plant	Gewoon sterrenkroos	*Callitriche platycarpa*	x							x			
Plant	Gewoon vingerhoedskruid	*Digitalis purpurea*	x*										
Plant	Groenknolorchis	*Liparis loeselii*	x				x		x				
Plant	Grondster	*Illecebrum verticillatum*	x*							x			
Plant	Grote leeuweklauw	*Aphanes arvensis*	x*										
Plant	Haaksterrenkroos	*Callitriche hamulata*	x							x			
Plant	Harlekijn	*Orchis morio*	x*										
Plant	Heidekartelblad	*Pedicularis sylvatica*	x							x			
Plant	Helm	*Ammophila arenaria*	x							x			
Plant	Hollandse iep	*Ulmus x hollandica*	x*										
Plant	Hollandse linde	*Tilia x vulgaris*	x*										
Plant	Hulst	*Ilex aquifolium*	x							x			
Plant	Kamgras	*Cynosurus cristatus*	x*										
Plant	Klein glidkruid	*Scutellaria minor*	x*										
Plant	Klein slijkgras	*Spartina maritima*	x*							x			
Plant	Klein tasjeskruid	*Teesdalia nudicaulis*	x										

Group	Dutch Name	Latin name	P 1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
Plant	Klein vogelpootje	*Ornithopus perpusillus*	x							x			
Plant	Kleine leeuweklauw	*Aphanes inexpectata*	x*										
Plant	Kleine leeuwetand	*Leontodon saxatilis*	x*							x			
Plant	Kleverige reigersbek	*Erodium lebelii*	x							x			
Plant	Klimopwaterranonkel	*Ranunculus hederaceus*	x										
Plant	Knolsteenbreek	*Saxifraga granulata*	x*										
Plant	Knolvossestaart	*Alopecurus bulbosus*	x							x			
Plant	Kruipbrem	*Genista pilosa*	x*										
Plant	Kruipend moerasscherm	*Apium repens*	x				x		x	x		x	x
Plant	Kruipende moerasweegbree	*Echinodorus repens*	x							x			
Plant	Kustmelde	*Atriplex glabriuscula*	x							x			
Plant	Kwelderzegge	*Carex extensa*	x							x			
Plant	Laksteeltje	*Catapodium marinum*	x										
Plant	Lamsoor	*Limonium vulgare*	x							x			
Plant	Langarige zeekraal	*Salicornia procumbens*	x*										
Plant	Liggend bergvlas	*Thesium humifusum*	x*										
Plant	Liggend hertshooi	*Hypericum humifusum*	x*										
Plant	Liggend walstro	*Galium saxatile*	x							x			
Plant	Liggende vleugeltjesbloem	*Polygala serpyllifolia*	x							x			
Plant	Melkviooltje	*Viola persicifolia*	x										
Plant	Moerasandijvie	*Tephroseris palustris*	x										
Plant	Moershertshooi	*Hypericum elodes*	x*							x			
Plant	Moerasmelkdistel	*Sonchus palustris*	x*										
Plant	Moerassmele	*Deschampsia setacea*	x							x			
Plant	Moeraswolfsmelk	*Euphorbia palustris*	x*										
Plant	Muizeoor	*Hieracium pilosella*	x*										
Plant	Noordse helm	*Calammophila baltica (x-)*	x*							x			
Plant	Ondergedoken moerasscherm	*Apium inundatum*	x							x			
Plant	Oranjegele paardebloem	*Taraxacum obliquum*	x*										
Plant	Paarbladig fonteinkruid	*Groenlandia densa*	x										
Plant	Paarbladig goudveil	*Chrysosplenium oppositifolium*	x*										

