



PRIORITISED ACTION FRAMEWORK (PAF) FOR NATURA 2000 in SWEDEN



pursuant to Article 8 of Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive)

for the *Multiannual Financial Framework* period 2021 – 2027

Body text from the EU PAF format is formatted in blue. Text specific for Sweden is in black.

Draft version from the Swedish Environmental Protection Agency to the Swedish Ministry of the Environment and Energy (2018-12-14)

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A. Introduction

A.1 General introduction

Prioritised action frameworks (PAFs) are strategic multiannual planning tools, aimed at providing a comprehensive overview of the measures that are needed to implement the EU-wide Natura 2000 network and its associated green infrastructure, specifying the financing needs for these measures and linking them to the corresponding EU funding programmes. In line with the objectives of the EU Habitats Directive¹ on which the Natura 2000 network is based, the measures to be identified in the PAFs shall mainly be designed "*to maintain and restore, at a favourable conservation status, natural habitats and species of EU importance, whilst taking account of economic, social and cultural requirements and regional and local characteristics*".

The legal basis for the PAF is Article 8 (1) of the Habitats Directive², which requires Member States to send, as appropriate, to the Commission their estimates relating to the European Union co-financing which they consider necessary to meet their following obligations in relation to Natura 2000:

- *to establish the necessary conservation measures involving, if need be, appropriate management plans specifically designed for the sites or integrated into other development plans,*
- *to establish appropriate statutory, administrative or contractual measures which correspond to the ecological requirements of the natural habitat types in Annex I and the species in Annex II present on the sites.*

Prioritised action frameworks shall therefore focus on the identification of those financing needs and priorities that are directly linked to the specific conservation measures established for Natura 2000 sites, in view of achieving the site-level conservation objectives for those species and habitat types for which the sites have been designated (as required by Article 6(1) of the Habitats Directive). Given that the Natura 2000 network also includes the Special Protection Areas (SPAs) designated pursuant to the EU Birds Directive 2009/147/EEC³, the financing needs and priority measures associated with bird species in SPAs are therefore also considered here.

¹ Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:01992L0043-20130701>

² Article 8 (1): "In parallel with their proposals for sites eligible for designation as special areas of conservation, hosting priority natural habitat types and/or priority species, the Member States shall send, as appropriate, to the Commission their estimates relating to the Community co- financing which they consider necessary to allow them to meet their obligations pursuant to Article 6 (1)."

³ Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147>

Member States are invited to also present in their PAFs additional measures, and their financing needs related to wider green infrastructure (GI)⁴. Such green infrastructure measures are to be included in the PAF where they contribute to the ecological coherence of the Natura 2000 network, including in a cross-border context, and to the objective of maintaining or restoring favourable conservation status of the targeted species and habitats.

In its Special Report N° 1/2017 on Natura 2000⁵ the European Court of Auditors concluded that the first completed PAFs (for the MFF period 2014-2020) did not present a reliable picture of the actual costs of the Natura 2000 network. The report therefore highlighted the need for updating the PAF format and providing further guidance for improving the quality of information that Member States provide in their PAFs. The recent EU Action plan for nature, people and the economy⁶ commits to this process, with a view to ensuring that Member States provide more reliable and harmonised estimates of their financing needs for Natura 2000.

In its conclusions on this action plan⁷, the Council of the European Union recognises the need for further improving the multiannual financial planning for investments in nature and agrees that there is a need to update and improve the PAFs. The importance of better forecasting the financing needs for Natura 2000 ahead of the next EU Multiannual Financial Framework is also recognised in a resolution by the European Parliament⁸.

A.2 Structure of the current PAF format

The current PAF format is designed to provide reliable information about the priority Natura 2000-related financing needs, with a view to their incorporation in the relevant EU funding instruments under the next Multiannual Financial Framework (MFF) 2021-2027. To this aim, the PAF requires a level of breakdown of financing needs that would allow for an effective allocation of the Natura 2000 funding under the relevant EU funds for the MFF 2021-2027. With a view to that goal, the PAF also takes into consideration the experience that EU Member States and regions have gained so far with the MFF 2014-2020.

An essential component of the current PAF format is the required breakdown of the Natura 2000- and green infrastructure-related conservation and restoration measures per broad ecosystem category. The

⁴ Green infrastructure is defined as 'a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services'.

⁵ Special Report No 1/2017: More efforts needed to implement the Natura 2000 network to its full potential <https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=40768>

⁶ COM(2017) 198 final: An Action Plan for nature, people and the economy http://ec.europa.eu/environment/nature/legislation/fitness_check/action_plan/communication_en.pdf

⁷ <http://www.consilium.europa.eu/en/press/press-releases/2017/06/19/conclusions-eu-action-plan-nature/>

⁸ European Parliament resolution of 15 November 2017 on an Action Plan for nature, people and the economy (2017/2819(RSP)) <http://www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P8-TA-2017-0441>

proposed ecosystem typology of 8 classes is very largely based on the MAES typology, which was established as a conceptual basis for an EU wide ecosystem assessment⁹. A comprehensive database allocating individual species and habitat types of EU importance to the MAES ecosystems is available for download from the European Environment Agency website¹⁰. It is recommended that the allocation of measures and costs to ecosystem types should largely follow this typology.

The presentation of priority measures and costs of the current PAF requires a distinction between running costs and one-off expenditure. Whereas running costs are typically associated with recurring measures that need to be continued in the long term (f. ex. staff costs for site management, annual payments to farmers for agri-environmental measures on grasslands, etc.), one-off expenditures are typically related to non-recurring actions such as habitat restoration projects, large infrastructural investments, purchase of durable goods, etc. The correct allocation of costs to either category ("running" versus "one-off") will be highly relevant for a correct allocation of measures under different EU funds.

Finally, priority measures under this PAF will not only contribute to the specific objectives of the EU nature directives, but will also provide important socio-economic and ecosystem service benefits to the society. Examples of benefits may include climate mitigation and adaptation, or other ecosystem services such as those related to tourism and culture. The Commission has already provided an overview of ecosystem services benefits related to Natura 2000¹¹.

This aspect should be emphasized where possible, with a view to promote and communicate the wide societal benefits of funding nature and biodiversity.

A.3 Introduction to the specific PAF of Sweden

This PAF gives Sweden's estimate of prioritised financing needs for the period 2021-2027, based on the best available information at this time. The geographic area covered is the entire Sweden and our exclusive economic zone (EEZ). In short, the analysis shows a large need for conservation measures during this period, for most of the habitats and species concerned. The need for EU co-financing is also considered to be large. *Both EU and national funding needs to target Natura 2000 conservation measures more effectively in the coming MFF period, to reach our common nature conservation targets.*

Around 90 habitats listed in Annex I of the Habitats Directive occur in Sweden, and around 160 taxa listed in annex II, IV and V. The network spans habitats important for nature conservation from the

⁹ <https://biodiversity.europa.eu/maes>

¹⁰ Linkages of species and habitat types to MAES ecosystems <https://www.eea.europa.eu/data-and-maps/data/linkages-of-species-and-habitat#tab-european-data>

¹¹ <http://ec.europa.eu/environment/nature/natura2000/financing/>

ocean floor up to mountain glaciers. For some habitats, species and measures, a lack of knowledge makes the estimates a bit more uncertain. For the marine environment, the costs for measures have not been possible to calculate within this version of PAF.

When estimating the need for measures 2021-2027, we have assumed that the current level of financing (2018) for measures will remain throughout the rest of the program period. The prioritized measures depend on maintaining a sufficient capacity at e.g. the County Administrative Boards. The actual need for measures 2021-2027 will also depend on how the pressures and threats evolve, and how measures are carried out within e.g. the Water Framework Directive and the Marine Strategy Framework Directive. If environmentally harmful subsidies or other factors increase the pressures or threats, the need for conservation measures will also increase.

Unfortunately, because of the time schedules, the final assessments from the 2019 Habitats Directive article 17 reporting, and Birds Directive article 12 reporting, have not been possible to use as a basis for this PAF. Instead, preliminary assessments have been used. From these preliminary assessments, the status and trends reported in 2019 are expected to be approximately the same as in 2013.

In this PAF, for 2021-2027, most costs (marine habitats and species are a notable exception) are based on known areas and a calculated cost per area unit. This PAF should therefore give a significantly better estimate of the actual needs than Sweden's PAF for 2014-2020.

When estimating the costs for 2021–2027, it is assumed that 1 euro = 10 Swedish krona (SEK) throughout the whole period, and all costs are given in current monetary value (2018). All figures are rounded off to the nearest thousand euro. In the D section, for 2014-2020, figures are taken directly in euro from the financing agreements. Thus, there are differences in the currency rates used for different programs (as well as differences in monetary value due to inflation) which makes figures from D and E not fully comparable.

This PAF is not a decision on financing levels for Natura 2000 in Sweden until 2027. The figures given are instead based on a systematic approach made with best available data of the need for conservation measures, which builds upon mapping, monitoring and reporting information. In some cases, the volume of measures has been calculated moderately when it takes time to expand the management capacity for nature conservation. The prioritised needs have not been balanced against other socio-economic priorities.

The preparation of this PAF has been done by the Swedish Environmental Protection Agency. Other agencies have supplied information and suggestions, most notably County Administrative Boards, Swedish Forest Agency, the Swedish Agency for Marine and Water Management, the Swedish Species Information Center at the Swedish Agricultural University, Swedish Board of Agriculture, Geological Survey of Sweden, Swedish Agency for Economic and Regional Growth, and Water District Authorities. For management measures in voluntary set-asides in the forest, sector representatives have also been involved. The prioritised measures in lakes and rivers are partly based on assessments from the Water District Authorities.

B. Summary of priority financing needs for the period 2021-2027

		Priority financing needs 2021-2027	
1.	Horizontal measures and administrative costs related to Natura 2000	Annual running costs (Euros / year)	One-off / project costs (Euros / year)
1.1.	Site designation and management planning	0	2 140 000
1.2.	Site administration and communication with stakeholders	70 826 000	2 193 000
1.3.	Monitoring and reporting	22 506 000	3 000 000
1.4.	Remaining knowledge gaps and research needs	16 350 000	8 240 000
1.5.	Natura 2000-related communication and awareness raising measures, education and visitor access	19 041 000	11 861 000
	Sub-total	128 723 000	27 434 000
2.a	Natura 2000 site-related maintenance and restoration measures for species and habitats	Annual running costs (Euros / year)	One-off / project costs (Euros / year)
2.1.a	Marine and coastal waters		
2.2.a	Heathlands and shrubs	5 892 000	1 632 000
2.3.a	Bogs, mires, fens and other wetlands	1 488 000	1 233 000
2.4.a	Grasslands	102 152 000	16 933 000
2.5.a	Other agroecosystems (incl. croplands)	0	0
2.6.a	Woodlands and forests	12 631 000	10 723 000
2.7.a	Rocky habitats, dunes & sparsely vegetated lands	6 863 000	585 000
2.8.a	Freshwater habitats (rivers and lakes)	3 042 000	10 445 000
2.9.a	Others	0	0
	Sub-total	132 068 000	41 550 000
2.b	Additional "Green infrastructure" measures beyond Natura 2000 (further improving coherence of the Natura 2000 network, including in a cross-border context)	Annual running costs (Euros / year)	One-off / project costs (Euros / year)
2.1.b	Marine and coastal waters		
2.2.b	Heathlands and shrubs	9 988 000	1 484 000
2.3.b	Bogs, mires, fens and other wetlands	921 000	7 038 000
2.4.b	Grasslands	229 702 000	33 966 000
2.5.b	Other agroecosystems (incl. croplands)	0	0
2.6.b	Woodlands and forests	16 447 000	142 916 000
2.7.b	Rocky habitats, dunes & sparsely vegetated lands	2 992 000	283 000
2.8.b	Freshwater habitats (rivers and lakes)	11 895 000	13 833 000
2.9.b	Others (caves, etc.)	0	0
	Sub-total	271 944 000	201 344 000
3.	Additional species-specific measures not related to specific ecosystems or habitats	Annual running costs (Euros / year)	One-off / project costs (Euros / year)
3.1	Species-specific measures and programmes not covered elsewhere	0	90 000
3.2.	Prevention, mitigation or compensation of damage caused by protected species	10 300 000	50 000
	Sub-total	10 300 000	140 000
	Annual total	543 036 000	268 645 000
	Total (2021-2027)		5 681 767 000

C. Current state of the Natura 2000 network

C.1. Area statistics of the Natura 2000 network

In Sweden, the Natura 2000 network is considered largely complete. The need for regular national evaluations, and additions if necessary, is acknowledged. A national evaluation made in 2015 resulted in the proposal of new SPAs and SCIs (see section E1.1 for details).

The highest coverage of Natura 2000 sites in Sweden is found in the alpine biogeographic region, with 46 % of the area as Natura 2000. Outside this area the network cover 5-6 % of the terrestrial area, by mostly small and dispersed sites. In the marine Baltic region around 11 % of the sea area under Swedish jurisdiction (including the Exclusive Economic Zone) is Natura 2000. In the marine Atlantic region, the corresponding figure is 30 % of the area.

Sweden has a high number of sites, 4087 at the time of writing, but the frequency of small sites is also high (2753 sites are less than 1 km² = 100 ha, 147 sites are less than 1 ha, that is 100 x 100 m). This is especially true in the boreal and continental terrestrial regions. In the northern boreal region and the alpine region, and the marine regions, on the other hand, some sites have a very large area (17 sites are larger than 100 000 ha each = 1000 km²).

There is a substantial overlap between the SPA sites and the pSCI/SCI/SAC sites. The total coverage of the network is around 13% of the area under Swedish jurisdiction, see table below. 96 sites are SPA only (approx. 1500 km²), 452 sites are SPA and pSCI/SCI/SAC combined (approx. 39 000 km²) and 3539 sites are pSCI/SCI/SAC only (approx. 38 000 km²).

Name of region	Natura 2000 area data per EU Member State (in km ²)						Proportion (in %) of the land or sea area covered by:		
	Terrestrial			Marine			SCI	SPA	N2K
	SCI	SPA	N2K	SCI	SPA	N2K			
ALP	39 574	19 246	39 715				46	22	46
BOR	16 912	6 749	17 186				5	2	5
CON	906	589	997				6	4	6
MBAL				15 704	12 355	15 761	11	9	11
MATL				4 264	1 944	4 277	30	14	30
Total	57 392	26 584	57 898	19 969	14 299	20 038	13	7	13

Table #. Areas covered by Natura 2000 sites within Swedish jurisdiction (Swedish territory + Exclusive Economic Zone), and the proportion of each region covered by those. The calculation of area within Natura 2000 sites have been done for each biogeographic (Continental = CON, Boreal = BOR and Alpine = ALP) and marine region (marine Atlantic = MATL and marine Baltic = MBAL). The *marine regions* cover sea areas only. The *biogeographical regions* cover terrestrial area, lakes and rivers. Thus, there is no overlap between the different regions as defined in this calculation. A Natura 2000 site with sea area only is for example counted just once, adding to the total area in the correct marine region. The areas for "SCI" include pSCI, SCI and SAC areas, and there is no adjustment for SPA coverage in this figure. Likewise, the areas given for SPA have not been adjusted for "SCI" coverage within them. The figures for N2k = Natura 2000 area are on the other hand adjusted, so a square kilometer which is both SPA and SCI is only counted as one square kilometer. The figures for area percentage have been calculated as the ratio between area covered by "SCI", SPA or N2k and the area of the region (see definition above).

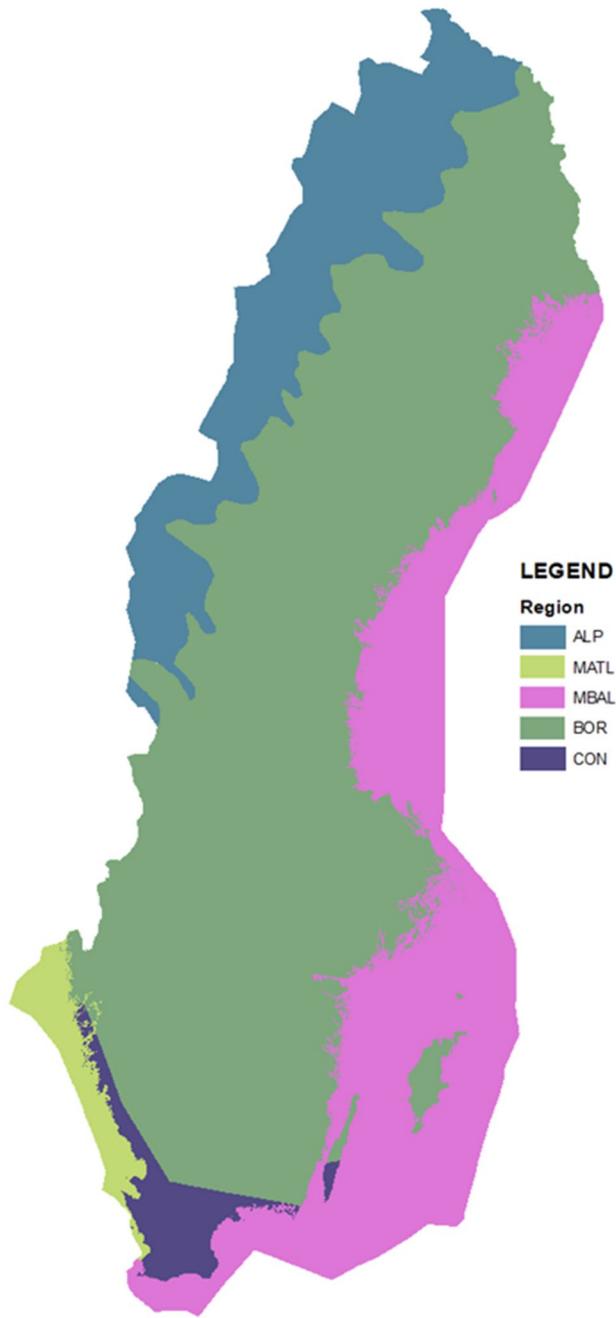


Figure 1. Map of the biogeographic and marine regions under Swedish jurisdiction.

C.2. Map of the Natura 2000 network in Sweden

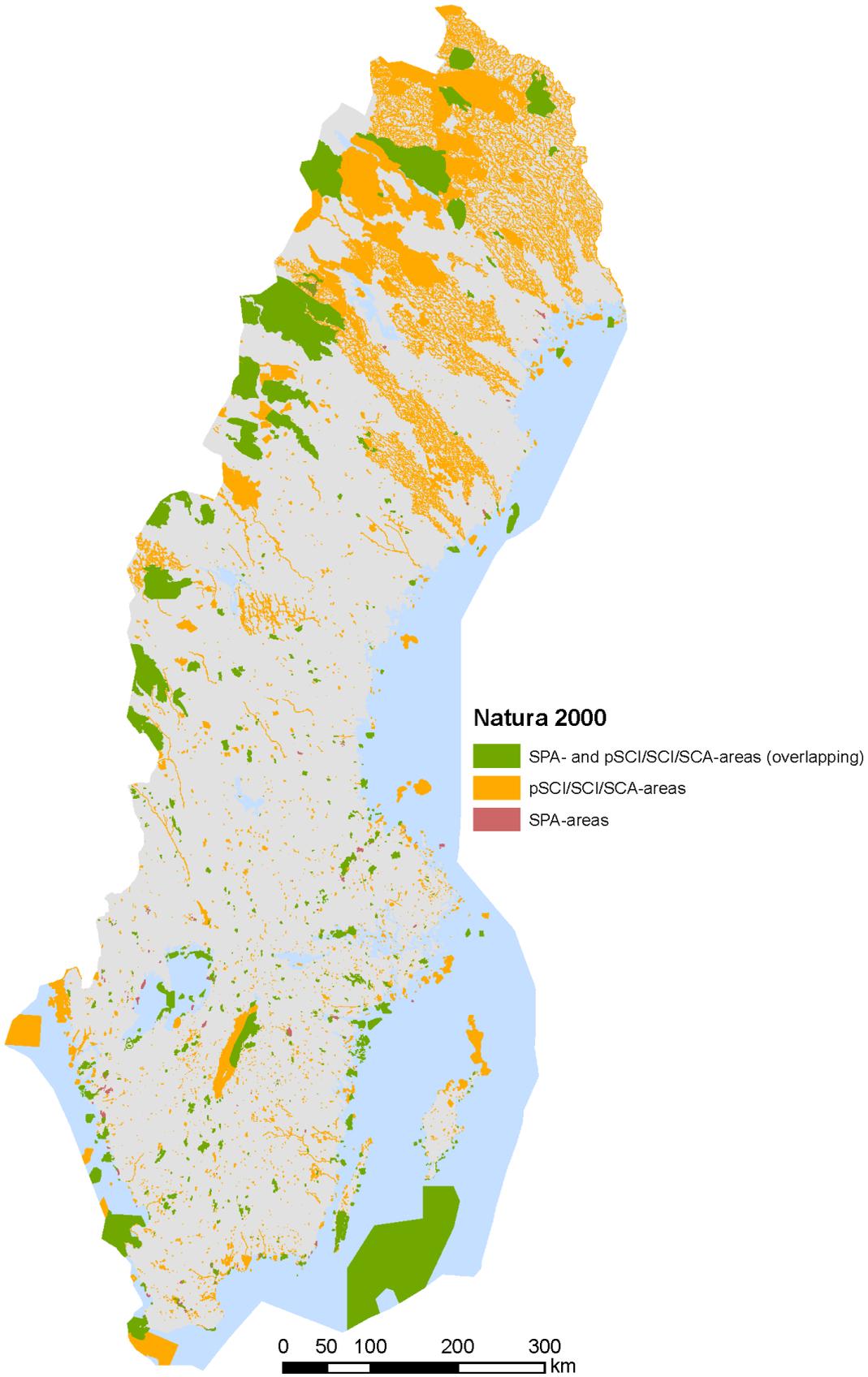


Figure 2. Map of Natura 2000 sites in Sweden. All areas have been slightly exaggerated to be visible in this scale. The large rivers in the northern Sweden are the most obvious example of this (being 10-200 m wide, they would not be visible otherwise).