Group	Dutch Name	Latin name	P 1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
Plant	Padderus	*Juncus subnodulosus*	x*										
Plant	Pijptorkruid	*Oenanthe fistulosa*	x*										
Plant	Pilvaren	*Pilularia globulifera*	x*							x			
Plant	Rankende helmbloem	*Ceratocapnos claviculata*	x*							x			
Plant	Rozetkruidkers	*Lepidium heterophyllum*	x*							x			
Plant	Ruwe iep	*Ulmus glabra*	x*										
Plant	Schedegeelster	*Gagea spathacea*	x										
Plant	Scheve hoornbloem	*Cerastium diffusum*	x							x			
Plant	Schraallandpaardebloem	*Taraxacum celticum*	x*										
Plant	Slanke waterkers	*Rorippa microphylla*	x*							x			
Plant	Slofhak	*Anthoxanthum aristatum*								x			
Plant	Spaanse ruiter	*Cirsium dissectum*	x							x			
Plant	Stekelbrem	*Genista anglica*	x										
Plant	Stekende bies	*Schoenoplectus pungens*	x										
Plant	Stijve moerasweegbree	*Echinodorus ranunculoides*	x							x			
Plant	Stippelzegge	*Carex punctata*	x							x			
Plant	Stomphoekig sterrenkroos	*Callitriche obtusangula*								x			
Plant	Strandduizendguldenkruid	*Centaurium littorale*	x							x			
Plant	Strandkweek	*Elytrigia atherica*	x*							x			
Plant	Tandjesgras	*Danthonia decumbens*	x*										
Plant	Taxus	*Taxus baccata*	x*										
Plant	Trekrus	*Juncus squarrosus*	x							x			
Plant	Valse salie	*Teucrium scorodonia*	x*										
Plant	Veelkleurig vergeet-mij-nietje	*Myosotis discolor*	x*							x			
Plant	Veelstengelige waterbies	*Eleocharis multicaulis*	x*							x			
Plant	Veenorchis	*Dactylorhiza sphagnicola*	x										
Plant	Veldgerst	*Hordeum secalinum*	x										
Plant	Vlottende bies	*Eleogiton fluitans*	x							x			
Plant	Vlozegge	*Carex pulicaris*	x*										
Plant	Vogelpootklaver	*Trifolium ornithopodioides*	x										
Plant	Vroege haver	*Aira praecox*	x							x			

Group	Dutch Name	Latin name	P 1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
Plant	Waterkruiskruid	*Senecio aquaticus*	x							x			
Plant	Weegbreefonteinkruid	*Potamogeton coloratus*	x							x			
Plant	Wilde gagel	*Myrica gale*	x*							x			
Plant	Wilde kamperfoelie	*Lonicera periclymenum*	x							x			
Plant	Wilde kievitsbloem	*Fritillaria meleagris*	x							x			
Plant	Wilde narcis s.s.	*Narcissus pseudonarcissus subsp. pseudonarcissus*	x*										
Plant	Winterlinde	*Tilia cordata*	x*										
Plant	Witte waterranonkel	*Ranunculus ololeucos*	x										
Plant	Zandblauwtje	*Jasione montana*	x*										
Plant	Zanddoddegras	*Phleum arenarium*	x							x			
Plant	Zeealsem	*Seriphidium maritimum*	x							x			
Plant	Zeerus	*Juncus maritimus*	x										
Plant	Zeewolfsmelk	*Euphorbia paralias*								x			
Plant	Zilt torkruid	*Oenanthe lachenalii*	x*							x			
Plant	Zilte waterranonkel	*Ranunculus baudotii*	x										
Plant	Zinkboerenkers	*Thlaspi caerulescens*	x*										
Plant	Zomerklokje	*Leucojum aestivum*	x										

Annex 2 Overview of habitats selected under the relevant policy options

Habitatcode	Ecosystem	Policy option 3	Policy option 5	Policy option 8
1110	coast		x	x
1130	coast		x	
1140	coast		x	
1160	coast		x	
1310	coast		x	
1320	coast		x	
1330	coast		x	
2110	coast		x	
2120	coast		x	
2130	coast		x	
2140	coast		x	
2150	coast		x	
2160	coast	x	x	x
2170	coast	x	x	
2180	coast		x	
2190	coast		x	
2310	coast	x	x	x
2320	coast	x	x	x
2330	coast		x	
3110	freshwater		x	
3130	freshwater		x	
3140	freshwater		x	
3150	freshwater		x	
3160	freshwater		x	
3260	freshwater		x	
3270	freshwater		x	
4010	heath		x	
4030	heath		x	
5130	heath		x	
6110	semi-natural graslands		x	
6120	semi-natural graslands		x	
6130	semi-natural graslands		x	
6210	semi-natural graslands		x	
6230	semi-natural graslands		x	
6410	semi-natural graslands		x	
6430	semi-natural graslands		x	
6510	semi-natural graslands		x	
7110	heatland & moors		x	
7120	heatland & moors		x	
7140	heatland & moors		x	

Habitatcode	Ecosystem	Policy option 3	Policy option 5	Policy option 8
7150	heatland & moors		x	
7210	heatland & moors		x	
7220	heatland & moors		x	
7230	heatland & moors		x	
9110	forest		x	
9120	forest		x	
9160	forest		x	
9190	forest		x	
91D0	forest		x	
91E0	forest		x	
91F0	forest		x	

Verschenen documenten in de reeks Werkdocumenten van de Wettelijke Onderzoekstaken Natuur & Milieu vanaf 2009

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