D. EU and national financing of the Natura 2000 network during the period 2014 – 2020

This section provides a comprehensive overview of the funding allocated to Natura 2000, protection of species of EU interest and green infrastructure during the period 2014-2020. This data should help the Commission and national/regional authorities to assess to what extent the financial needs of Natura 2000 are currently met and what the funding gap is.

D.1 European Agricultural Fund for Rural Development (EAFRD)

Total allocation from the EAFRD to the Member State/region: 4 409 712 380 euro (for the entire 7-year period, including funding which is not relevant for Natura 2000)

Measure	Total current allocation to the EAFRD measure		Current allocation to actions or sub-measures relevant for Natura 2000		Current spending on actions or sub-measures relevant for Natura 2000		Comments (relevance, experience to-date, challenges for the next period)
	EU	National	EU	National	EU	National	
M4 Investments in physical assets	125 189 321	191 611 569	3 146 360 *	4 819 109 *	869 000 **	1 331 000 **	*Submeasures relevant are: non-productive investments, such as restoration of semi-natural pastures and meadows, and fencing to protect pastures from large carnivores. Appr. 95% are spent on fencing. That the area is located within N2000 sites is one of the regional selection criteria for projects in this program period. **In Sweden, it is not possible to see how much of the allocation that is spent in Natura 2000 areas.
M7 Basic services & village renewal in rural areas	-	-					The measure is not used in Sweden.
M8 Investments in forest area	4 698 048	7 190 712	4 649 099 *	7 120 773 *	671 500 *	1 028 500 *	Main activities under this measure are prescribed burning, restoration of sites with cultural and biological values, and activities to increase the proportion of broad-leaved and other deciduous forests. *It is not possible to see how much of the allocation that is spent in Natura 2000 areas.
M10 Agri-environment and climate measures	390 077 572	597 042 741	317 358 396 *, **	486 080 581 *, **	178 572 200 *, **	273 511 000 *, **	More than half of the budget goes to maintenance of semi-natural pastures and meadows. * It is not possible to see how much of the allocation that is spent in Natura 2000 areas. **This figure includes semi-natural pastures and meadows, including restoration of pastures, maintenance of wetlands, and ley management.

Measure	Total current allocation to the EAFRD measure		Current allocation to actions or sub-measures relevant for Natura 2000		Current spending on actions or sub-measures relevant for Natura 2000		Comments (relevance, experience to-date, challenges for the next period)
	EU	National	EU	National	EU	National	
							<p>Additional comments:</p> <p>1. The approximate total spending during the current program period (covering the five years 2014-2018 (until September)) on maintenance of semi-natural pastures in N2000 areas is 79 948 559 Euro. (EU: €31 579 681, National: €48 368 878).</p> <p>2. Analyses carried out by The Swedish Board of Agriculture show that the proportion of Natura 2000 habitat in Sweden covered by agri-environmental schemes (AES) for maintenance of semi-natural pastures varies between habitat types. In 2014, 32 percent of habitat type 6520 was covered by AES, while the same figure for habitats 6110, 6210, 6280 were approximately 85 %¹¹.</p> <p>Experience to-date, challenges for the next period</p> <p>For the coming period, it is important to ensure that enough funding goes to Natura 2000 management, to ensure that the nature conservation objectives dependent on management are met.</p> <p>There is a need for simplification of CAP, for example through less detailed regulations and a new approach to audits. This is in line with the EU Commission's concept "the new delivery model" that shifts focus to a more result-oriented CAP. A detailed and complex system creates many challenges. It can be, for example, difficult to motivate beneficiaries to apply for funding since the administration is too heavy. This can be even more significant for small scale projects since there is less resources for administration.</p>
M12 Natura 2000 payments							The measure is not used in Sweden 2014-2020. Regardless of whether this measure is used or not, MS should in the future be asked to show that enough EAFRD funding reach Natura 2000, where such funding is necessary to reach the conservation objectives.
M13 Payments to areas facing natural or other specific constraints	385 192 946	589 566 459	385 192 946 *	589 566 459 *	209 872 000 *	321 450 000	Measures for other specific constraints can for example be provision of bridges at islands without connection to mainland. *It is not possible to see how much of this that is spent in Natura 2000 areas.
M15 Forest-environmental and							The measure is not used in Sweden.

Measure	Total current allocation to the EAFRD measure		Current allocation to actions or sub-measures relevant for Natura 2000		Current spending on actions or sub-measures relevant for Natura 2000		Comments (relevance, experience to-date, challenges for the next period)
	EU	National	EU	National	EU	National	
climate services and forest conservation							
Other measures	599 103 142	863 851 249	7 552 786 *, ***	11 568 191 *, ***	4 315 900 **, ***	6 610 400 **, ***	* "Other measures" with relevance for N2000 areas are projects for cooperation with focus on environment (M16) and information and knowledge services (M1, M2) with focus on biodiversity and landscape ** It has not been possible to calculate exactly how much of M1, M2 and M16 that is spent on biodiversity and landscape. However, so far four out of seven years of the budget (i.e. approximately 60 % of the total budget) with relevance for N 2000 areas have been spent. *** It is not possible to see how much of this that is spent in N2000 areas.
Subtotal	1 763 565 250	2 646 147 130	743 030 241	1 131 246 368	395 660 400	606 013 600	
TOTAL	4 409 712 380		1 874 276 609		1 001 674 000		In 2014, 16 million euro was used from EAFRD (including both EU and national funding) within Natura 2000 areas (see below for further details). If this is multiplied by 7 to represent the whole period, the sum would be around 112 million euro within Natura 2000. Program and budget adjustments since then makes it likely that the actual sum spent in Natura 2000 is at bit higher.

[1] Figures extracted from the Swedish survey of semi-natural pastures (TUVA):

<http://www.jordbruksverket.se/etjanster/etjanster/etjansterformiljoocklimat/tuva.4.2b43ae8f11f6479737780001120.htm> Further clarifications to table D1

All amounts are in euros (€1 = SEK 8,39) and cover the whole program period (seven years), except for column 3, *current spending*, which covers 2014-2018 (until September).

The amounts in column 1, *total current allocation to the ... measure*, correspond to the allocated amounts as decided in the current program period, and cover the whole program period. Currently, the EU allocates 39,5 % and Sweden allocates 60,5% of the resources. This allocation of resources can change during the program period due to budgetary amendments.

The amounts in the second column, *current allocation to actions or sub-measures relevant for Natura 2000*, cover measures that are relevant for the Natura 2000 network. This does not imply that the full amounts have been used within Natura 2000. There is not enough information available to specify the amounts that are allocated specifically to measures within Natura 2000 areas.

The amounts in column 3, *current spending on actions or sub-measures relevant for Natura 2000*, represent what have been spent during the current program period until September 2018.

Sweden does not use M12 (Natura 2000 payments) or M15 (Forest-environmental and climate services and forest conservation) in the current Rural Development Programme (2014-2020).

M10 encompasses all agri-environmental payments. Payments are allocated both to land within Natura 2000 areas, and to other land that comply with the definitions used for agri-environmental payments and that are managed according to the regulations. The same applies for the compensatory allowance in M13. At the same time, restoration and development activities that are carried out under other measures (M4, M7, M8) can be carried out within Natura 2000 areas, but the extent of such allocations is not known.

During 2014, 64 549 ha within Natura 2000 areas was managed with agri-environmental payments for semi-natural pastures and meadows. The payments to these lands from EAFRD that year amounted to about 16 million euro (including both EU and national funding). Note that the numbers under M10 and *Current spending* reflect the estimated amount of payments that has been paid out during 2014-2018, based on the areas within Natura 2000 that qualify for agri-environmental payments for semi-natural pastures.

In addition, the Single Payment Scheme offers financing for management of semi-natural pastures, however, not for management of Alvars, grazed forests, mountain pastures, or sward/rock mosaic grasslands. These amounts are *not* included here as they are financed via the European Agricultural Guarantee Fund, EAGF (see D.5).

D.2 European Regional Development Fund (ERDF) / Cohesion Fund (CF)

Total allocation from ERDF to the Member State/region: 775 334 602 EUR

Total allocation from Cohesion Fund to the Member State/region: 0 EUR (The Cohesion Fund does not target Sweden.)

Category of intervention	Allocation to measures relevant for Natura 2000		Current spending on measures relevant for Natura 2000		Comments (relevance, experience to-date, challenges for the next period)
	EU	National	EU	National	
85 Protection and enhancement of biodiversity, nature protection and green infrastructure	-	-	-	-	None of the categories of intervention connected to Natura 2000 have been selected for ERDF in Sweden (see the partnership agreement between Sweden and EU).
86 Protection, restoration and	-	-	-	-	Not used in Sweden 2014-2020, see above. Sweden has noticed that many other countries are using ERDF for this purpose.

sustainable use of Natura 2000					ERDF has a potential to be used in ways which will support the Natura 2000 network also in Sweden, for example by promoting ecosystem services and sustainable tourism. To reach its full potential, a low administrative burden is important.
Other categories	-	-	-	-	
Subtotal	-	-	-	-	
TOTAL	-	-	-	-	

D.3 European Maritime and Fisheries Fund (EMFF)

Total allocation from the EMFF to the Member State: 120 156 004 euro (for the entire 2014-2020 period and all measures in the EMFF, not just for Natura 2000)

Measure	Allocation to measures relevant for Natura 2000		Current spending on measures relevant for Natura 2000		Comments (relevance, experience to-date, challenges for the next period)
	EU	National	EU	National	
Article 40. 1b-g. Measure I.18B	1 214 327	809 551	107 270	71 514	The use of these measures has been small so far. One of the reasons can be that it is difficult to combine national co-finance and EU-finances for these types of projects since national co-financing might not correspond to the entire duration of projects. It is also difficult for national agencies to apply when terms and conditions differ between measures with similar purposes, i.e. salaries are only eligible in some measures.
Article 80.1.b Measure VIII.2	2 696 069	1 797 379	0	0	So far, this measure has not been used in Sweden. Support should preferably be limited to one measure for a certain set of project purposes. All terms and conditions should be streamlined for measures concerning protected areas. Funding should not be earmarked for certain purposes, as that will put other terms and conditions in place. Flexibility for MS should be increased by allowing broader measures for protected areas and let MS decide what type of projects to fund, as long as they are able to show a contribution towards reaching conservation objectives for the area. In other words, a new broad measure for "Actions to reach conservation objectives in Natura 2000 or other marine protected area" might help.
Article 80.1c, Measure VIII.3	860 165	573 443	0	0	This measure will, within this period, enhance the work with national marine habitat mapping, including Natura 2000 habitats. This is an important base for management and monitoring actions, and this measure should be considered for a higher proportion of the funding for the coming period. There will be a continued need for EU funding which target mapping and/or inventory work for the next MFF period to promote the fulfilment of the Habitats Directive.
Subtotal	4 770 561	3 180 373	107 270	71 514	
TOTAL (EU+SE)	7 950 934		178 784		

The European Maritime and Fisheries Fund has two measures directly connected to payments for area protection: funds to increase the areas protected as Natura 2000 sites, and funds for other types of marine areas (e.g. marine protected areas, marine reserves, etc.). In addition, there are several measures that are connected to Natura 2000 indirectly. Such measures are not accounted for here, except that 80.1.c is included. Within 80.1.c only one project has been approved so far, a marine mapping project with high importance for future management, monitoring and compliance monitoring actions. *Current spending* is the payments that have been paid out during the current program period until September 2018. The EU share of the funding is 60 %, and 1 euro = 8,39 SEK.

D.4 LIFE Programme

Type of project or financing instrument	Current allocation to measures relevant for Natura 2000		Comments (number of projects, relevance, experience to-date, challenges for the next period)
	EU	National	
Traditional projects	48 610 361	38 305 309	In Sweden, 19 nature projects, all with high relevance for implementing and improving the Natura 2000 network, have been carried out. Measurable effects of high impact on favourable conservation status have been achieved. The Life programme is very important for Natura 2000 in Sweden. If the administration could be simplified, this would lower administrative costs and likely lead to even better results for the same amount of funding. Many actors in the conservation society have highlighted the need for similar projects outside of Natura 2000 sites. This is possible to achieve to some extent within the integrated projects. A suggestion is to enhance the possibility to fund actions outside Natura 2000 sites using LIFE, and to rank these projects by their contributions to improving the status in Natura 2000 sites, to decide if they should be financed. Project owners have also experienced that it is very valuable to work in project form, since it gives a clear focus on what is to be achieved. Further simplification of the application procedure, and of the administrative requirements while started, has also been stressed by project owners. It is however important to retain strict requirements on measurable effects from project actions.
Integrated projects	10 008 312	13 393 333	The project "Grip On Life IP", with high relevance for implementing and improving the Natura 2000 network, is ongoing. The project started in 2017 and ends in 2025. It is therefore too early to see results. Another project, "IP Rich Waters" is also ongoing, and also has high relevance for improvements in the environment, of relevance for Natura 2000.
Others (NCFE etc.)	-	-	NCFE has not been used within nature and biodiversity in Sweden so far.
Subtotal	58 618 673	51 698 642	
TOTAL	110 317 315		

Notes on the D4 table, LIFE programme figures: Sums in euro are taken from the EU decisions (the database of LIFE-projects), for both EU and national funding. Thus, the exchange rate varies by month or year according to the rules. For projects that continue until 2020 the sums include the approved funding until 2020.

For projects that end outside of the program period 2014-2020, the total project funding in this table has been reduced using the ratio of years within the period. Projects included in these figures are (in abbreviated form): MIA, LIFE to admire, VINDEL river, MOTH, Foder och fågring, Grace, UC4LIFE, Remibar, Sandlife, reclaim, Elmiás, Vänern, Coast Benefit, TripleLakes, BushLIFE, LIFE Taiga, SemiAquatic LIFE (the Swedish part), ReBorn, LIFE BTG, GRIP and IP Rich Waters. The figures do not include the Swedish parts of the Sambah and Marmoni projects, which were not led by Sweden.

Concerning projects that have not yet been decided as of this writing (November 2018), an assumption is that two new projects per year (2019 and 2020) are being funded (with numbers taken from actual concept notes) adding 5 665 638 euros in national funding and 8 498 144 euros in EU-funding.

Note: this table is different from D.1-D.3, since "current allocation" here is not a decided amount for the entire program period – programs can still be approved in 2019-2020 and if this happens the total allocation for the period 2014-2020 will increase (see previous paragraph). To get a sum for the entire program period, an estimate based on the previous paragraph and the figures from the table is approximately 57 364 280 euro in national funding and 67 116 817 euro in EU funding (to a total of 124 481 097 euro).

D.5 Other EU funds, including Interreg:

Total EU funding/co-funding allocated from other EU programs for the implementation of EU nature policy and associated green infrastructure in the Member State/region: around 689 000 000 euro for the entire period (99 million euro yearly).

Total national/regional funding allocated for the co-funding of these measures: 5 476 457 euro (for Interreg projects decided at the time of writing).

In addition to EAFRD (see D.1), approximately **95 358 000 euro per year** from the EAGF (European Agricultural Guarantee Fund) are used for maintenance of pastures and meadows (see table below, footnote #1).

Category of intervention	Allocation to measures relevant for Natura 2000 #2		Current spending on measures relevant for Natura 2000		Comments (relevance, experience to-date, challenges for the next period)
	EU	National	EU	National	
85 Protection and enhancement of biodiversity, nature protection and green infrastructure	10 755 046	4 113 442	3 640 571	1 471 384	Interreg Programs that have selected this category of intervention are Botnia Atlantica, North, Sweden-Norway and NPA
86 Protection, restoration and sustainable use of Natura 2000	678 715	678 715	15 792	15 793	Sweden- Norway
Other categories (87+88)	4 704 560	684 300	731 925	394 387	North, Sweden-Norway, NPA
EAGF #1	667 500 000	-	476 790 000	-	
Subtotal	683 638 321	5 476 457	481 178 288	1 881 564	
TOTAL (EU+nat)	689 114 778		483 059 852		

These figures are only indicative. It has not been possible within the timeframe for this PAF to analyse all EU funds and programs and their possible contributions to Natura 2000. For example, the Horizon 2020 is not included here, even though research is one of the prioritised actions in section E of this PAF.

#1 The sum for EAGF has been calculated from the average payment per hectare (includes the single-payment scheme and the green direct payments) to arable land in each of Sweden's 21 counties. This average payment is then multiplied by the area of semi-natural pastures and mown meadows in each county (with allocated payment entitlements) and all counties are summed to a grand total for the whole of Sweden. By doing so, any regional differences in the amount of single-payment as well as in the areas of semi-natural pastures and mown meadows are controlled for. In total, there are approximately 407 000 hectares of semi-natural pastures and mown meadows under the single-payment scheme. Numbers used are from 2017 (have been multiplied by 7 to get the sum for the whole period).

#2 Note: Here, in this table, allocation for Interreg projects include only those decided at the time of writing. For EAGF however, allocation represent an approximation for the entire program period (see explanation below). To get a sum for the entire program period for D.5, a projection for coming Interreg projects must be added. An estimate for D.5 for the entire period is around 693 198 855 euro. The figures for Interreg projects relevant for Natura 2000 are probably overestimated, since it has not been possible to validate how much of the projects that are relevant for this PAF.

For EU Interreg programs, numbers are only given for those that have managing authorities located in Sweden. The numbers presented are from 2018-10-17, with the NPA program as an exception with data from the end of 2017.

For Interreg programs, all *allocated* means will be used during the remaining period. If the allocation of means continues as to date, the projected additional sum of funding will be as presented in the table below. The sums have been calculated using the share of funds allocated to date to the different categories of intervention multiplied within the framework set for each thematic objective and program.

Category of intervention	Interreg programs, projected (additional) sum for the entire period 2014-2020 (euro)
85	3 021 091
86	225 618
87+88	837 368

D.6 Other (mainly national) funding for Natura 2000, green infrastructure, and species protection in 2014-2020:

The total financing allocated to implementation of EU nature policy and associated green infrastructure, for measures or projects not benefiting from any EU co-funding is approximately: **2 885 000 000 euro (~ 412 000 000 euro yearly)**. All amounts are calculated using the rate 1 euro = 8,39 SEK. These figures do not include costs mentioned in D.1-D.5. The sum of D.1-D.5 is, for comparison, approximately 386 000 000 euro yearly (including both EU and national financing).

It is not easy to give an accurate figure of the average yearly funding for the whole Natura 2000 network, species protection and the green infrastructure necessary to maintain it, between 2014-2020 in Sweden. The costs for government funded measures aiming at preserving biodiversity have been estimated by the Swedish Board of Agriculture, the Swedish Environmental Protection Agency, the Swedish Forest Agency and the Swedish Agency for Marine and Water Management for 2017 (Naturvårdsverket 2018, "Sammanställning av medel för biologisk mångfald för år 2017"). The costs reflect the biodiversity measures by authorities as defined for reporting to the Convention on Biological Diversity, which is a wider perspective than used in this PAF. If the employee related costs for the County Administrative Boards are added, but EU funding and national co-funding of EU measures are subtracted, the estimated total spending is around 412 million euro yearly.

In addition to this, the public, farmers, land owners, private companies, organisations, and municipalities have spent money and large efforts on nature conservation in different ways. Also, spatial planning and handling of permits by authorities play an important role in reaching biodiversity targets. These costs, and opportunity costs, have not been estimated in this PAF.

The sum of D.1-D.6, based on figures given above, is around 798 million euro yearly.

A more effective targeting of Natura 2000 using existing funding is clearly needed, and possibly also higher funding, to reach our common nature conservation targets.

E. Priority measures and financing needs for 2021–2027

E.1. Horizontal measures and administrative costs related to Natura 2000

E.1.1. Site designation and management planning

Current status and progress made so far in terms of site identification, designation and management planning (situation: 1/11/2018)

Sweden has 4087 Natura 2000 sites at present (November 2018). Compared to most other countries this is a high number, but many of them are small, especially in the terrestrial part of the boreal and continental zone - see section C1 for more detail. The high frequency of small sites can make the Swedish network vulnerable to changes in the “matrix” outside the network. The high frequency of small sites can make the Swedish network vulnerable to changes in the “matrix” outside the network.

At the latest evaluation by the EU commission (February 2016) the following deficiencies were found in the Swedish network; Alpine region, scientific reserve for the habitat 7220 (Petrifying springs with tufa formation), Boreal region, insufficient moderate for the habitat 1650 (Boreal Baltic narrow inlets) and the species *Barbastella barbastellus* and scientific reserve for the habitat 2330 (Inland dunes with open Corynephorus and Agrostis grasslands), Continental region, insufficient minor for two species, *Lutra lutra* and *Myotis bechsteinii*, Marine atlantic region, insufficient major for the habitat 8330 (Submerged or partially submerged sea caves), scientific reserve for the species *Halichoeros grypus*, Marine Baltic region, insufficient minor for the species *Halichoeros grypus* and scientific reserve for the species *Phocoena phocoena*.

Since the evaluation in February 2016 Sweden has proposed 23 more SCIs and 6 more SPAs. Furthermore, Sweden has proposed to increase the areas of 13 other Natura 2000 sites. In Sweden, the legal protection of Natura 2000 applies from the moment the government has taken the decision to propose a pSCI. Some of the new proposals address the deficiencies observed by the EU Commission, but most of the proposed sites address nationally evaluated deficiencies (normally related to red-listed habitats and species, and species in need of protected areas that have less than 20 % coverage in the network).

All management plans for Natura 2000 sites in need of updating have recently been updated by the responsible authorities, the County Administrative Boards, and there are only around 40 sites that lack management plans. The conservation plans for Natura 2000 sites includes site level conservation objectives and conservation measures.

Sites of Community Importance (SCIs) under the EU Habitats Directive	Number of sites	Number of sites with:		
		legal site designation (SAC or equivalent)	specific site level conservation objectives	specific site-level conservation measures
Alpine region	258	258	258	258
Boreal region	3484	3465	3449	3449
Continental region	423	419	416	416
Total	3987	3965	3946	3946

Special Protection Areas (SPAs) under the EU Birds Directive	Number of sites	Number of sites with:		
		legal site designation (SAC or equivalent)	specific site level conservation objectives	specific site-level conservation measures
Alpine region	28	na	28	28
Boreal region	473	na	467	467
Continental region	64	na	64	64
Total	548	na	542	542

Further measures needed

The relevance of the established network, as well as the green infrastructure, for the fulfillment of the objectives in the nature directives needs to be evaluated regularly. Such evaluations could point to further needs in protected areas. (see also sections C1, E1.3 and E1.4). Further needs of measures should be included in relevant plans, for example river basin management plans according to the Water Framework Directive, and in the marine spatial planning under the Marine Strategy Framework Directive.

Many of the nationally protected areas established recently are in forest habitats. Since this work has taken a lot of time and work effort, the revision of older, outdated management plans, has not been carried out according to the full needs. As many of the nationally protected areas overlap with Natura 2000 sites, it is also important to settle any inconsequence between the two types of management plans.

Prioritization of measures to be implemented during the next MFF period

There is a need to revise approximately 3000 old, outdated management plans for nationally protected areas. This is a one-off measure to address this specific need. The continuous updating of management plans is dealt with, by the County Administrative Boards, in the regular site management.

List of prioritized measures to be carried out, and estimated costs for these measures

Name and short description of the measures	Type of measure*	Estimated cost in Euros (annualised)	Possible EU co-funding source
Revision of management plans for nationally protected areas. #1	O	2 140 000	

* indicate whether the measure is recurring or one-off

#1: The figure is calculated from the estimation that 20 management plans could be revised per annual manpower.

Expected results

Natura 2000 sites and other protected areas are managed strategically at both national and County levels to achieve cost-efficient allocation of management resources. Natura 2000 habitats are managed, or restored, according to best knowledge and best practice. Updated management plans are valuable documents for spatial planning in the municipalities and for improved use of protected areas in relation to other means.

E.1.2. Site administration and communication with stakeholders

Current status and progress made so far in terms of site administration and communication with stakeholders

When Natura 2000-sites are designated, the County Administrative Boards communicate the general and specific aims for the sites with landowners, relevant authorities, and other stakeholders. The same procedure applies for nationally protected areas such as Nature reserves. When new management plans are produced these are also communicated. Other examples of continuous cooperation in management of protected areas and green infrastructure include:

- councils including authorities, other stakeholders, and public organizations for management planning of certain protected areas,
- catchment partnerships which ensure effective stakeholder involvement when implementing river basin management plans,
- County Administrative Boards offering farm-advisory services and arranging conferences and courses directed to farmers, landowners, local authorities, etc.
- national authorities responsible for fisheries management in marine protected areas ensure early involvement of relevant stakeholders,
- authorities responsible for marine spatial planning involve relevant stakeholders in producing plans in an early stage to ensure that both green infrastructure and N2000 network is considered in the planning.

Experience and lessons learned from earlier periods show that support for measures to preserve and develop the ecological values in forests in voluntary set-asides (green infrastructure outside Natura 2000 sites) is dependent on targeted counselling and education. Without targeted counselling or education, there is a high risk that funds for measures to enable favourable conservation status will be unused and that the intended effects in the forests will be lost. The rural development program 2007-2013 provided an arrangement to support the funds for measures with information, advice, and education. An evaluation of this arrangement showed very good results and participants were positive to the advice given. Similar arrangements are also available for the period 2014–2020.

It is necessary to provide targeted advisory and training focusing on alternative forest management methods, as an alternative to traditional clear-felling forestry practices, since these alternatives are not widely implemented. Natura 2000 sites and its associated green infrastructure benefit a lot if forests nearby are managed with alternative methods such as continuous cover forestry. In the same way targeted information and advisory is necessary to increase the area of broadleaved forests in southern Sweden. Expansion or re-creation of broadleaved forests is one way to restore a favourable conservation status to habitats with oak, hornbeam, beech, and other broadleaved tree species.

Further measures needed

An increased effort is needed for the designation of new protected areas and for the management and monitoring of protected areas and species according to the needs presented in this PAF. This means that more annual manpowers are needed at the County Administrative Boards, the Swedish Forest Agency, the Swedish Environmental Protection Agency and the Swedish Agency for Marine and Water Management.

Cooperation in management could be improved and increased. The immediate benefits of these kinds of activities are more cost-effective management, coordination of local and national objectives, coordination of the objectives of local interests, such as landowners, companies and authorities, and coordination of the objectives of different sectors. The LIFE project GRIP on LIFE IP (2018 – 2025) has the main aim to contribute to, improve and increase this kind of cooperation. It aims to disseminate and get a wide acceptance for the Swedish PAF in order to achieve the goals of the EU Habitats Directive. The work within GRIP is inspired by the Natura 2000 Biogeographical Process and include the exchange of experiences and best practices, stakeholder cooperation networks across regions and sectors, as well as international peer-to-peer learning, e.g. Nordic platforms.

GRIP on LIFE targets to improve the conservation status of watercourse and wetland habitats and their characteristic species, and thus the ecosystem services they provide, in selected sites within the Boreal and Continental biogeographical regions. The project will also increase available funding by strengthening the coordination of existing funds to improve the conservation status of habitats and species in the Natura 2000 network while enhancing sustainable use of watercourses and wetlands to help improve their conservation status.

More measures directed to farmers are needed because the grassland habitats are generally far from favourable conservation status and their status is deteriorating. In this habitat group most of the management is done by farmers having agri-environmental subsidies for maintenance of semi-natural pastures. More information directed to farmers about management methods and expected results for biodiversity is therefore needed.

In 2019, a new law enters into force which implies that all water power plants must apply for new permits to ensure compliance with modern environmental requirements and EU directives. A national plan for issuing of new permits is under development at the time of writing (Nationell plan för omprövning av vattenkraft), which will facilitate contact between decision-makers, stakeholders, and various kinds of experts. The implementation of the law will require collaborative projects, promotion of best practices, and implementation of those best practices in water power plants.

To improve the ecological status in the green infrastructure set-asides on private land, it is estimated that roughly 2500 landowners need counselling annually.

To improve the ecological status in a wider perspective, to increase the amount of continuous tree cover forestry and regeneration with broad leaved trees (instead of Norway spruce), it is estimated that 2000 landowners need counselling annually.

For the marine environment, counselling of fishermen and coastal tourism operators should also increase.

Prioritization of measures to be implemented during the next MFF period

All the measures mentioned above should, to some extent, be prioritized during 2021-2027, see table below.

List of prioritized measures to be carried out, and estimated costs for these measures

Name and short description of the measures	Type of measure*	Estimated cost in Euros (annualised)	Possible EU co-funding source
Counselling in the forest green infrastructure habitats outside Natura 2000	R	1 500 000	
Counselling in a wider perspective in the forest green infrastructure	R	1 500 000	
The LIFE project GRIP on LIFE (2021 – 2025)	O	1 893 000	
Information and communication strategy directed to farmers, including development of new digital based information	O	100 000	
Production and communication of printed and digital information material directed to farmers	R	21 500	
Farm advisory services	R	1 500 000	
Conferences and courses directed to farmers, landowners and other stakeholders	R	1 505 000	
Administration of liming of lakes and rivers at the County Administrative Boards and the Swedish Agency for Marine and Water Management	R	12 000 000	
Designation, management and monitoring of protected areas and species at the County Administrative Boards #1	R	42 000 000	
Designation, management and monitoring of protected areas and species at the Swedish Forest Agency #1	R	5 000 000	
Designation, management and monitoring of protected areas and species at the Swedish Environmental Protection Agency #1	R	3 000 000	
Designation, management and monitoring of protected areas and species at the Swedish Agency for Marine and Water Management #1	R	2 000 000	
Improvements of IT systems for management of Natura 2000 sites #2	O	200 000	
IT systems for designation and management of Natura 2000 areas #3	R	800 000	

* indicate whether the measure is recurring or one-off

#1: For CABs the need is estimated to 20 annual manpowers per CAB, equalling 420 persons, for handling designation, management and monitoring of protected areas and species. For SEPA the need is estimated to 30 annual manpowers and for SWAM and SFA the need is estimated to 20 and 50 annual manpowers, respectively. Regular updating of management plans is included in this sum.

#2: VIC Natur IT system (including IT operation, development, support and depreciation) had an annual budget of around 3,5 million euro in 2017. An estimated 1 million euro would be used if the system had been only for Natura 2000 issues.

Expected results

Counselling of 2500 forest owners resulting in 10 000 ha of restored Natura 2000 forest habitats annually in the green infrastructure outside Natura 2000 sites.

Counselling of 2000 forest owners resulting in 5000 ha of continuous tree cover forestry or broad-leaved forest plantations annually in the green infrastructure outside Natura 2000 sites.

The courses and information material produced for farmers are expected to reach around 20 000 farmers, and thereby increase the conservation status of grasslands and other habitats in need of grazing or mowing.

The other measures are expected to help maintain and increase the conservation status for many habitats and species, by more result oriented and cost-effective management. This kind of cooperative

measures are also expected to help raise the general awareness and contribute to other benefits. These results are not possible to quantify.

E.1.3. Monitoring and reporting

Current status and progress made so far in terms of monitoring and reporting

Sweden has built up a system for monitoring, that is based on different programs which can be grouped as follows:

- 1) national and regional environmental monitoring of for example forests, lakes and landscapes,
- 2) national biogeographical monitoring of selected habitats and species,
- 3) site-focused monitoring of protected areas (including Natura 2000 sites).

However, the extent to which monitoring has been implemented varies between different habitats, species and regions. For marine habitats and species in particular, more efforts are needed to develop relevant methods and implement monitoring programs. During the last years, several improvements of the monitoring system have been made. An example is the LIFE+ project “MOTH” (Monitoring Of Terrestrial Habitats), which ended in 2014 and demonstrated sample-based monitoring of several terrestrial less common but widespread habitats. Another example is the MARMONI LIFE+ project, dealing with marine monitoring. Both the site-based and biogeographical monitoring is currently under revision, after having been in use for 5-10 years. The monitoring of large carnivores is handled with higher ambition than other species, due to the high political interest (Naturvårdsverket report 6830, 2018, gives a report on this monitoring system, in Swedish:

<http://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6830-1.pdf?pid=22578>).

Inventories, research projects and public observations have also contributed with important new knowledge for several species and habitats, which are used for reporting. One example is the “Sambah” research project (Static Acoustic Monitoring of the Baltic Harbour Porpoise, see www.sambah.org). In this, the eight EU Member States around the Baltic Sea cooperated to survey the distribution and abundance of harbour porpoises in the Baltic Sea. The results have been used to suggest new Natura 2000 areas, as a basis for the coming Article 17 reporting under the Habitats Directive, and as a basis for a new monitoring program for this species. For some species and habitats, the knowledge is still too limited to direct monitoring efforts effectively, and the reporting for those need to be based more on expert judgements. This applies especially to the marine environment.

Further measures needed

Existing monitoring programs need to be upheld, and in some cases the sampling should be increased to get better data. A few details in the current monitoring would benefit of being adjusted to better correspond to the latest reporting formats for the Habitats and Birds directive. One example is that the Article 17 format in the 2019 reporting asks for a figure on how much of a habitat that is in a “good” vs “not good” condition (new for this reporting). In most of Sweden’s monitoring programs, this can only be inferred from other data which are not collected with the primary purpose of answering that question, which is not optimal.

To cover the requirements from the Habitats Directive and the Marine Strategy Framework Directive (new Commission Decision for MSFD EU COM 848/2017) a coordinated monitoring for marine benthic habitats and species needs to be developed.

The monitoring of species and habitats is, as stated above, partly based on insufficient knowledge. Funding for further inventories, especially in the marine environment but also for some poorly known terrestrial habitats and species, is needed to help build a knowledge base. This can then be used, inter alia, to direct monitoring efforts, improve the quality of reporting, and direct conservation actions better.

For the reporting, there is a need to develop methods and IT systems to simplify the reporting and make the assessments easier and of higher quality. Sweden is willing to help EU to put more effort into data standardization and data harvesting, with the ambition of reducing the reporting burden for Member States while maintaining the desired data quality for EU-level analysis. This would be in line with the roadmap and conclusions from the fitness check on environmental reporting – the Fitness Check evaluation SWD(2017) 230 and Report COM(2017) 312.

For monitoring of protected areas, better IT support systems are needed to simplify the analysis of data to make best use of the results for management and other decisions on prioritization. There is also ongoing work to improve the access to online information of monitoring and reporting data.

At the time of writing, in 2018, none of the “further measures needed” are implemented, but some of that work is expected to start before the 2021–2027 period starts.

Prioritization of measures to be implemented during the next MFF period

Regarding the monitoring of habitats and species covered by the Nature directives, maintaining established sampling programs is important. Of the “further measures needed” mentioned above, all should be started 2021-2027 if funding allows. When looking at different habitat groups, the marine habitats stand out as having less data and less ongoing monitoring of the species and habitats covered by the Nature directives, and with increased funding for mapping and monitoring these have a high priority. There are significant needs for improved monitoring and further baseline mapping also for some terrestrial habitats and species (mostly the lower flora and fauna). An analysis of this is ongoing, and priorities are not clear as of this writing. If the political interest in the large carnivores should happen to decrease, and a favourable conservation status for those species is well secured, the monitoring of these could be decreased, thus freeing funding for other purposes. At present, however, none of those points are true.

List of prioritized measures to be carried out, and estimated costs for these measures

Name and short description of the measures	Type of measure*	Estimated cost in Euros (annualised)	Possible EU co-funding source
Monitoring of the outcome of the management of Natura 2000 sites and other protected areas #2	R	2 100 000	
Terrestrial environmental monitoring and reporting related to Natura 2000, IT systems for this etc #1	R	5 010 000	
Terrestrial biogeographic monitoring of habitats and species #3	R	2 200 000	
Reporting for article 17, Habitats Directive #4	R	111 000	
Reporting for article 12, Birds Directive	R	25 000	
Monitoring of large terrestrial carnivores (wolves, brown bear, lynx, wolverine, golden eagle) including DNA analysis, IT systems and costs for personell. The largest part is staff at the County Administrative Boards, financed by the 1:3 grant through the Swedish EPA (50 annual manpower). # 8	R	6 000 000	
Coordination and administration of monitoring and reporting related to the Birds and Habitat Directives #5	R	-	
The Swedish Species Portal (IT system for species registrations from volunteers and some governmental monitoring and inventories)	R	1 000 000	
Aquatic environmental monitoring and reporting related to Natura 2000, IT-systems for this etc #6	R	6 000 000	
Method development and pilot studys, mostly for marine biogeographic monitoring of habitats and species	O	3 000 000	
Aquatic reporting for Habitats and Birds directives #7	R	60 000	

* indicate whether the measure is recurring or one-off

#1: The figure is calculated as 80 % of the amount stated as funding for biodiversity within the grant “1:2 miljöövervakning m.m.” in the Swedish EPA report to the government in June 2016 (NV-08874-17, annex 1 and 2). Of the 5 million euro for biodiversity environmental monitoring, 80 % is estimated to be of relevance for the Natura 2000 network (the remaining 20 % is nationally and/or internationally relevant biodiversity monitoring costs, but not relevant for the Habitats or Birds Directives).

#2: In accordance with the national recommendations to the County Administrative Boards (CABs), this is calculated as 5 % of the budget for management of protected areas. The cost for administration at the CABs is not included here, but in the figure in E1.2 for general administrative costs related to Natura 2000 management at the CABs.

#3: Naeslund et al, 2018

#4: Reporting costs for article 17 reporting according to project plan, excluding specific costs for aquatic habitats and species, annualized (reporting once every sixth year)

#5: No figure given here, since this work is included in the general figure for administration in E1.2 (desk officers at Swedish EPA, Swedish Agency for Marine and Water Management, and others)

#6 – 1,3 million euro annually is estimated in the 2014 analysis of biogeographic monitoring of aquatic habitats and species. Monitoring of harbour porpoise was calculated to 65 000 euro annually in the suggested monitoring scheme 2017. This is in addition to the ongoing environmental aquatic monitoring. Biogeographic monitoring is under revision at present (2018) and the actual need is likely bigger. 4,6 million euro is estimated as the current funding for aquatic biodiversity monitoring in 2017 (NV-08874-17). Thus, a rounded figure of 6 million euro is estimated here.

#7 – Estimated from the proportion of aquatic vs terrestrial habitats and the known costs for the terrestrial reporting.

#8: See Naturvårdsverket report 6830 (2018), “Beskrivning av det skandinaviska inventeringssystemet för stora rovdjur”. This is funded using the 1:3 grant handled by the Swedish EPA, except 0,32 million euro which goes directly to Sametinget. The sum includes all costs related to the action, for example manpower at the Swedish EPA and the County Administrative Boards.

Expected results

Ongoing monitoring, analysis and reporting gives us a necessary base for reporting and decisions on for example prioritization of funding conservation measures, and continuous time series of data are important to understand the developments. The information is also important to allow the public, media and politicians to take part in discussions about what to prioritize, where and when.

E.1.4. Remaining knowledge gaps and research needs

Current status

The knowledge about the status of the Natura 2000-habitats is relatively good for some habitats but weaker for others and in certain regions. This is especially the case for the green infrastructure outside protected areas. There have been comprehensive nationwide surveys of wetlands, meadows and pastures, woodland key habitats and of some watercourses, but a relatively large knowledge gap remains also for these habitats. The largest knowledge gaps are connected to forest habitats outside protected areas, for certain grassland habitats, fresh water and marine habitats, and for many species. The strategic work with green infrastructure started relatively recently in Sweden and is not yet fully developed.

There is a general need to develop, or improve, management strategies both on national and regional levels and make them more comprehensive.

In general, the adaptive management of protected areas is not very well developed. Management is mostly carried out based on the professional skills gained in the management organizations in the counties. Monitoring is carried out, but the monitoring results are generally not used systematically. Adaptive management is therefore not fully developed. There is a lack of management guidelines, based on research, monitoring and best practice are for some habitat types.

For several marine Natura 2000 habitat types the lack of knowledge is significant, particularly in off-shore areas. Habitat maps exist to some extent in the coastal area but the quality is varying and patchy with respect to methodology and geographic scope. Habitat maps of high resolution primarily exist for protected areas. These maps are often based on modelling and/or desk work and have not been verified in the field. For some coastal habitat types there is also a lack of knowledge. The ongoing shore inventory section of the THUF environmental monitoring (Terrester Habitat Uppföljning, SLU) project will give useful data, but should be complemented with mapping and further monitoring.

In 2016, a national project for habitat mapping was initiated at the Swedish Agency for Marine and Water Management. The purpose of the project is to produce seamless maps of benthic habitats, including Natura 2000 habitat types, to cover different management needs and to establish a long-term cooperation on mapping activities between relevant national authorities. The budget is approximately 1 million euros annually, including co-funding from EHFF. The project is expected to run until 2020 but significant knowledge gaps will remain beyond that date, with continued need for EU funding aimed at mapping and/or inventory work in 2021–2027. More efforts are also needed to develop relevant monitoring methods for benthic habitats.

Research relevant for Natura 2000 can be financed through Swedish EPA research grants and a few other sources. There has not been time enough to make a thorough review for this PAF, but highly relevant research has been funded recently (for example by decisions by the Swedish EPA in the end of 2018 on funding i.e. for forest and grassland biodiversity) and several topics remain to be researched. Examples include a lack of knowledge about the ecological needs of many species, especially for the lower flora, lower fauna and fungi, when it comes to quantitative and qualitative habitat demands, dispersal abilities, genetic diversity and population viability analysis. At present, research on large carnivores is financed with approximately a few hundred thousand euros annually.

Further measures needed

The Article 17 report shows the need to increase the area, and improve the connectivity, of many habitat types of forests, semi-natural grasslands, wetlands, fresh water and marine habitats. Extensive surveys of several habitat types outside Natura 2000 areas are therefore needed to identify new Natura 2000 habitats that could be included in the green infrastructure, either by establishment of new protected areas or the conservation of the habitats by voluntary means.

The Article 17 report also shows that structures and functions need to be improved for many habitat types to reach favourable conservation status. Surveys of management needs in Natura 2000 areas and other protected areas are required and old management plans should be revised according to the needs. Strategies to prioritize between habitat types, management methods, and regions needs to be developed. Monitoring of the effects of management is required to adapt management and achieve as favourable outcomes as possible. A stronger emphasis on other gains from Natura 2000 management needs to be incorporated in new management plans, for example their contribution to ecosystem services, climate mitigation and adaptation, rural development, nature tourism, and small and medium enterprises.

The following specific measures are needed to get better knowledge about the distribution and status of Natura 2000 habitats and species and their management needs:

- Surveys of Woodland Key Habitats outside Natura 2000 sites and other protected areas to gain better knowledge of the distribution, status, and management needs of high conservation value forest habitats to increase the possibilities to achieve an improved and more cost-efficient green infrastructure.
- Surveys of other habitats than forests and species outside Natura 2000 sites and other protected areas to gain better knowledge of their distribution, status, and management needs of habitats with high value for nature conservation, to increase the possibilities to achieve an improved and more cost-efficient green infrastructure in both terrestrial and marine systems.
- Surveys of habitats and species, structures and functions, and management needs in approximately 3000 Natura 2000 sites and other protected areas to gain knowledge of the required management needs of the actual sites.
- Improved methods and participatory processes for adaptive management.
- The development and administration of a GIS-based site-related database, including site information on conservation status and site-based management and monitoring needs for all Natura 2000 sites and other protected areas.
- Surveys of alien invasive species that can threaten the favorable conservation status of habitats or species and development of control programs of such alien invasive species.
- The development of national and regional management strategies to manage areas in the most cost-efficient way. A compilation and analysis of site-related geographical information of management needs is required to prioritize resources and make strategic planning of the management of protected areas including Natura 2000 sites.

- Develop management guidelines, based on research, monitoring and best practice for some habitats, including semi-natural grasslands, wet forests in need of hydrological restoration, marine and coastal habitats, and many typical species.

- Carry out management courses and other support to ensure that principles of adaptive management are incorporated in management strategies and guidelines for management of protected areas at both national and county levels.

- Research to increase the ecological knowledge, e.g. distribution traits, habitat needs, and critical habitat thresholds of many species, especially in the lower flora, lower fauna, fungi and in marine ecosystems. Such knowledge would enable the achievement of connectivity and long term favourable conservation status for species.

Prioritization of measures to be implemented during the next MFF period

All the measures mentioned above should, to some extent, be prioritized during the next MFF period, see table below.

List of prioritized measures to be carried out, and estimated costs for these measures

Name and short description of the measures	Type of measure*	Estimated cost in Euros (annualised)	Possible EU co-funding source
Surveys of Woodland Key Habitats outside Natura 2000 sites and other protected areas. #1	O	2 000 000	
Surveys of other habitats than forests and species outside Natura 2000 sites and other protected areas. #2	O	2 100 000	
Surveys of habitats and species, structures and functions and management needs in approximately 3000 Natura 2000 sites and other protected areas. #3	O	2 140 000	
Improving methods and processes for adaptive management.	O	100 000	
Surveys of alien invasive species in areas included in PAF. #4	R	1 050 000	
Developing national management strategies for protected areas	O	100 000	
Developing 21 regional management strategies for protected areas (on County level)	O	600 000	
Develop management guidelines	O	200 000	
Consultant support to carry out management courses	R	200 000	
Mapping of marine benthic habitats #5	O	1 000 000	
Research to increase the ecological knowledge about species and habitats #6	R	14 400 000	
Other Research measures, for example on thresholds for connectivity #7	R	700 000	

* indicate whether the measure is recurring or one-off

#1: The figure is the same as in the current budget.

#2: The figure is calculated as 1 annual manpower per County. Example of habitats to survey are springs and springfens (code 7160) and dune habitats (21xx, 23xx).

#3: The figure is calculated from the estimation that 20 sites could be surveyed per annual manpower.

#4: The figure is calculated as half annual manpower per County.

#5 : Mapping of marine benthic habitats

#6: The figure is taken from the current spending on research related issues at the Swedish Species Information Centre and the Swedish Biodiversity Centre at the Swedish Agricultural University. Other universities also do research relevant for Natura 2000 species and habitats,. Funding of relevant research also come from MISTRA and FORMAS, but they are considered outside the scope of this PAF due to a lack of time to delimit the actual amounts. The number given here should thus be read as being an underestimation of the actual need.

#: Swedish EPA research funding in end of 2018 for biodiversity in fragmented landscapes and protected areas 2-3 years ahead is used to estimate this figure

Expected results

A considerable improvement in the knowledge of the distribution, status, and management needs of Natura 2000 habitats both in Natura 2000 sites and in the green infrastructure outside Natura 2000 sites.

Natura 2000 sites and other protected areas are managed strategically at both national and county level and management resources are prioritized in a cost-efficient way. Natura 2000 habitats are managed, or restored, according to best knowledge and best practice.

Principles of adaptive management are overarching the management of protected areas at national and county levels and are reflected in management strategies and guidelines. Monitoring of management activities are carried out systematically and management of protected areas is adapted according to the results.

A first generation of green infrastructure is developed at national and county levels. Meadows and pastures outside protected areas, forest voluntarily set asides in the forestry plans, and other valuable, or potentially valuable habitats, in the green infrastructure are managed in a cost-efficient way. Furthermore, marine spatial plans are based on green infrastructure and ensure connectivity between sites.

E.1.5. Natura 2000-related communication and awareness raising measures, education and visitor access

Current status

Most of the Natura-2000 sites are also protected nationally, either as national parks or as nature reserves. Many awareness raising measures, including visitor access activities, are only carried out in areas that are national parks or nature reserves, whereas Natura 2000 sites which are not nationally protected as such, are less developed in this respect. In total there are 30 national parks and around 5000 nature reserves which cover about 13% of Sweden's total area.

Awareness raising activities such as information, education, and demonstration of visit values represent a ground pillar in the public communication. The visitor centers (Naturum) play an important role in this work and offer a “gate” to nature. There are 33 visitor centers (23 state owned and 10 owned by municipalities). Information and communication are also carried out at websites of the national parks and the County Administrative Boards.

Accessibility measures to facilitate nature tourism for all, such as information and interpretation as well as means to improve physical accessibility, constitute an important part of the work. Priority is given to national parks and nature reserves important for the general public. During the current funding period, the work with measures such as guidelines for accessibility (Naturvårdsverket et.al, 2013), guidelines for planning and organizing entrance points in national parks and other much visited areas (Naturvårdsverket, 2015), guidelines for interpretation and web-based education for managers to make nature and cultural areas accessible for all visitors have improved.

The costs of awareness-raising and accessibility measures are divided between one-off investments and recurrent costs. Bigger one-off investments include visitor centers, the national park websites, and entrance point to the sites. Smaller one-off investments include accessible toilets, information signs, improvement or construction of new paths, and bird observation platforms. In the alpine region, recurring maintenance cost of security huts along winter paths and small-scale bridges over water courses are prioritized. Due to an increasing number of facilities and other investments, the recurrent costs for maintenance of facilities, buildings, web-sites, information signs, etc. are increasing annually. Against this background, the financial means to keep up with maintenance work are not always enough.

Another challenge is the rapidly increasing interest of nature tourism and increasing number of visitors in protected areas. To manage the increased number of visitors, Sweden needs to invest in capacity building and peer-to-peer learning about adaptive management tools, e.g. zonation and strategies to cope with litter, etc. To sustain good conservation status, increased visitor rates also requires improved communication between managers, nature tourism companies, the local community, and municipalities. Several national parks are working strategically with stakeholders for sustainable tourist destination development with the aim to create sustainable tourism in the whole area. One example is Åsnen National Park within Destination Åsnen. The possibilities for commercial activities for companies working with nature tourism are in some respects restricted in protected areas. Developments such as Destination Åsnen, provide an interesting example of how protected areas can be included in wider strategies that contribute to local development and green jobs - without jeopardizing the conservation objectives of the site.

Between 2014-2018, Sweden has carried out 19 traditional LIFE-projects with the goal to improve the conservation status of various habitats and species within the Natura 2000 network. All projects include communication activities to raise awareness of habitats, species and the Natura 2000 network as such. Many projects have also facilitated access to Natura 2000 sites by the construction of footbridges, observation towers, etc.

In 2017 an integrated LIFE project, GRIP on LIFE, was launched with the goal to implement the Swedish PAF in a set of habitats connected to watercourses and wetlands in forested landscapes. The success of the project depends crucially on cooperation and dialogue between different authorities as well as the private sector and the public involved. The project will contribute to developing and improving the communication around Natura 2000 and PAF in an important way.

Further measures needed

It is important to continue prioritizing work within Natura 2000 sites that are also protected as a national park or nature reserve. This is because the areas are well spread over the country and provide a diversity of nature experiences that can appeal to a broad target group. Many of the areas have high accessibility and several services with high potential to enlighten visitors of the importance of protected areas. In areas that are only protected as Natura 2000, agreements with the land-owners about these types of measures need to be improved.

Visitor access (physical and information/interpretation)

The work with maintenance and investment in facilities needs to continue, both to improve physical access and for awareness raising. Each year new protected areas are established, bringing about

increasing visitor numbers. Due to the high number of protected areas, maintenance work and investments needs to be prioritized carefully according to where they have the highest effects, since finances are limited.

The increasing nature tourism in protected areas accentuates the need for responsible planning and management. Such management needs to be able to handle sudden and sometimes unpredictable increases in numbers of visitors in protected areas. Measures include zonation (for which guidelines are needed), peer-to-peer learning and adoption of best practice from other countries such as Iceland and Norway.

Monitoring, evaluation and adaptive management needs to be improved. The maintenance gap in protected areas needs to be estimated and acted upon.

Entrance points to national parks and other nature sites of high visitor interest, as well as for example cottages and trails, need recurrent management.

Education and awareness

To tailor awareness-raising activities, people's knowledge of the aim of protected areas as well as visitor behavior needs to be assessed. Currently, the work with surveys and monitoring is limited. Some questions are surveyed yearly but the assessments need to be further developed.

- Continue, and expand on, the yearly survey about awareness of protected areas in Sweden.
- Develop the website sverigesnationalparker.se
- Communicate and create awareness through visitor centers.
- Visitor monitoring – to be able to measure effects and goals, e.g. awareness, accessibility, etc.

Prioritization of measures to be implemented during the next MFF period

All measures are prioritised.

List of prioritized measures to be carried out, and estimated costs for these measures

Name and short description of the measures	Type of measure*	Estimated cost in Euros (annualised)	Possible EU co-funding source
Buildings and recreation facilities; e.g. toilets, waste sorting facilities, information boards and buildings, bird-watching towers, shelter, areas for fireplaces, benches, tables, etc.	O	4 198 000	
Buildings and recreation facilities; e.g. toilets, waste sorting facilities, information boards and buildings, bird-watching towers, shelter, areas for fireplaces, benches, tables, etc.	R	6 297 000	
Parking areas; foundation, hard/flattened areas with gravel, car front-railings, etc.	O	495 000	
Parking areas; foundation, hard/flattened areas with gravel, car front-railings, etc.	R	742 000	
Path/track; gravel paths, footbridges, wooden paths, ramps, railings, fence, etc.	O	2 039 000	
Path/track; gravel paths, footbridges, wooden paths, ramps, railings, fence, etc.	R	3 059 000	
Information and interpretation; information signs, direction signs, web-information, folders/brochures, guiding, etc.	O	2 628 000	
Information and interpretation; information signs, direction signs, web-information, folders/brochures, guiding, etc.	R	3 943 000	
Visitor centers (Naturum); visitor information in visitor centres, guiding, exhibitions, technical information, etc.	O	2 500 000	
Visitor centers (Naturum); visitor information in visitor centres, guiding, exhibitions, technical information, etc.	R	5 000 000	

* indicate whether the measure is recurring or one-off

Expected results

We believe that the effect of the work will result in:

- an increased number of visitors and therefore *more visitors who learn about protected areas* and who enjoy protected areas and therefore defend and acknowledge their importance. From 2013 – 2017, the annual number of visitors in Swedish national parks has increased from about 2,3 million to about 2,5 million. The same trend can be seen in the visitor centers where the annual number has increased from 1,4 million in 2014 to 1,8 million in 2017. The nature reserves also show increasing numbers of visitors.
- an increased number of people *who will consider protected areas as important for their outdoor recreation and nature experiences*, which is important for the general awareness. In a survey from 2018, 98% of the respondents agree totally or partly that it is important to protect nature. Compared to results in 2017, the share has increased from 94% to 98%. In the same survey (2018), 56% of the respondents agree that nature reserves and national parks are important for their outdoor recreation (Kantar Sifo, 2018).
- an increased number of visitors *that have higher needs, difficulties, and perhaps also resistance to visit protected areas*, such as people with disabilities, older people, immigrants,

and families with small children. In an unpublished survey from 2016 (170 people), with respondents with disabilities, it was shown that 9 out of 10 wants to spend more time in nature. The three most important factors identified to hinder outdoor access were; 1) difficulties to find information of accessible areas, 2) the information presented not being accessible, and 3) the areas not being physical accessible. These factors are no different in protected areas (Naturvårdsverket, 2016).

- *a sustainable recreation and nature tourism* in the national parks and nature reserves (through adaptive management, guidelines, awareness, accessibility, channeling, etc.)

E.1.6. References (for horizontal measures and administrative costs related to Natura 2000)

provide text

E.2 Site-related maintenance and restoration measures, within and beyond Natura 2000

E.2.1. Marine and coastal waters

Current status of habitats and species, conservation measures taken until now and their impact so far, remaining pressures and threats

Among the Swedish marine and coastal habitat types, listed in Annex I of the Habitats directive, all require management within the habitats and/or in adjacent terrestrial and freshwater habitats to reach or maintain a favourable conservation status (1110, 1130, 1140, 1150, 1160, 1170, 1180, 1610, 1620, 1650 and 8330).

All these habitats were reported to have unfavorable status in the 2013 report on the conservation of habitats and species under the Habitats directive (“Article 17 report”). The same assessment is predicted for the upcoming 2019 report. The area coverage for most habitats was assessed as adequate, but for lagoons (1150) exploitation including dredging has led to a decreased area. Also, eelgrass meadows have decreased, particularly in MATL, primarily due to coastal exploitation and increased turbidity. For all habitats, quality was assessed as inadequate or bad.

The major anthropogenic pressures on marine and coastal habitats include discharge of nutrients and contaminants, and fishing and exploitation along the coastline, including dredging and bottom trawling. The combination of different pressures such as eutrophication and overfishing may also lead to additional effects, so called cascade effects, in the marine environment. It has been shown that the absence of large predatory fish, caused by overfishing, may reinforce the effects of eutrophication and lead to a decreased distribution of vegetation, e.g. eelgrass meadows.

For some areas, species and/or habitats are put under pressure because of shipping and noise pollution. Ship traffic can also damage the seafloor, and the impact can be considerable especially in shallow areas and around navigational lines.

There are considerable knowledge gaps concerning the occurrence and distribution of several marine habitat types, and information on their specific conservation status is often lacking. Due to the general absence of comprehensive marine spatial data in combination with insufficient monitoring of marine

benthic habitats, the assessments made within the Article 17 reporting are primarily based on extrapolation or expert opinion from a limited amount of data. Consequently, it is very hard to estimate how much of a habitat area that is in need of a specific measure to improve in status.

Measures needed to maintain or restore favourable conservation status

Based on the current status of the marine and coastal habitat types, large-scale measures to reduce eutrophication and discharge of contaminants to the marine environment are needed to reduce the general impact of these pressures on marine species and habitats. In addition, more specific measures are needed locally to e.g. decrease discharge of nutrients to sensitive shallow bays in the Natura 2000 network. Similarly, the impact of fishing needs to be addressed on different levels.

Measures aimed at reducing eutrophication in the marine environment are primarily addressed within the Water Framework Directive and the Marine Strategy Framework Directive (MSFD) programmes of measures and coordinated regionally in the Regional Sea Conventions. Further land-based nutrient reduction measures are needed as well as in-situ habitat restoration, of e.g. eelgrass meadows. In the MSFD programme of measures, there are also several measures aimed at limiting the discharge of contaminants to the marine environment, e.g. through better guidance and/or stricter regulations concerning sewage water, tributyltin (TBT), shipwrecks, etc.

Concerning fishing, there is ongoing work to further implement fisheries conservation measures, both nationally and in offshore Natura 2000 areas in accordance with the Habitats directive and EU Common Fisheries Policy (ref: Uppdrag om bevarandeåtgärder vad avser fiske i marina skyddade områden. Redovisning av regeringsuppdrag M2017/02522/Nm). The proposed measures can include no-take zones as well as zones with restricted gear types in order to e.g. prevent damage to habitats from bottom contacting gear or by-catch of harbour porpoise and sea birds. The regulations can address both commercial and/or recreational fisheries. The intention is to implement fisheries conservation measures in marine protected areas where necessary as soon as possible, by 2020 at the latest. However, measures under the CFP require dialogue both with stakeholders and formal consultations with concerned member states - which may delay the implementation. Such a delay should not be a cause for concern for the conservation objectives of Natura 2000 sites, since the Habitats Directive (in particular its article 6) applies alongside of CFP fisheries regulations. A delay may have other negative effects.

An adaptive management scheme for Natura 2000 areas may also entail additional fisheries conservation measures, based on identified gaps in ongoing evaluations of the effect of the implemented measures.

The ongoing small-scale exploitation of the coastline needs to be reduced - both within and outside of protected areas - since the accumulated effect has a severe impact on green infrastructure, with fragmented habitats and decreased connectivity. Small scale dredging is a diffuse, but important pressure on the marine environment, from which negative effects on habitats and species can accumulate both momentarily and over time, occasionally generating a larger total effect on the environment than single large-scale projects.

A coordinated strategy for measures against physical damage and for biological recovery of coastal environments is under development, as an action within the MSFD programme of measures. The

negative effects of small-scale dredging could potentially be mitigated by generating toolboxes and regionally adapted guidelines for dredging.

In addition to overarching measures as those described above, specific restoration measures may also be needed, both within aquatic and adjacent terrestrial habitats, to improve the status of most of the marine and coastal habitats. The experience with ecological restoration in marine environments is, however, limited, and many methods have only been applied on a very limited scale. The efficiency, cost and success rate of marine restoration measures are therefore often poorly known. Methods for ecological compensation and restoration of marine habitats are under development (reference: God havsmiljö 2020 Marin strategi för Nordsjön och Östersjön Del 4: Åtgärdsprogram för havsmiljön. Havs- och vattenmyndighetens rapport 2015:30).

The scope of this PAF does not include general measures that falls within sector responsibility, e.g. regulation concerning agriculture, fisheries etc, whereas site-specific measures to mitigate effects of eutrophication and fishing should be addressed within the PAF. It should, however, be emphasized that a coordinated approach including both large-scale and site-specific measures is a prerequisite for successful management of Natura 2000 areas.

Examples of site-specific measures, including measures that are needed both within marine and adjacent freshwater and terrestrial habitats, are listed below. The examples are divided in two groups based on the pressures relevant for marine habitats as addressed within the Article 17 report.

(1) Examples of measures to mitigate the pressure from discharge of nutrients from agriculture and forestry, including run off due to erosion (i.e., targeted threat A and B within the list of threats, Article 17)

- Restoration of coastal wetlands
- Restoration of flooded zones
- Restoration of functional buffer zones along rivers and beaches
- Removal of flood barriers
- Installation of lime filter and/or two-step ditches
- Filling of open ditches in forests and restoring natural hydrology e.g. meandering of
- Fixation of phosphorus or gentle dredging of nutrient rich sediments, where appropriate
- Removal of vegetation (common reed, vegetation on bird islands)

(2) Examples of measures needed to mitigate the pressure from extraction of resources, energy production and its related infrastructure, development and operation of transport systems, development, construction and use of residential, commercial, industrial and recreational infrastructure and areas (i.e., targeted threat C, D, E and F within the list of threats, Article 17)

- Installation of erosion barriers adjacent to ship lanes that allows natural vegetation at the shore
- Reducing impacts at installation and the running of industrial facilities constructions etc, by the coast or at sea (e.g. reduce sound pollution, turbidity, emission of oil and chemicals, light)
- Removal or capping of polluted sediments

- Decrease fragmentation of habitats by reducing the impact on hydromorphology and biology from constructions and/or water activities
- Restoring natural hydrology at constructions in the water (bridges, causeways etc).
- Restoring thresholds of lagoons that have been subjected to dredging
- Restoring shallow embanked bays
- Restoring the seafloor in abandoned exploitation areas
- Restoring flatfish bottoms and other vegetation free soft substrate bottoms (e.g. re-sedimentation of dredged areas)
- Restoring eelgrass
- Restoring mussel- and oyster beds
- Planting seaweeds on hard substrates
- Planting rooted macrophytes (other than eelgrass)
- Restoring cold-water corals

In addition to specific measures as exemplified above, significant efforts through research, mapping and inventories are needed to improve the knowledge level concerning marine habitats (See E.1.4).

Prioritization of measures to be implemented during the next MFF period

Based on the status assessment in the last Habitats Directive article 17 report, the need for measures in marine and coastal habitats is very large, and action needs to be taken simultaneously on many different levels, both inside and outside the Natura 2000 network. Consequently, it would be easy to say that all proposed measures need to be prioritized, Still, the Natura 2000 areas have specific regulations and needs, which are the focus of this PAF.

Generally speaking it is of high priority to make sure that effects from harmful activities are evaluated and minimized in an adaptive manner. If necessary, regulations should be adjusted when increased knowledge gives better information on the status of habitats and species in the Natura 2000 areas. To establish such a regime in practice, funding for mapping, monitoring and enforcement is of high priority for 2021–2027.

We assume that regulation of fisheries in Natura 2000 areas will be implemented, where appropriate, by 2020 at the latest, but a need for additional fisheries conservation measures may nevertheless arise in 2021–2027. The need for further regulation of shipping in and/or close to some Natura 2000 areas should be evaluated (wintering bird areas or harbor porpoise breeding areas are of highest priority).

When it comes to nutrient discharge, measures to reduce local input of nutrients and organic matter where it matters most for specific Natura 2000 sites are given priority in this PAF, whereas general measures to reduce discharge of nutrients to the marine environment are not included.

To make sure that established regulations are known and followed, enforcement and information is needed. As already mentioned, significant efforts to increase the knowledge on distribution and status of marine habitats needs to be made during the next MFF period, in order to provide a basis for implementation of relevant measures and an evaluation of the achieved effect.

Prioritized measures

Reduce nutrient run-off and transport of eroded materials from agriculture and forestry, by developing functional buffer zones, restoring coastal wetlands and flooded zones, restoring natural hydrology and installing ditches.

Reduce negative impact on hydromorphology and biology from constructions and/or water activities in coastal areas and/or exiting watercourses, thereby decreasing fragmentation of habitats as well as restoring the processes and ecological functions upholding green infrastructure.

- Decrease fragmentation and create larger areas of connected habitats
- Restore natural transports of sediments from large watercourses and maintain natural processes in shallow marine areas

When the threats cannot be stopped or minimized, restoration is priority as it may counteract further threats and thereby reduce further harm. See below for restoration suggestions relating to specific habitats:

- Restoring eelgrass meadows, which is a component of several marine habitats and a prioritized subtype of Sandbanks (1110). The area coverage of eelgrass meadows has decreased significantly, and Sandbanks exhibit a continuing negative trend. However, replanting of eelgrass is only feasible in areas where the conditions are suitable. Large areas that used to be populated by eelgrass are now too turbid to allow eelgrass growth. Additional measures to stabilize sediments are thus needed.
- Restoring thresholds of lagoons (1150) that have been damaged/destroyed by dredging. 1150 is a prioritized habitat exhibiting a decrease in area within the MBAL biogeographic region.
- Remove common reed, where motivated from a biological aspect, to increase habitat quality by improving spawning and recruitment of fish. Relevant for e.g. Large shallow bays and inlets (1160).
- Restore, where appropriate, cold water coral reefs (*Lophelia pertusa*), in areas where no harmful fishing activities occur.

List of prioritized measures to be carried out, and estimated costs for these measures

Within Natura 2000 sites designated for the targeted habitats and species.

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source

Additional measures beyond Natura 2000 (wider green infrastructure measures).

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source

* indicate whether the measure is recurring or one-off

Expected results for targeted species and habitat types

We expect that the addressed measures will lead to an improvement in status of coastal and marine habitats, but due to the significant knowledge gaps concerning specific conservation status of marine and coastal habitat types, and the multitude of pressures affecting the marine environment, it is difficult to predict to which degree the status of different habitats will improve by which measures. Positive effects by e.g. fisheries conservation measures or restoration measures may also be counteracted by existing pressures and/or additional threats e.g. climate change, invasive species etc.

Based on the above, all measures should be linked to relevant monitoring and evaluation of the effects, to make sure measures are fit for purpose and that the habitats' conservation status is improving.

Species listed under Annex IV in the Habitats directive or under Annex I in the Birds directive, that are currently not in favourable conservation status but are expected to be positively affected by conservation measures in the marine habitats include:

Birds

- *Clangula hyemalis*, The greater part of the North European population is wintering on the marine banks in the Baltic. It is dependant on protection of marine banks, restoration of mussel banks, and reduced eutrophication.
- *Haliaeetus albicilla*
- *Hydroprogne caspia*
- *Somateria mollissima*
- *Sterna sandvicensis*
- *Sternula albifrons*

Mammals

- *Phocoena phocoena*

Expected results: other benefits

See section F, section on marine and coastal waters.

E.2.2. Heathlands and shrubs

Current status of habitats and species, conservation measures taken until now and their impact so far, remaining pressures and threats

Heathlands are in general threatened by the abandonment of agricultural land and by changes in land use. With few exceptions, habitat types and species associated with the agricultural landscape have poor conservation status. All but three (2140 in the boreal region, 2170 and 5130) of these habitats were reported as being in bad or unfavourable conservation status in the 2013 report under article 17 of the Habitats directive, and the same assessment is likely in the coming 2019 report. Both area coverage and the "Structures and functions" criterion were assessed as inadequate in the report,

meaning that the management regime needs to be improved in these habitat types and that additional restoration actions will be required in areas that have been abandoned or are subjected to land use change.

The management of heathland and shrub habitat types is similar to the management of many grassland habitat types, e.g. traditional grazing and in some cases mowing or heathland burning. They are mainly maintained by current agricultural production holdings, enabled with subsidies for management of lands with biological values, but significant areas are also restored and maintained by County Administrative Boards, municipalities, and non-profit organizations. Just as for the grassland habitat types, major efforts, both in terms of restorations and annual management measures, need to be implemented also in heathland and shrub habitat types to improve their conservation status.

The conservation status among coastal dunes is unfavourable in many areas as a result of the plantation of sand-binding vegetation, reduced soil disturbance from grazing livestock, absence of fire, nitrogen deposition, and the spread of invasive species. Significant areas have been restored in recent years in parts of southern Sweden within the SandLife project. Additional restoration actions are however still necessary, particularly in the boreal zone.

Surface areas reported in this document are based on information of recorded objects in national databases (TUVA and NNK), and statistics from the Swedish Board of Agriculture. A total of 21 000 ha of heathland and shrub area are currently recorded. 51% of this area is located within the Natura 2000 network.

Associated species listed under Annex IV in the Habitats directive or under Annex I in the Birds directive, that are currently in unfavourable conservation status but will be positively affected by conservation measures in the heathland habitats, are listed under *Expected results* below.

Measures needed to maintain or restore favourable conservation status

Among the heathland and shrub habitat types listed in Annex I of the Habitats Directive occurring in Sweden, six require active management through agricultural practices (2140, 2170, 2320, 4010, 4030, and 5130). In addition, the habitat types 2180 (Wooded dunes) and 2190 (Humid dune slacks) are also included here.

Active annual management measures are required to ensure maintenance, avoid deterioration and/or progressively lead to an improvement of ecological condition in all Annex I heathland and shrub habitat types. Active annual management measures include grazing (2320, 4010, 4030, and 5130), recurring prescribed burning (2140, 2320, 4010, and 4030) and/or soil disturbance (e.g. tillaging; 2140, 2170, 2180, 2190, and 2320). Burning and soil disturbance are not appropriate every year but rather with 3-10-year intervals. Active clearing of bush and understory vegetation is also necessary to avoid overgrowth in 2170, 2180, and 2190.

In addition to the traditional management measures, decimation of problematic alien and native species is required to maintain good ecological status in some habitat types.

Restoration measures are needed to increase the area in good conservation status in all habitat types. It is likely that many parcels, for which no application for management subsidies have been received in recent years, are abandoned and in need of restoration measures. In addition, the Swedish Species

Information Centre has made assessments of restoration needs from aerial photos of sand dune habitats (2100-series). Taken together, these assessments and statistics on subsidies for habitat management from the Swedish Board of Agriculture, suggests that 35 % of the heathland and shrubs are in unfavourable condition and therefore require restorations.

In addition to the active management actions presented here, several other actions necessary to halt habitat deterioration can be listed for some habitat types. These include the reduction of atmospheric nitrogen deposition, the reduction of negative impacts from some types of recreational activities, and the adaptation and maintenance military activities in a few specific areas.

Prioritization of measures to be implemented during the next MFF period

Heathland and shrub habitats recorded in available databases and other inventories (TUVA and NNK, statistics from the Swedish Board of Agriculture) are prioritized during 2021-2027. Taken together, the total area of heathland and shrub habitats to be maintained through recurring management measures encompass 21 000 hectares, of which 10 000 hectares are located inside Natura 2000 sites, and 11 000 hectares in the green infrastructure.

The active maintenance measures presented above are all essential to avoid further deterioration of the conservation status of these seven habitat types. Any reduction in the extent of the area actively managed for these habitat types would lead to a further deterioration of their conservation status. For that reason, all maintenance measures for heathlands and shrubs are to be considered as priority measures. Among these measures, attention should be paid to those measures implementing the necessary conservation measures for Natura 2000 sites.

Furthermore, it is suggested that all deteriorated heathland objects recorded in national databases could be restored to good conservation status with a reasonable effort during 2021–2027. Based on statistics on subsidies for habitat management of lands with biological values, it is estimated that the area of grazed pastures (2320, 4010, 4030, 5130) that have been abandoned relatively recently and therefore are possible to restore is 5 400 ha. 2 000 ha of this total area is located inside Natura 2000 sites, and 3 400 hectares in the green infrastructure. Corresponding figures for the dune habitats (2140, 2170, 2180, 2190) are 2 900 ha, of which 2 600 ha is located inside Natura 2000 sites, and 300 ha in the green infrastructure.

List of prioritized measures to be carried out, and estimated costs for these measures

Within Natura 2000 sites designated for the targeted habitats and species.

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Grazing	R	5618 ha/y	4 775 000	
Prescribed burning	R	4100 ha/y	820 000	
Tillaging	R	5892 ha/y	59 000	
Clearing of bush and understory vegetation	R	5189 ha/y	114 000	
Removal of <i>Campylopus introflexus</i> and/or <i>Rosa rugosa</i>	R	632 ha/y	14 000	
Culling of wild boar	R	5006 ha/y	110 000	
Restoration of pastures	O	1966 ha/7y	747 000	
Restoration of sand dunes	O	2640 ha/7y	884 000	

** indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

Additional measures beyond Natura 2000 (wider green infrastructure measures).

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Grazing	R	9824 ha/y	8 350 000	
Prescribed burning	R	7055 ha/y	1 411 000	
Tillaging	R	1158 ha/y	12 000	
Clearing of bush and understory vegetation	R	516 ha/y	11 000	
Removal of <i>Campylopus introflexus</i> and/or <i>Rosa rugosa</i>	R	77 ha/y	2 000	
Culling of wild boar	R	9197 ha/y	202 000	
Restoration of pastures	O	3438 ha/7y	1 307 000	
Restoration of sand dunes	O	531 ha/7y	178 000	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

Estimated costs for maintenance and restoration measures are based on information from authentic management projects conducted in many different sites with very different local conditions and in different parts of the country. The variation in costs is therefore substantial but the standard costs suggested here are based on relevant figures and are near the median of those in the assembled background information. In future management projects, the realized costs may therefore be lower or higher than those presented here.

Expected results for targeted species and habitat types

The full implementation of the above recurring maintenance measures targeting eight heathland and shrub habitat types will help ensuring that current habitat types will be maintained during 2021-2027. The addition of suggested restoration measures will stop the deterioration of the habitats and ensure that the amount of habitat area in good condition will increase.

Species listed under Annex IV in the habitat directive or under Annex I in the Birds directive, that are currently not in favourable conservation status but will be positively affected by conservation measures in the heathland habitats include:

- *Lacerta agilis*
- *Anthus campestris*

Expected results: other benefits

See section F.

E.2.3. Bogs, mires, fens and other wetlands

Current status of habitats and species, conservation measures taken until now and their impact so far, remaining pressures and threats

Sweden has 11 of the wetland habitat types listed in the Annex I of the Habitats directive (7110, 7120, 7130, 7140, 7160, 7210, 7220, 7230, 7240, 7310, 7320). Of these wetlands, all the wetlands in the alpine region is reported to have a favourable conservation status due to quite low pressures as compared to the continental and boreal region, especially the southern part of the boreal region.

In the boreal and continental regions, the pressures and threats are higher. Many wetlands are hydrologically modified by e.g. drainage for improving the forest production or to increase the area of agricultural land. Road construction in or close to wetlands often impact the hydrology negatively and increases the habitat fragmentation. Peat extraction have a severe negative impact on both habitat status and the hydrology on neighbouring habitats.

Dryer conditions from affected hydrology result in overgrowth of open mire types with higher vegetation such as shrubs and trees. Decreased traditional management, such as grazing or mowing, also causes overgrowth. Dryer conditions in combination with less management make the situation even more severe. In addition, climate change and nitrogen deposition from air pollution are increasing the overgrowth. Historically, many of the habitats have been more used for e.g. hay production (e.g., 7230 and 7140) or as sources for water (7160). Habitat types with a small local areal distribution (e.g., 7160, 7220) have been or are often neglected and have been or are in the risk of being deteriorated due to forestry, changed hydrology or road constructions.

The status is reported unfavourable (reporting period 2008-2012) for 7 wetland habitats in the boreal region (out of 8 wetland habitats in this region) and 6 wetland habitats in the continental region (out of 7 wetland habitats in this region). Only minor changes are expected in the assessment of status for the period for 2013–2018.

Measures needed to maintain or restore favourable conservation status

All wetland habitat types are dependent or favoured by natural or close to natural hydrological conditions. Hydrological restoration by blocking and/or filling old ditches and drainage systems are of great importance for wetland habitats that are negatively hydrologically affected. Adapting road culverts, that act as fauna barriers and/or water dams, is also important.

To recreate open bogs, first the hydrology needs to be restored, then higher vegetation that has thrived during drier conditions need to be removed. Raising the water table often drowns the higher vegetation, but the organic matter also often needs to be removed to maintain more nutrient poor conditions, which is natural for bogs. Recurrent removal of vegetation may be needed to maintain the open habitats dependent on the growth rate.

Rich fens, and some other habitats, often need a more active, and recurring, management, either mowing or grazing or a combination of both to achieve favourable conservation status. Many of the fens have not been mowed or grazed for quite a long time and need first to be restored and then management need to be reinstated. In the boreal and continental regions, large areas of the habitat need to be restored in order to achieve favourable reference area.

Invasive alien species is a problem that is increasing. However, the current or the future needs are not yet known.

Prioritization of measures to be implemented during the next MFF period

Continuation of management, or restoration followed by reinstatement of maintenance by mowing or grazing, of alkaline fens (7230), and some other habitats, are important to maintain or improve the status for the habitats. Hydrological restoration and improved green infrastructure are crucial for all the wetland habitat types and before performing any other measures, the hydrological functioning needs to be considered. The habitats 7110, 7140, 7230, 7160 and 7220 are highly prioritised for management actions and restoration.

Habitat 7120 is considered to have a lower priority outside the Natura 2000 network due to that there are still several other bogs (7110) that still can be restored, and it is more efficient to prioritize them. Palsa mires (7320) are decreasing due to climate change and there are currently no feasible measures available.

List of prioritized measures to be carried out, and estimated costs for these measures

Within Natura 2000 sites designated for the targeted habitats and species.

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Maintain existing extensive agricultural practices and agricultural landscape features – by grazing	R	1 240 ha/y	301 000	
Maintain existing extensive agricultural practices and agricultural landscape features – by mowing	R	1 240 ha/y	709 000	
Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures – by grazing	R	198 ha/y	24 000	
Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures – by mowing	R	794 ha/y	453 000	
Recreate Annex 1 agricultural habitats – by clearance of higher vegetation in alkaline fens within Natura 2000 for the boreal and continental regions	O	723 ha/7y	244 000	
Habitat restoration of areas impacted by transport – by adaption or reconstruction of culverts that act both as a barrier and or alter the hydrological function.	O	37 units/7y (culverts)	55 000	
Restore habitats impacted by multi-purpose hydrological changes – by hydrological restoration by filling and blocking ditches. Includes hydrological investigations #1	O	4 900 ha/7y	910 000	
Restore habitats impacted by multi-purpose hydrological changes – by restoration by clearance of higher vegetation (shrubs, bushes and/or trees.)	O	63 ha/7y	24 000	
Management, control or eradication of invasive alien species – by eradication or reduction.	O/R	unknown	unknown	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

Additional measures beyond Natura 2000 (wider green infrastructure measures).

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures – by grazing	R	132 ha/y	16 000	
Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures – by mowing	R	1584 ha/y	905 000	
Recreate Annex 1 agricultural habitats – by restoration of alkaline fens to reach the FRV for the habitat in the boreal and continental regions. Combination of hydrological restoration and clearance of higher vegetation.	O	735 ha/7y	392 000	
Habitat restoration of areas impacted by transport – by adaption or reconstruction of culverts that act both as a barrier and or alter the hydrological function.	O	98 units/7y (culverts)	146 000	
Restore habitats impacted by multi-purpose hydrological changes – by hydrological restoration by filling and blocking ditches. Includes hydrological investigations #1	O	34 090 ha/7y	6 331 000	
Restore habitats impacted by multi-purpose hydrological changes – by restoration by clearance of higher vegetation (shrubs, bushes and/or trees.)	O	448 ha/7y	169 000	
Management, control or eradication of invasive alien species – by eradication or reduction.	O/R	unknown	unknown	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

#1 The cost for hydrological investigation is estimated to 200 euro/ha based on experiences from the LIFE AdMire project

Expected results for targeted species and habitat types

Full implementation of the listed measures is needed to improve the conservation status and, in many cases, relatively soon reach favourable conservation status. Several of the measures are recurring and needs to be performed several times throughout the period. Some of the restoration measures are one-off. By a combination of restoration and management the deterioration of habitats will stop and, the possibility to reach favourable conservation status increases.

Species listed under Annex IV in the Habitats directive or under Annex I in the Birds directive, that are currently not in favourable conservation status but will be positively affected by conservation measures in the wetland habitats listed above:

Vertebrates

- *Lutra lutra*
- *Myotis dasycneme*

Amphibians

- *Bufo variabilis*
- *Epidalea calamita*
- *Pelobates fuscus*

- *Pelophylax lessonae*
- *Rana dalmatina*
- *Triturus cristatus*

Plants

- *Arctophila fulva*
- *Liparis loeselii*
- *Persicaria foliosa*

Birds

- *Alcedo atthis*
- *Anser erythropus*
- *Botaurus stellaris*
- *Chlidonias niger*
- *Ciconia ciconia*
- *Circus cyaneus*
- *Circus pygargus*
- *Falco peregrinus*
- *Gallinago media*
- *Gavia stellata*
- *Haliaeetus albicilla*
- *Limosa lapponica*
- *Porzana porzana*

Expected results: other benefits

Mires provide a series of ecosystem services and climate change adaptation e.g. sequestration of carbon, purification of water by reduced nutrient levels, reduced leakage of metals and acids from drained acid sulfate soils, increase the retention time of the water, flood prevention and increased biodiversity and habitats. Restoration and management of wetlands will increase the services mentioned above.

Species listed under Annex IV in the Habitats directive or under Annex I in the Birds directive, that are currently not in favourable conservation status but will be positively affected by conservation measures in the wetland habitats listed above:

E.2.4. Grasslands

Current status of habitats and species, conservation measures taken until now and their impact so far, remaining pressures and threats

Semi-natural grasslands are in general threatened by the abandonment of agricultural land or by changes in land use. With few exceptions, habitat types and species associated to the agricultural landscape have poor conservation status. All but two of the grassland habitat types, 6280 in the continental region and 6430 in the alpine region, were reported as being in bad or unfavourable conservation status in the 2013 report under article 17 of the Habitats directive, and the same assessment is likely in the coming 2019 report. In most cases, both area coverage and the “Structures and functions” criterion were assessed as inadequate in the report, meaning that the management

regime needs to be improved in these habitat types and that additional restoration actions will be required in areas that have been abandoned or are subjected to land use change.

Most semi-natural grasslands are maintained by current agricultural production holdings, enabled with subsidies for management of lands with biological values, but significant areas are also restored and maintained by County Administrative Boards, municipalities, and non-profit organizations. However, even though the total area of managed semi-natural grasslands has been relatively constant over the last decade, the number of agricultural holdings is decreasing, especially in less productive regions where much of the grasslands rich in biodiversity are located. Remaining semi-natural grasslands are also very small and fragmented compared with the historical state, and habitat quality is easily eroded in periods of abandonment or disadvantageous management. As a result, several indicators of grassland biodiversity indicate an unsatisfactory conservation status and a negative trend. It is therefore suggested that the 2020 Swedish environmental quality objective “A Varied Agricultural Landscape” will not be reached with current practices and funding systems (<https://www.miljomal.se/Environmental-Objectives-Portal/Undre-meny/About-the-Environmental-Objectives/13-A-Varied-Agricultural-Landscape/>). Major efforts, both restorations and annual management measures, need to be implemented to improve the conservation status of semi-natural grasslands.

Surface areas reported in this document are based on information of recorded objects in national databases (TUVA and NNK), statistics from the Swedish Board of Agriculture, and on specific inventories (1310, 6120, and 6530). In total, 357 000 ha of semi-natural grasslands are currently documented in these databases. 20 % of this area is located within the Natura 2000 network according to the national survey TUVA, and only 63 % of this area was managed with CAP payments (Ref Nv rapport). In addition to this more than two thirds of the national funding for the Natura 2000 network are allocated to the grassland habitats and species, but this is generally used for other types of investments, not as direct payments to farmers. Financing of measures in the Natura 2000 areas for the next period is thus a big challenge.

Associated species (listed under Annex IV in the Habitats directive or under Annex I in the Birds directive) that are currently not in favourable conservation status but will be positively affected by conservation measures in the grassland habitats, are listed under Expected results below.

Measures needed to maintain or restore favourable conservation status

Among the grassland habitat types listed in Annex I of the Habitats directive occurring in Sweden, seventeen require active management through agricultural practices (1310, 1330, 1630, 2130, 2330, 6120, 6210, 6230, 6270, 6280, 6410, 6430, 6450, 6510, 6520, 6530, and 9070).

Active annual management measures are required to ensure maintenance, avoid deterioration and/or progressively lead to an improvement of ecological condition in all Annex I grassland habitat types. Active and recurring management measures include grazing and mowing in pastures and meadows, respectively. Traditional management of meadows also includes spring litter raking and, in Fennoscandian wooded meadows (6530), pollarding of trees. A few habitat types are also characterized by recurring burning (2130, 2330) and/or soil disturbance (e.g. tillaging; 2130, 2330, 6120), with a 3-10-year interval.

In addition to the traditional management measures, recurring decimation of problematic alien and native species is required to maintain good ecological status in most habitat types. Beach cleaning from plastics, Styrofoam, and other waste is needed in the coastal habitat types 1310, 1330, and 1630.

Restoration measures are needed to increase the area in good conservation status in all habitat types. It is likely that parcels, for which no management subsidies have been disbursed in recent years, are abandoned and in need of restoration measures. Statistics on subsidies for habitat management of lands with biological values from the Swedish board of agriculture, suggests that 33 % of the grasslands recorded in available databases require restorations.

Large areas that currently are closed forest were historically used as forage land by grazing livestock, and as a result, they were relatively open pastures but with a rich and complex vegetation structure in which the tree layer varied from sparse forest with open patches to small copses of trees and shrubs in open grassland. Many of those forests, that today still have a large amount of such structures, need to be restored to Scandinavian wooded pastures (9070) and are therefore included in these measures for grasslands. Restoration measures specific for the 9070-habitat type include the recreation of veteran tree structures and dead-wood substrates as well as restoration of forest edges and stand heterogeneity.

In addition to the active management actions presented here, several other actions necessary to halt habitat deterioration can be listed for some habitat types. These include the reduction of atmospheric nitrogen deposition, the eradication of Dutch elm disease and *Hymenoscyphus fraxineus* (causing ash dieback), the reduction of negative impacts from some types of recreational activities, and the reduction of negative impact from hydropower operation and infrastructure.

Prioritization of measures to be implemented during the next MFF period

Grassland habitats recorded in available databases and other inventories (TUVA and NNK, statistics from the Swedish Board of Agriculture, and from directed inventories) are prioritized during 2021–2027. The total area of grasslands to be maintained through recurrent management measures encompass 357 000 ha, of which 108 000 ha are located inside Natura 2000 sites, and 249 000 ha are in the wider "green infrastructure".

The active maintenance measures listed above are all essential to avoid further deterioration of the conservation status of these seventeen grassland habitat types. Any reduction in the extent of the area actively managed for these habitat types would lead to a further deterioration of their conservation status. For that reason, all maintenance measures for grasslands are to be considered as priority measures. Among these measures, particular attention will have to be paid to those measures implementing the necessary conservation measures for Natura 2000 sites.

Furthermore, it is suggested that all deteriorated grassland objects recorded in national databases could be restored to good conservation status with a reasonable effort during 2021–2027. Based on statistics on subsidies for habitat management of lands with biological values, it is estimated that the area of grazed pastures that have been abandoned relatively recently and therefore are possible to restore is 106 000 ha. 29 000 ha of this total area is located inside Natura 2000 sites, and 77 000 ha in the wider green infrastructure. Corresponding figures for mowed meadows are 12 000 ha, of which 8 000 ha is located inside Natura 2000 sites, and 4 000 ha outside.

Finally, it is also suggested that 15 000 ha (of which 6 500 ha is located inside Natura 2000 sites) of current woodland areas are restored and managed to Fennoscandian wooded pastures (9070).

List of prioritized measures to be carried out, and estimated costs for these measures

Within Natura 2000 sites designated for the targeted habitats and species.

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Grazing	R	92 632 ha/y	78 737 000	
Mowing	R	15 048 ha/y	17 305 000	
Litter raking	R	2 446 ha/y	269 000	
Pollarding	R	479 ha/y	1 437 000	
Creating old (veteran) tree structures, tree and dead-wood substrates, and managing forest edges and heterogeneity	R	188 ha/y	625 000	
Prescribed burning	R	847 ha/y	169 000	
Tillaging	R	965 ha/y	10 000	
Removal of <i>Cotula coronopifolia</i> and/or <i>Rosa rugosa</i>	R	6 442 ha/y	142 000	
<i>Mustela vison</i> culling	R	5 932 ha/y	830 000	
Management of expansive plant species and culling of wild boar	R	78 990 ha/y	1 738 000	
Beach cleaning	R	5 932 ha/y	890 000	
Restoration of pastures	O	28 800 ha/7y	10 944 000	
Restoration of forests to Fennoscandian wooded pastures (9070)	O	6 494 ha/7y	2 468 000	
Restoration of meadows	O	8 190 ha/7y	3 522 000	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

Additional measures beyond Natura 2000 (wider green infrastructure measures).

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Grazing	R	239 461 ha/y	203 542 000	
Mowing	R	8 917 ha/y	10 255 000	
Litter raking	R	7 270 ha/y	800 000	
Pollarding	R	2 516 ha/y	7 548 000	
Creating old (veteran) tree structures, tree and dead-wood substrates, and managing forest edges and heterogeneity	R	156 ha/y	518 000	
Prescribed burning	R	1 980 ha/y	396 000	
Tillaging	R	2 015 ha/y	20 000	
Removal of <i>Cotula coronopifolia</i> and/or <i>Rosa rugosa</i>	R	4 781 ha/y	105 000	
<i>Mustela vison</i> culling	R	4 460 ha/y	624 000	
Management of expansive plant species and culling of wild boar	R	237 593 ha/y	5 227 000	
Beach cleaning	R	4 460 ha/y	669 000	
Restoration of pastures	O	76 800 ha/7y	29 184 000	
Restoration of forests to Fennoscandian wooded pastures (9070)	O	8 205 ha/7y	3 118 000	
Restoration of meadows	O	3 870 ha/7y	1 664 000	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

Estimated costs for maintenance and restoration measures are based on information from authentic management projects conducted in many different sites with very different local conditions and in different parts of the country. The variation in costs is therefore substantial but the standard costs suggested here are based on relevant figures and are near the median of those in the assembled background information. In future management projects, the realized costs may therefore be lower or higher than those presented here.

Expected results for targeted species and habitat types

The full implementation of the above recurring maintenance measures targeting 17 grassland habitat types will help ensuring that all known occurrences of current habitat types will be maintained during 2021-2027. The addition of suggested restoration measures will stop the deterioration of the habitats and ensure that the amount of habitat area in good condition will increase.

Species listed under Annex IV in the Habitats directive or under Annex I in the Birds directive, that are currently not in favourable conservation status but will be positively affected by conservation measures in the grassland habitats:

Bats

- *Barbastella barbastellus*

Amphibians

- *Bufo variabilis*
- *Coronella austriaca*
- *Epidalea calam*

Butterflies

- *Coenonympha hero*
- *Lopinga achine*
- *Maculinea arion*
- *Parnassius apollo*
- *Parnassius Mnemosyne*

Plants

- *Botrychium simplex*
- *Dianthus arenarius*
- *Persicaria foliosa*
- *Pulsatilla patens*

Birds

- *Calidris alpina schinzii*
- *Calidris pugnax*
- *Circus pygargus*
- *Crex crex*
- *Emberiza hortulana*
- *Limosa lapponica*
- *Limosa limosa*

Expected results: other benefits

Measures carried out to improve the status of habitats and species also have other benefits in addition to biodiversity. Agricultural landscapes are shaped by human farming activities, and measures taken to improve favourable conservation status of fauna and flora also helps to protect and make visible both the biological cultural heritage and traditional cultural heritage, such as stonewalls, wooden fencing and clearance cairns. Moreover, varied agricultural landscapes rich in biodiversity are also important for outdoor recreation. Many Swedes also experience recovery from stress when they spend time in agricultural land.

E.2.5. Other agroecosystems (incl. croplands)

Current status of habitats and species, conservation measures taken until now and their impact so far, remaining pressures and threats

No habitats, species or measures.

Measures needed to maintain or restore favourable conservation status

No measures

Prioritization of measures to be implemented during the next MFF period

No measures

List of prioritized measures to be carried out, and estimated costs for these measures

Within Natura 2000 sites designated for the targeted habitats and species.

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source

Additional measures beyond Natura 2000 (wider green infrastructure measures).

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source

* indicate whether the measure is recurring or one-off

Expected results for targeted species and habitat types

n.a.

Expected results: other benefits

n.a.

E.2.6. Woodlands and forests

Current status of habitats and species, conservation measures taken until now and their impact so far, remaining pressures and threats

Six forest habitat types occurring on dry to mesic site types (9010, 9020, 9060, 9160, 9180, 9190) and five habitat types occurring on moist to wet (9010, 9080, 91D0) or alluvial (91E0, 91F0) site types require future conservation measures in form of restoration and recurrent actions in Sweden.

Future conservation measures are needed particularly in the boreal and continental regions. In these regions, all but one of the 11 habitat types listed, 91D0 in the boreal region, have unfavourable-bad or unfavourable-inadequate conservation status. Formal protection and voluntary set-asides are currently the most important measures to prevent further loss of the forest habitat types. An improvement of the conservation status also requires that the area of the habitat types is increased by restoration, but also that the local conditions in terms of typical structures, functions and species is improved and maintained by active and recurrent actions in existing areas of the habitat types.

The productive forest area in Sweden is ca 23 million ha (230,000 km²). Here priority of measures is given primarily to the areas of the habitat types that have been identified as high conservation value forests (HCVFs); the core areas and main dispersal sources of many rare and threatened forest-living species. The analysed area of HCVFs comprise ca 2.2 million ha; i.e. they comprise a relatively small proportion (ca 9 %) of the total productive forest land area in Sweden. The HCVFs include not only the Natura 2000 sites protected by the state or municipalities, but also woodland key habitats and forest areas voluntarily set aside from forestry by landowners (individual persons, organizations and companies). Most of the HCVFs have hitherto been managed passively (called minimum intervention). Only a minority have been actively managed with the aim to improve or maintain the local conditions although the area of habitat types in need of such actions are significant.

Measures needed to maintain or restore favourable conservation status

To avoid deterioration of habitat status formal protection is needed, and this demands compensation payments to landowners or land purchase.

Three main restoration measures are needed to meet three corresponding and wide-ranging pressures to the habitat types. First, prescribed forest fires are needed to restore areas and maintain local conditions of particularly boreal coniferous and deciduous forests on dry to mesic site types (mainly 9010, but also 9060). Fire is a vital natural disturbance factor in the boreal region. However, efficient fire suppression due to the increase of the human population and the expansion of the forestry industry during the past 150 years have led to a lack of forest fires as well as fire dynamics and structures.

Second, hydrological restoration by blocking and/or filling old ditches and drainage systems are needed to increase areas and maintain local conditions of boreal and continental swamp forests (9010, 9080), but also alluvial and riparian forests (91E0, 91F0). Hydrological modifications due to draining for improving the forest production but also during road constructions, comprise important pressures to these forest habitat types.

Third, opening closed forests and then reintroducing continuous, low intensive conservation grazing is needed to restore areas and maintain local conditions of particularly continental broad-leaved deciduous forests (9020, 9160, 9180, 9190), but also some boreal coniferous forests (9050 and 9060). The successive decrease of traditional agriculture and forest treatments have led to loss and adverse natural succession that comprise important pressures to these forest habitat types.

Besides the three main measures, five additional actions are needed to restore the typical structures and functions and favour species that are currently inadequate or lacking in some areas due to previous, historical land-use. To improve local conditions in some coniferous and deciduous forests on dry to mesic site types,

- 1) restoration actions that mimic natural disturbance dynamics (e.g. tree aging and gap-phase dynamics) are needed to recreate forest structures (e.g. veteran trees and canopy gaps) and
- 2) substrates (e.g. coarse woody debris). Likewise, to improve local conditions in forest edges and some deciduous forests,
- 3) actions are needed to restore natural vegetation structures and stand heterogeneity. To support the regeneration and survival of key tree species in some deciduous forests,
- 4) fences need to be set up around some restored areas to hinder losses and damages of trees due to deer browsing. In some of these areas,
- 5) planting of key deciduous tree species is also needed.

Prioritization of measures to be implemented during the next MFF period

To stop further deterioration in habitat area conservation of forest habitat by formal protection have top priority. The target area prioritised for formal protection is set at the same level as for the year 2018. This is historically a high level, but it is motivated by the primary importance of this action to improve conservation status. Some of the targeted forests in this measure will also be of importance to improve conservation status for wetland, grassland and freshwater habitats.

The three main restoration measures; prescribed burning, conservation grazing and hydrological restoration, have top priority. The priority of these measures is given primarily to the HCVFs. The annual need of prescribed burning in boreal coniferous and deciduous forests (mainly 9010 but also

9060) is estimated to be around 11 300 ha. The annual need of conservation grazing in broad-leaved deciduous forests (9020, 9160, 9180, 9190) along with boreal coniferous forests (9050 and 9060) is estimated to be around 13 000 ha. The annual need to opening closed deciduous forests prior to grazing or to promote the regeneration and survival of deciduous trees is estimated to be around 11 000 ha. The annual need of hydrological restoration in swamp forests (9010, 9080) as well as alluvial and riparian forests (91E0, 91F0) is estimated to be around 1 000 ha.

The priority order and the estimated annual needs of the additional actions 1)-5) are as follows; 1) creating veteran tree structures (ca 3 500 ha) and 2) dead-wood substrates (ca 4 000 ha); 3) restoration of forest edges and stand heterogeneity (1 000 ha); 4) fencing out deer (250 ha); and 5) planting trees (50 ha).

List of prioritized measures to be carried out, and estimated costs for these measures

Within Natura 2000 sites designated for the targeted habitats and species.

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Land purchase and compensation payments to landowners (The major part of the cost is productive forest; the rest covers other habitat types. The unit target is expressed in area of productive forest as this is the most expensive land type)	O	5000 ha productive forest//7y #1	7 090 000	
To restore and maintain natural disturbance dynamics (forest fire) and forest structures – by burning (fire)	R	4 684 ha/y	7 494 000	
To maintain existing extensive agricultural practices and agricultural landscape features – by grazing after removal of competing trees in closed forests	R	6 043 ha/y	5 137 000	
To favour the opening of closed woodlands, to preserve or restore habitat continuity and to manage species composition – by logging/opening of competing trees	O	2 016 ha/7y	432 000	
To restore natural hydrology – by filling and blocking ditches. Includes hydrological investigations	O	3 682 ha/7y	683 000	
To restore natural forest structures and functions – by creating old (veteran) tree structures	O	9 093 ha/7y	1 072 000	
To restore natural forest structures and functions – by creating tree and dead-wood substrates	O	14 175 ha/7y	822 000	
To restore natural forest structures and functions – by creating and managing forest edges and heterogeneity	O	1 190 ha/7y	355 000	
To favour specific (deciduous) tree species – by fencing out deer	O	301 ha/7y	224 000	
To favour specific (deciduous) tree species – by planting trees	O	63 ha/7y	45 000	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

Additional measures beyond Natura 2000 (wider green infrastructure measures).

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Land purchase and compensation payments to landowners (The major part of the cost is productive forest; the rest covers other habitat types. The unit target is expressed in area of productive forest as this is the most expensive land type)	O	95 000 ha productive forest/7y #1	134 710 000	
To restore and maintain natural disturbance dynamics (forest fire) and forest structures – by burning (fire)	R	6 619 ha/y	10 590 000	
To maintain existing extensive agricultural practices and agricultural landscape features – by grazing after removal of competing trees in closed forests	R	6 890 ha/y	5 857 000	
To favour the opening of closed woodlands, to preserve or restore habitat continuity and to manage species composition – by logging/opening of competing trees	O	6 008 ha/7y	1 287 000	
To restore natural hydrology – by filling and blocking ditches. Includes hydrological investigation	O	8 113 ha/7y	1 506 000	
To restore natural forest structures and functions – by creating old (veteran) tree structures	O	14 287 ha/7y	1 684 000	
To restore natural forest structures and functions – by creating tree and dead-wood substrates	O	14 336 ha/7y	832 000	
To restore natural forest structures and functions – by creating and managing forest edges and heterogeneity	O	5 565 ha/7y	1 658 000	
To favour specific (deciduous) tree species – by fencing out deer	O	1 393 ha/7y	1 033 000	
To favour specific (deciduous) tree species – by planting trees	O	280 ha/7y	206 000	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

#1 The measure also includes protection of non-productive forests, wetlands, grassland and aquatic areas, but the area of protected productive forest is most relevant to the cost.

Expected results for targeted species and habitat types

Full implementation of the listed measures is needed to improve the conservation status and, in many cases, relatively soon reach favourable conservation status. The cost for formal protection is one-off. Some of the restoration measures are one-off. Several of the measures are recurring and needs to be performed several times throughout the period. By a combination of restoration and recurrent measures the deterioration of habitats will stop and, the possibility to reach favourable conservation status increases.

Expected results: other benefits

Forests provide a series of ecosystem services, e.g., climate regulation and carbon sequestration, nutrient cycling, berry and fungi production, game production, water regulation and supply, flood prevention, biodiversity protection and human recreation. Restoration and recurrent measures of forests will increase these ecosystem services. See also section F.

E.2.7. Rocky habitats, dunes & sparsely vegetated lands

Current status of habitats and species, conservation measures taken until now and their impact so far, remaining pressures and threats

Sparsely vegetated lands are in general threatened by changes in land use. With few exceptions, habitat types and species associated to the agricultural landscape have poor conservation status. All but two, 6110 and 8240 in the continental region, of these habitats were reported as being in bad or unfavourable conservation status in the 2013 report under article 17 in the Habitats Directive, and the same assessment is likely in the coming 2019 report. In most cases, both area coverage and the “Structures and functions” criterion were assessed as inadequate in the report, meaning that the management regime needs to be improved in these habitat types and that additional restoration actions will be required in areas that have been abandoned, subjected to land use change, or exploitation.

The management of 6110, 8230, and 8240 are similar as for the grassland habitat types. They are mainly maintained by current agricultural production holdings, enabled with subsidies for management of lands with biological values, but significant areas are also restored and maintained by the County Administrative Boards, municipalities, and non-profit organizations. As for the grassland habitat types, major efforts, both in terms of restorations and annual management measures, need to be implemented also in these three habitat types to improve their conservation status.

Surface areas reported in this document are based on information of recorded objects in national databases (TUVA and NNK), statistics from the Swedish Board of Agriculture, and on directed inventories (1610, 1620). A total of 16 000 ha of sparsely vegetated habitat area is currently recorded. 67% of this area is located within the Natura 2000 network.

A total of 11 000 ha needs traditional grazing management. 70% of this area is located within the Natura 2000 network. An additional 5 000 ha of seaside habitats (60% within Natura 2000) require recurring cleaning from plastics, Styrofoam, oil-spill etc.

Associated species listed under Annex IV in the Habitats directive or under Annex I in the Birds directive, that are currently not in favourable conservation status but will be positively affected by conservation measures in dunes and sparsely vegetated habitats, are listed under Expected results below.

Measures needed to maintain or restore favourable conservation status

Among the habitat types listed as “rocky habitats, dunes, and sparsely vegetated lands” in Annex I of the Habitats Directive occurring in Sweden, three require active management through agricultural practices (6110, 8230, and 8240). Seven beach and dune habitats do not require traditional management but are threatened by exploitation and by pollution from the sea, plastics, Styrofoam, and other waste. (1210, 1220, 1610, 1620, 1640, 2110, and 2120).

Active annual management measures are required to ensure maintenance, avoid deterioration and/or progressively lead to an improvement of ecological condition in all Annex I habitat types. Active annual management measures include grazing (in 6110, 8230, and 8240), and soil disturbance (e.g. tillaging; 2120). Tillaging is however not appropriate every year but rather with 10-year interval.

In addition to the traditional management measures, recurring decimation of problematic alien species, and beach cleaning are required to maintain good ecological status in several habitat types. *Rosa rugosa* is a problematic alien species occurring in 2120. Active cleaning of seaside habitats is necessary in 1210, 1220, 1610, 1620, 1640, 2110, and 2120.

Restoration measures are needed to increase the area in good conservation status in all habitat types. Areas in need of restoration with no management subsidies have been identified through maps (Blockdatabasen). It is assumed that such areas are no longer managed and in need of restoration measures. In addition, the Swedish Species Information Centre has made assessments of restoration needs from aerial photos of sand dune habitats (2100-series). Taken together, these assessments and statistics on subsidies for habitat management from the Swedish Board of Agriculture, suggests that 23 % of the sparsely vegetated habitats are in not-good condition and therefore require restorations.

In addition to the active management actions presented here, several other actions necessary to halt habitat deterioration can be listed for some habitat types. These include the reduction of atmospheric nitrogen deposition, the reduction of negative impacts from some types of recreational activities, the protection of habitats from limestone mining on Gotland, and the adaptation and maintenance of military activities in a few specific areas.

Prioritization of measures to be implemented during the next MFF period

Here, it is suggested that sparsely vegetated habitat types recorded in available databases and other inventories (TUVA and NNK, statistics from the Swedish board of agriculture) are prioritised during 2021–2027. Taken together, the total area of sparsely vegetated habitat types to be maintained through recurrent management measures encompass 16 000 ha, of which 11 000 ha are located inside Natura 2000 sites, and 5 000 ha are in the wider green infrastructure.

The active maintenance measures listed above are all essential to avoid further deterioration of the conservation status of these habitat types. Any reduction in the extent of the area actively managed would lead to a further deterioration of their conservation status. For that reason, all maintenance measures for sparsely vegetated habitat types are to be considered as priority measures. Among these measures, particular attention will have to be paid to those measures implementing the necessary conservation measures for Natura 2000 sites.

Furthermore, it is suggested that all sparsely vegetated habitat types recorded in national databases could be restored to good conservation status with a reasonable effort during 2021–2027. Based on statistics on subsidies for habitat management of lands with biological values, it is estimated that the area of grazed pastures (6110, 8230, 8240) that have been abandoned relatively recently and therefore are possible to restore is 2 000 ha. 1 300 ha of this total area is located inside Natura 2000 sites, and 700 ha in the wider green infrastructure. Corresponding figures for the dune habitats (2110, 2120) are 300 ha, of which 260 ha is located inside Natura 2000 sites, and 40 ha outside.

List of prioritized measures to be carried out, and estimated costs for these measures

Within Natura 2000 sites designated for the targeted habitats and species.

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Grazing	R	7516 ha/y	6 389 000	
Tillaging	R	203 ha/y	2 000	
Removal of Rosa rugosa	R	203 ha/y	5 000	
Management of expansive plant species	R	203 ha/y	5 000	
Beach cleaning	R	3088 ha/y	463 000	
Restoration of pastures	O	1315 ha/7y	500 000	
Restoration of sand dunes	O	255 ha/7y	85 000	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

Additional measures beyond Natura 2000 (wider green infrastructure measures).

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Grazing	R	3152 ha/y	2 679 000	
Tillaging	R	65 ha/y	1 000	
Removal of Rosa rugosa	R	65 ha/y	1 000	
Management of expansive plant species	R	65 ha/y	1 000	
Beach cleaning	R	2061 ha/y	309 000	
Restoration of pastures	O	715 ha/7y	272 000	
Restoration of sand dunes	O	35 ha/7y	12 000	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

Estimated costs for maintenance and restoration measures are based on information from authentic management projects conducted in many different sites with very different local conditions and in different parts of the country. The variation in costs is therefore substantial but the standard costs suggested here are based on relevant figures and are near the median of those in the assembled background information. In future management projects, the realized costs may therefore be lower or higher than those presented here.

Expected results for targeted species and habitat types

The full implementation of the above recurring maintenance measures targeting ten sparsely vegetated habitat types will help ensuring that current habitat types will be maintained during 2021-2027. The addition of suggested restoration measures will stop the deterioration of the habitats and ensure that the amount of habitat area in good condition will increase.

Species listed under Annex IV in the Habitats directive or under Annex I in the Birds directive, that are currently not in favourable conservation status but will be positively affected by conservation measures in dunes and sparsely vegetated habitats:

- *Anthus campestris*

- *Maculinea arion*
- *Parnassius apollo*
- *Saxifraga osloensis*

Expected results: other benefits

The suggested measures contribute to an open and varied landscape, valuable for recreation and tourism. See also section F.

E.2.8. Freshwater habitats (rivers and lakes)

Current status of habitats and species, conservation measures taken until now and their impact so far, remaining pressures and threats

Sweden occupies 8 freshwater habitat types listed in the Annex I of the species and habitats directive (3110, 3130, 3140, 3150, 3160, 3210, 3220 and 3260). In the alpine region, all freshwater habitats except 3210 are considered to be in favourable conservation status. The large rivers (3210) are considered to be in moderate conservation status in all regions mainly due to fragmentation by barriers (e.g. dams), lack of natural flow dynamics and remnants of physical modifications from timber transport. Fragmentation and physical modifications are problems in all river habitats. In the boreal and continental regions, other environmental problems and pressures as eutrophication, acidification and other pollution become more prominent and affects both lake and river habitats. Fragmentation also affect lakes by impeding species dispersal.

Measures needed to maintain or restore favourable conservation status

When it comes to the river habitats, restoration measures to increase structures and functions are important such as increasing the connectivity by removing barriers or construct faunal passages, habitat restoration and measures to mitigate modified hydrological regimes in order to re-establish close to natural flows with erosion and sedimentation processes.

Flow regimes that are close to natural with amplitude variations allows repeated inundation of the floodplain and is beneficial for many habitats and species that are dependent of flooding periods. The measure “reducing/minimizing the impact of Natura 2000 by imitating more natural like flows (ecological flows) in the operation of the dams” is therefore very important, but the Swedish EPA have not been able to quantify this measure due to remaining uncertainties both regarding biological effects and legal procedures.

In 2019, a new law enters into force which implies that all water power plants must apply for new permits to ensure compliance with modern environmental requirements and EU directives. A national plan for issuing of new permits is under development at the time of writing (Nationell plan för omprövning av vattenkraft), which will facilitate contact between decision-makers, stakeholders, and various kinds of experts. The implementation of the law will require collaborative projects, promotion of best practices, and implementation of those best practices in water power plants.

Restoration of pastures and meadows in bordering grasslands is also an important measure to structure and function in the shoreline zones of lakes and rivers. The cost of this measure is described in part E.2.4 (Grassland habitats).

Liming of selected lakes and rivers to reduce the effects of air pollution is necessary to avoid further decrease in status for lakes, rivers and associated species.

Measures for reducing the input of nutrients and suspended matter (anthropogenic sources) to lakes and rivers are important. This can include measures for mitigation diffuse sources of nutrients and pollution by obtaining buffer zones along the water, construction of new wetlands, blocking ditches, increasing water retention time as well as mitigation of point source pollution by adequate waste water treatment. Land-use in the whole catchment area can affect the freshwater habitats. Invasive alien species is a problem that is increasing, and measures are taken for some species. Measures in the whole water catchment area could be important, also far upstream from the valuable habitat. However, the current or the future needs are not yet known.

Prioritization of measures to be implemented during the next MFF period

There are pronounced needs for improving the structures and functions for the habitats, which are first order priority, in order to reach favourable conservation status and provide habitat for the species. Many measures of morphological restoration are one-off with long life expectancy but can vary from site to site. Increasing the connectivity, allowing migration of e.g. fish and sediment transport both laterally and longitudinally is of great importance. Mitigation of problems associated with eutrophication, acidification and pollution is important and the measures/actions need to be planned on catchment and regional level. The measures can be carried out on adjacent terrestrial land. Improving the freshwater habitats is a process which will take long time and needs to be in cooperation and inclusion with the work with river management basin plans (water framework directive).

List of prioritized measures to be carried out, and estimated costs for these measures

Within Natura 2000 sites designated for the targeted habitats and species.

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Increasing the connectivity by removal of old dams or similar barriers. (dams) cost for stakeholder contacts and legal procedure included	O	14 units/7y (dams)	509 300	
Increasing the connectivity by removal of old dams or similar barriers. (similar barriers) cost for stakeholder contacts and legal procedure included	O	57 units/7y (barriers)	178 000	
Increasing the connectivity by creation of faunal passages (technical, nature-like etc)	O	170 units/7y (barriers)	3 670 000	
Removal and/or adaptation of culverts (road passages etc) associated with transport.	O	139 units/7y (culverts)	208 000	
Restoring hydrological regimes by e.g., filling out ditches. Approximation of restoration of 2 ditches per each km river per 7 year period.. cost for stakeholder contacts and legal procedure included	O	9 km/7y	5 000	
Measures directed against <i>Nymphoides peltata</i> (Sv: sjögull) covering the species (plastic sheets). Estimation of an accurate cost of the measures needed is difficult.	R	2 ha/y	55 000	
Elimination/eradication of IAS fish population by fishing (e.g., <i>Ctenopharyngodon idella</i> (Sv: gräskarp))	R/(O)	500 ha/y	28 000	
Reducing the impact of canalisation, straightening (e.g., from the timber transport period), increase physical structures and characteristics.	O	403 km/7y	5 875 000	
Liming	R	880 lakes/y and 1800 km rivers/y	2 960 000	
Reducing/minimizing the impact of Natura2000 by imitating more natural like flows (ecological flows) in the operation of the dams.	R	unknown/difficult to estimate	unknown/difficult to estimate	
Reduce diffuse pollution to surface or ground waters from agricultural activities	O	48 400 ha/7y	unknown/difficult to estimate	
Reduce diffuse pollution to surface or ground waters from agricultural activities	O	163 km/7y	unknown/difficult to estimate	
Reducing diffuse pollution to surface and ground waters due to forestry activities.	R	16 100 ha/y	unknown/difficult to estimate	
Reducing diffuse pollution to surface and ground waters due to forestry activities.	R	352 km/y	unknown/difficult to estimate	
Reduce/eliminate point pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities	R	32 800 ha/y	unknown/difficult to estimate	
Reduce/eliminate point pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities	R/(O)	134 km/y	unknown/difficult to estimate	
Reduce/eliminate diffuse pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities	R/(O)	48 100 ha/y	unknown/difficult to estimate	
Reduce/eliminate diffuse pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities	R/(O)	159 km/y	unknown/difficult to estimate	
Restoration of pastures and meadows in bordering grassland habitats	O	See part E.2.4	See part E.2.4	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

Additional measures beyond Natura 2000 (wider green infrastructure measures).

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Increasing the connectivity by removal of old dams or similar barriers. (dams). cost for stakeholder contacts and legal procedure included	O	20 units/7y (dams)	704 000	
Increasing the connectivity by removal of old dams or similar barriers. (similar barriers) cost for stakeholder contacts and legal procedure included	O	79 units/7y (barriers)	249 000	
Increasing the connectivity by creation of faunal passages (technical, nature-like etc)	O	347 units/7y (barriers)	7 513 000	
Removal and/or adaptation of culverts (road passages etc) associated with transport.	O	382 units/7y (culverts)	573 000	
Restoring hydrological regimes by e.g., filling out ditches. Approximation of restoration of 2 ditches per each km river per 7 year period. cost for stakeholder contacts and legal procedure included	O	58 km/7y	30 000	
Measures directed against <i>Nymphoides peltata</i> (Sv: sjögull) covering the species (plastic sheets). Estimation of an accurate cost of the measures needed is difficult.	R	2 ha/y	55 000	
Reducing the impact of canalisation, straightening (e.g., from the timber transport period), increase physical structures and characteristics.	O	307 km/7y	4 763 000	
Liming	R	3 500 lakes/y and 7 200 km rivers/y	11 840 000	
Reducing/minimizing the impact of Natura2000 by imitating more natural like flows (ecological flows) in the operation of the dams..	R	unknown/difficult to estimate	unknown/difficult to estimate	
Reduce diffuse pollution to surface or ground waters from agricultural activities	O	231 200 ha/7y	unknown/difficult to estimate	
Reduce diffuse pollution to surface or ground waters from agricultural activities	O	7 747 km/7y	unknown/difficult to estimate	
Reducing diffuse pollution to surface and ground waters due to forestry activities.	R	1 400 ha/y	unknown/difficult to estimate	
Reducing diffuse pollution to surface and ground waters due to forestry activities.	R	352 km/y	unknown/difficult to estimate	
Reduce/eliminate point pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities	R	32 800 ha/y	unknown/difficult to estimate	
Reduce/eliminate point pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities	R	217 400 ha/y	unknown/difficult to estimate	
Reduce/eliminate point pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities	R/(O)	2 210 km/y	unknown/difficult to estimate	
Reduce/eliminate diffuse pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities	R/(O)	228 300 ha/y	unknown/difficult to estimate	
Reduce/eliminate diffuse pollution to surface or ground waters from industrial, commercial, residential and recreational areas and activities	R/(O)	7 501 km/y	unknown/difficult to estimate	
Restoration of pastures and meadows in bordering grassland habitats	O	See part E.2.4	See part E.2.4	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

Expected results for targeted species and habitat types

Full implementation of the listed measures would improve the conservation status and, in many cases, relatively soon reach favourable conservation status. By a combination of restoration and mitigation of other pressures and maintenance the deterioration of habitats will stop and, the possibility to reach favourable conservation status increases.

Species listed under Annex IV in the Habitat directive or under Annex I in the Birds directive, that are currently not in favourable conservation status but will be positively affected by conservation measures in the freshwater habitats:

Vertebrates

- *Lutra lutra*

Amphibians

- *Bufo variabilis*
- *Epidalea calamita*
- *Pelobates fuscus*
- *Pelophylax lessonae*
- *Rana dalmatina*
- *Triturus cristatus*

Fishes

- *Aspius aspius*
- *Petromyzon marinus*
- *Salmo salar*

Plants

- *Alisma wahlenbergii*
- *Arctophila fulva*
- *Luronium natans*
- *Najas flexilis*
- *Persicaria foliosa*

Molluscs

- *Unio crassus*

Birds

- *Alcedo atthis*
- *Anser erythropus*
- *Botaurus stellaris*
- *Gavia stellata*
- *Haliaeetus albicilla*

Expected results: other benefits

Freshwater in favourable conservation status provides a series of ecosystem services and climate change adaptations e.g., reproduction of fish, flood prevention, increased water retention time (purification), sediment transport, increased biodiversity, habitats, drinking water and water supply, sport fishing and outdoor life/recreation, flood prevention and increased biodiversity. Restoration and management of freshwater will increase the services mentioned above.

E.2.9. Others (caves, etc.)

Current status of habitats and species, conservation measures taken until now and their impact so far, remaining pressures and threats

N.a.

Measures needed to maintain or restore favourable conservation status

N.a.

Prioritization of measures to be implemented during the next MFF period

N.a.

List of prioritized measures to be carried out, and estimated costs for these measures

Within Natura 2000 sites designated for the targeted habitats and species.

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Measure 1				
Measure 2				
etc.				

Additional measures beyond Natura 2000 (wider green infrastructure measures).

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Measure 1				
Measure 2				
etc.				

* indicate whether the measure is recurring or one-off

Expected results for targeted species and habitat types

N.a.

Expected results: other benefits

N.a.

E.2.10. References for site-related maintenance and restoration measures within and beyond Natura 2000

provide text

E.3. Additional species-specific measures not related to specific ecosystems or habitats

E.3.1. Species-specific measures and programmes not covered elsewhere

Current status of the species

The species addressed in this section have inadequate conservation status and are all subject to species-related programs.

Measures needed to maintain or restore favourable conservation status

The most important and costly species-specific measures are restoration of habitats. These measures are included in section E2. Other general measures such as project coordination, research and species surveys are included in section E1. The measures described here are other species-specific measures. It is however in most cases essential that these measures are combined with restoration of habitats. A total list of species-specific measures including species specific habitat restoration measures is kept at the Swedish EPA.

Prioritization of measures to be implemented during the next MFF period

Species-specific measures for threatened Annex II species that are subject to species related programs. Other species-specific measures are included in sections E1 and E2.

List of prioritized measures to be carried out, and estimated costs for these measures

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Transplantation and hand pollination of plants,	O	700 locations/7y	10 000	
Reintroduction of insects to new sites	O	105 locations/7y	80 000	

* indicate whether the measure is recurring or one-off. N.B For one-off-measures, the costs are given as yearly mean cost, while the targets are presented for the whole period 2021-2027. For recurrent measures, both the targets and the costs are given on a yearly basis.

Expected results for targeted species

Full implementation of the listed measures is needed to improve the conservation status of the species concerned, listed below. In many cases, habitat restoration followed by recurring measures for securing the habitat quality is also needed to make the positive effects permanent.

Species listed under Annex IV in the Habitat directive or under Annex I in the Birds directive, that are currently not in favourable conservation status but will be positively affected by species-specific conservation measures:

Plants

- *Arctophila fulva*
- *Artemisia oelandica*
- *Alisma wahlenbergii*
- *Hippuris tetraphylle*
- *Liparis loeselii*
- *Luronium natans*
- *Pulsatilla patens*
- *Pulsatilla vulgaris ssp. gotlandica*

Insects

- *Cerambyx cerdo*
- *Euphydrias maturna*
- *Lopinga achine*
- *Parnassius mnemosyne*
- *Phengaris arion*

Expected results: other benefits

The plants and insects listed above contribute to a varied landscape with important functions for ecosystem services such as pollination, cultural heritage and tourism.

E.3.2. Prevention, mitigation or compensation of damage caused by protected species

Current status in terms of prevention, mitigation and compensation for damages

For large carnivores the main topics are damages on livestock and on reindeer herding. The problems are dealt with in different ways. The compensation system in the reindeer husbandry area is performance based; the sami-villages (reindeer herding companies) get compensation depending on the number of large carnivore reproductions/occurrence found and documented in their area. Totally, the compensation is around 5 200 000 Euro, but the herders claim larger impact on the reindeer livestock. For damages on other livestock there is a compensation system, based on inspection of the damage by regional authorities plus the value of the damage. The number of animals killed varies between years, but the annual cost is generally 100 000 – 200 000 Euro. The farmers can apply for subsidies for mitigating measures, primarily fencing out carnivores. The annual cost varies but is generally about 1 000 000 Euro. Fencing seems to be quite effective, but the cost is quite high. Large carnivores' attacks dogs occasionally and the last 5 years, 45 – 70 dogs have been injured or killed each year. Subsidies are paid to dog owners for purchasing wolf-safe vests. As the wolf population grow and spread, the damages will probably increase. These measures aim towards a higher acceptance for large carnivores, but that is hard to measure.

Crop losses in Sweden caused by large grazing birds (only protected species) the last 5 years sum up to 3 000 000 Euro. The yearly variation is large, due to the connection between weather conditions and damage situation. In addition to these reported damages there is an unknown extent of damage (unreported) caused by both protected and unprotected species. Subsidies are more constant, approximately 100 000 euro annually.

Damage preventive measures currently used are scaring practices, restricted lethal control and diversionary fields on which large grazing birds are left undisturbed to forage. Damage of crops also leads to complex secondary effects, such as negative attitudes towards conservation initiatives of wetland birds. Moreover, there is an increasing number of reports from managers and conservationists about the impact from these birds on vulnerable flora and fauna within wetlands. For example, reed beds seem to disappear because of overgrazing by geese, and cranes are reported to negatively affect waders by predation on chicks and eggs.

Measures needed

The measures described need to be continued, and the funding revised if necessary, according to the development of damages and wildlife populations.

Prioritization of measures to be implemented during the next MFF period

Continuation of the described actions along with efforts to increase knowledge about the underlying mechanisms, both for wildlife and people.

To make informed decisions and to implement effective measures, it is of fundamental importance to understand the probability of finding large grazing birds at certain stop-over sites and fields under different conditions. There is a need for a more holistic approach than today and joint management of reserves, birds and agriculture.

Management plans are needed for species of large grazing birds with clear goals at an international, national and regional level to facilitate communication of common goals and strategies.

List of prioritized measures to be carried out, and estimated costs for these measures

Name and short description of the measures	Type of measure*	Target (Unit & quantity)	Estimated cost in Euros (annualised)	Possible EU co-funding source
Prevention crop damages	R	Affected areas	400 000	
Compensation crop damages	R	Affected areas	750 000	
Prevention damages on live stock	R	Affected areas	1 000 000	
Compensation damages on live stock	R	Affected areas	150 000	
Prevention damages on dogs	R	Dog owners, mainly hunters, in affected areas	100 000	
Compensation injured or killed dogs	R	Dog owners, mainly hunters, in affected areas	50 000	
Damages on reindeer	R	Affected sami villages	5 200 000	
Information and education	R	National	700 000	
National plan for management of large grazing birds	O	National	50 000	
Pre-emptive measures and compensation for damage by seals on fishing #1	R	Affected fisheries	1 950 000	

* indicate whether the measure is recurring or one-off

#1: 19 526 000 SEK for 2017 according to Swedish Agency for Water and Marine Management, information in PM 20180424 Fredrik Nordwall (NV- Åtg. Biol. Mf).

Expected results for targeted species

Predation on reindeer:

Populations of large carnivores can be kept at levels above favourable conservation status.

The compensation system in the reindeer husbandry area is performance based. The compensation thus works as an incentive to have large carnivore reproductions as well as reporting their occurrence to the rangers from the County Administrative Boards.

Predation on sheep and apiaries:

Populations of large carnivores can be kept at levels above favourable conservation status.

Predation on dogs:

Populations of large carnivores can be kept at levels above favourable conservation status.

Fear and anxiety among residents in areas with bears and/or wolves:

Populations of large carnivores can be kept at levels above favourable conservation status.

Divert targeted species from vulnerable crops to less damage prone areas (stubble fields and diversionary fields). Keep breeding/moulting geese within wetlands and not on adjacent agriculture fields (fences along land and waterbodies). Decreased number of individuals to elevate detrimental effects on other flora and fauna (overgrazing of reed beds and depredation on other bird species and animals). Increased fencing and use of other preventive measures results in less attacks on live stock.

Expected results: other benefits

Lowered conflict between agriculture and conservation interests. Positive effects on other flora and fauna. Facilitated communication between interest groups by having well motivated and clear goals and strategies (management plans). Increased acceptance for large carnivores. This a complex and hard-to-measure issue.

E.3.3. References for additional species-specific measures not related to specific ecosystems or habitats

provide text

F. Further added values of the prioritized measures

Protected areas, including Natura 2000 sites, provide provisioning, regulating, cultural, and supporting ecosystem services with benefits for human well-being (TEEB, 2011). Ecosystem services include tangible benefits, such as water and production of food and timber, as well as regulating and supporting ecosystem services such as air quality, and flood and erosion prevention. Together, they contribute to the provision of socio-economic benefits in a broader sense, e.g. rural development benefits, employment opportunities, and carbon sequestration. Protected areas also provide cultural services by giving opportunities for recreation, hunting, and tourism as well as the maintaining of cultural identity (Bio Intelligence Service, 2011). In addition, protected areas preserve genetic diversity that is potentially beneficial to human well-being (e.g. pharmaceutical discoveries). People also value the existence value of habitats and species protected today and, in the future – independently of the ecosystem services they may provide (ten Brink et al., 2013).

The provision of these ecosystem services depends crucially on diversity within and among species and ecosystems. Protected areas play an important role in providing “green infrastructure” fundamental in maintaining the overall functioning of ecosystems. Together, protected areas can increase the resilience of wider ecosystems and their ability to provide ecosystem services even when facing disturbances and shocks both within and beyond the protected site (Gantioler et al., 2014).

Many Natura 2000 sites are valuable for biodiversity because of the way they have been managed, e.g. extensive grazing, and a continuous management is desirable to maintain the species and habitats of good conservation status (ten Brink, 2011). Other sites are valuable because they preserve habitats and ecosystems. The public good character of the benefits associated with the management or conservation practices imply that there are usually no prices or market incentives for the provision of these positive externalities. Therefore, if society wishes to preserve ecosystem services connected to the Natura 2000 network and their associated benefits, economic compensation, preferably results-based compensation¹², for carrying out restoration, conservation, and management activities is necessary. The collective property of payments to agricultural practices was reflected in the latest Eurobarometer (European Commission, 2018). About 60 % of the respondents stated that the common agricultural policy (CAP) benefits all citizens, not just the farmers. Moreover, more than half of the respondents indicated that one of the main objectives of the CAP is to protect the environment and tackle climate change.

¹² *Results-based schemes* refers to payments conditioned on the achievement of specific biodiversity results in contrast to *management-based schemes* where payments are conditioned on the carrying out of certain activities. See for example: <http://ec.europa.eu/environment/nature/rbaps/handbook/docs/rbaps-handbook.pdf>

The cost-efficiency of funding for the implementation and conservation of the Natura 2000 network can be assessed with respect to:

- 1) the overall benefits of implementing Natura 2000 and its impact on biodiversity targets compared to the costs,
- 2) the degree to which funding is allocated to specific activities for which benefits outweighs the costs, and
- 3) the efficiency of the funding process in terms of transaction costs associated with delivery and access to funding.

In general, there are many studies indicating that financing of activities that enhance, preserve, or restore biodiversity represents an efficient use of resources – the associated benefits outweigh the costs (Kettunen et al., 2017). There is also increasing evidence that the benefits of protected areas can significantly exceed the associated costs (Gantioler et al., 2014). Jacobs (2004) estimated that the net benefits for Natura 2000 sites in Scotland generated overall national welfare benefits seven times larger than the overall national costs. In a study by Rensburg et al. (2009), it was found that the total rate of return on government support to the Burren National Park in Ireland was 235 percent, including all operating costs for farming and direct payments necessary to meet the conservation objective. In a review of the benefits of site and species protection ensured by the EU nature directives, Milieu et al. (2016) concluded that the benefits greatly exceed the costs of implementation at the EU, national and local levels.

However, there is less evidence on the cost-efficiency of specific management activities and initiatives, as well as on the cost-effectiveness of the funding process. This is unfortunate given that the values of the Natura 2000 network not only depend on the designation of a site, but on the management that is carried out to meet the conservation target. The Article 17 report provides information on conservation and restoration measures carried out on Natura 2000 sites, and on the conservation status of habitats and species in general – but not on the cost-efficiency of the management activities compared to other available alternatives. Monitoring and evaluation have an important role to play to ensure improved cost-efficiency. It is also important to allocate resources for regular updating of management plans for Natura 2000 sites and other protected areas to adapt to new knowledge. Better data on cost efficiency could increase the chances to secure funding for implementation and management of the Natura 2000 network.

Based on the current funding period, there is a large gap between the estimated costs of managing the European Natura 2000 network and the estimated available financing (Kettunen et al., 2011). Article 8 of the Habitats Directive commits EU to co-funding of the implementation of the Natura 2000 network through a combination of EU financial instruments. In the past funding period the member states have fallen short of closing the financing gap. The challenge is to secure enough funding for the network. Here, the key is to strengthen the linkages between conservation measures and wider social, economic and cultural policies and financing instruments, such as rural development, opportunities for small and medium enterprises, nature tourism, and climate mitigation and adaptation. A related important factor is to recognize Natura 2000 sites and other areas assigned to conserve biodiversity in a wider landscape perspective. The benefits associated with ecosystem service provision crucially depend on the management of surrounding areas as well as the area's infrastructure. To increase the potential of Natura 2000 and other conservation sites to contribute significantly to the provision of ecosystem services, it is crucial to develop strategies to prioritize between habitat types, management methods, and location. Part of the solution is to improve cooperation between different layers of decision-

making. Kettunen et al. (2017) identified the following necessary improvements to the existing financing framework: i) earmarking expenditure for biodiversity priorities under the sectoral EU funds, ii) addressing eligibility gaps, iii) improving coordination and coherence, iv) reducing the administrative burden, v) improving monitoring, vi) continuing efforts in awareness raising and stakeholder cooperation. The Life project GRIP has potential to develop a first blueprint for the creation of such collaborative mechanisms to secure funding.¹³

Ecosystem services

The most comprehensive compilation of the economic values associated with the full Natura 2000 network is a syntheses report by the European Commission (ten Brink et al., 2013). The report builds on 26 structured interviews with a broad set of stakeholders in 26 member states, and a review of around 60 studies. The study estimates that the Natura 2000 network delivers gross benefits of ecosystem services amounting to between €200 – 300 billion annually, which represents around 1.7 – 2.5 % of EU GDP. The study also points out that the estimates vary significantly between habitat types. The mean estimate of benefits per hectare and year ranges from €1,898 for grasslands to €7,866 for heath and scrub lands.

It is important to point out a few caveats here. The estimates are expected to be conservative as they are derived from base studies that only consider a subset of the total economic value - mainly related to employment, tourism, and recreation for which data is more readily accessible. The estimates are based on benefit transfer methods that involve a substantial number of assumptions and uncertainties with respect to effect sizes. One reason for valuing ecosystem services in monetary terms is to be able to put them on a single scale which is useful for cost comparisons. However, even if monetary valuation provides a tool for a comprehensible quantification of ecosystem services, it should not be used as a single yardstick for decision-making. Ecosystems deliver several types of ecosystem services and it is often not possible, nor desirable, to disentangle these effects and estimate their monetary value – particularly considering the risk of underestimating their value. In many cases, qualitative or quantitative descriptions of ecosystem services is a more viable tool to communicate their benefits and, hopefully, integrate that understanding into decision-making processes¹⁴.

There are no studies estimating the economic benefits specifically related to Natura 2000 sites in Sweden. However, the project “Communicating ecosystem services”¹⁵ (Naturvårdsverket, 2018a) that ran between 2014–2017, led to the compilation of several reports on ecosystem services in different

¹³ See also OECD's report Mainstreaming biodiversity for sustainable development: <http://www.oecd.org/environment/resources/Policy-Highlights-Mainstreaming-Biodiversity-for-Sustainable-Development.pdf>

¹⁴ Tools and guidelines for measuring, modelling and valuing ecosystem services was recently released by IUCN. See: <http://sdg.iisd.org/news/iucn-report-guides-practitioners-in-selecting-tools-for-ecosystem-services-assessment/>

¹⁵ Kommunikationsatsning om ekosystemtjänster.

sectors. The qualitative and quantitative benefits associated with different nature types are listed below.

Marine and coastal waters

The maritime industry contributes to about 2 % of the Swedish GDP and provides employment to about 3 % of the people on the employment market. Marine tourism is the largest sector, contributing to almost 40 % of the net value, whereas the fishing industry contributes to about 1 % (Havs- och vattenmyndighet, 2018).

36 percent of the Swedish population is located within 5 km from the coastline, and 49 % within 10 km from the coastline (SCB, 2012). Tourism and production of food and health products are the most straightforward ecosystem services to quantify in monetary terms. There are also a range of cultural ecosystem services that contributes to human wellbeing including recreational services, health benefits, contribution to education and scientific information, employment opportunities, as well as the cultural identity and landscapes related to coastal small-scale activities. Coastal and marine tourism is estimated to make up 23-29 % of the total revenues in the tourism sector. The economic value of recreational fisheries has for example been estimated to SEK 1 billion, and the sector employs around 2000 people yearly (Naturvårdsverket, 2011). In Europe, the overall value of sea activities is estimated to about €500 billion and the sector is estimated to sustain around 5.4 million jobs (European Commission, 2012).

All the ecosystem services above depend on supporting and regulating ecosystem services such as primary production, regulating biogeochemical cycles and decomposition of environmental toxins in sediments, habitats and climate regulation. Loss of biodiversity jeopardizes the marine ecosystems to provide these services and thereby to support the wide range of socio-economic benefits derived from marine activities. Marine protected areas (MPA) constitutes one way of reducing human impacts and maintain or restore marine biodiversity. While the initial cost of establishment may outweigh the benefits, in the longer term MPAs are important for the blue economy. The Kosterhavet MPA, consisting of two marine Natura 2000 sites, is one example where conservation is combined with wider socio-economic benefits. The park has actively engaged in nature-based tourism, small-scale fisheries and development of selective gear, education and research on sustainable use of marine areas, as well as industrial algae production. The site has become one of Sweden's most visited National parks and is particularly popular among recreational boat owners. The catch rate of Northern shrimp increased by 78 % during the period 2012-2015 (Russi et al., 2016). This is not a unique example – a recent report on the economic benefits of MPAs in Europe concludes that they are associated with wide local economy and community benefits (European Commission, 2018). The report identifies direct benefits tied to changes in biodiversity and indirect benefits such as increased revenues from fisheries, actual or perceived improvements in recreation activities, and changes in numbers and distribution of tourists over the year. In sum, the MPAs are contributing to reduce seasonality, increase access to finance, and broaden sector revenues and profits. Still, the report recognizes that there are very few studies that establish robust estimates of the net benefits associated with MPAs.

Indicators for assessing marine ecosystem services have been compiled by the Swedish Agency for Marine and Water Protection (2015). In the latest assessment of the environmental condition of the North and Baltic seas (2018), it was concluded that the negative marine environmental status substantially limits the provision of ecosystem services. This affect the economic viability of marine

tourism and fisheries negatively. The current marine environmental status is associated with an estimated loss for the fisheries industry of about EURO 1,2 million per year. The corresponding loss in the marine tourism sector is estimated to EURO 4,9 million per year. The total annual welfare loss is estimated to about EURO 7 million compared with a situation with good environmental status.

Woodlands and forests

About two thirds of the Swedish surface is covered by forest, even though the distribution varies across the country. Forest recreational activities are important ecosystem services. The frequency of visiting forests for recreational purposes has been estimated to 85 visits per person and year (Ezebilo, 2016). The total recreational value of forest has been estimated to be between SEK 14-60 billion per year, which was corresponding to the total production value of timber per year (Hansen and Malmaeus, 2016). Studies have shown that the recreational value increase when forests are managed less intensively and display fewer traits of industrial production methods (Naturvårdsverket, 2011).

Besides recreational services, protected forests help sustaining a wide range of ecosystem services including filtration and regulation of water flows, climate regulation, erosion protection, and absorption of nitrogen. Forests also provide habitat for cattle and reindeer grazing, and forest edges adjacent to agricultural land are particularly beneficial for wild pollinators. The availability of pollinating insects was associated with a 40 % increase in the harvest yield of broad bean in a Swedish study (Bartomeus et al., 2014).

A compilation of the ecosystem services in forests have been compiled by the Swedish Forest Agency (2017).

Freshwater habitats (rivers and lakes)

In Sweden, many houses and weekend cottages are located in the proximity of lakes systems. Fresh water systems are important providers of cultural ecosystem services for e.g. swimming, angling, and bird watching. Recreational angling in fresh water alone attracts more than one million people annually (Havs- och vattenmyndigheten, 2017). Rivers and lakes also give rise to esthetical and cultural values, including landscape formation - such as the river systems in Torneträsk. These tangible ecosystem services are, among others, dependent on fresh water systems providing supporting services including primary production, biogeochemical cycling, water circulation, and sustenance of the food web.

Fresh water also provides natural protection in terms of regulating ecosystem services including climate regulation, erosion prevention, mitigation of eutrophication and pathogens, water purification, and flood protection. These ecosystem services are most easily interpreted as avoidance of costs. For example, loss of natural flood protection could imply costly technical solutions to achieve the same service.

Indicators for assessing ecosystem services in freshwater systems have been compiled by the Swedish Agency for Marine and Water Protection (2017).

Bogs, mires, fens and other wetlands

Among other adverse effects, degraded wetlands incur additional costs on water companies that must replace natural purification services with chemical removal of pollutions. In a recent study by the Swedish Board of Agriculture (2018), the estimated effect of restoring agricultural land and organic soils to wetlands is a reduction in CO₂-equivalents from 30 to 9 tons per hectare and year. The socio-economical benefits from restoration depends on the location as well as the way uncertainties are accounted for. Despite the large uncertainties in the estimations, the study concludes that restoration generates economic net benefits for the society, particularly if the positive effects on biodiversity and nitrogen fixation are considered.

Grasslands, Heathlands and shrubs, Other agroecosystems (incl. croplands)

A varied landscape with different small biotopes is sustaining a wide range of ecosystem services. Many of the red listed species are tied to the agricultural landscape, particularly grasslands, heathlands and shrubs (Sandström et al., 2015). Besides providing the necessary ecosystems to sustain the regulating and supporting ecosystem services necessary for food production, e.g. pollination by bees, a varied landscape provides predator insects important for pest control which reduces pesticide costs. The economic value of insect pollination in the EU is more than €14 billion per year. It has also been shown that heterogenous agricultural landscapes are valued higher in terms of esthetical and cultural attributes by the Swedish population (Hasund et al., 2009).

The major source for finance for the management of grasslands is the EU Common Agricultural policy (Single Payment Scheme and Agri-environmental payments). More than 80 000 ha of the grasslands needing management are part of the Natura 2000 network in Sweden, areas of special conservation interest. About 30 000 ha are not included in the payment schemes. Some of the grasslands are not financed by national protection schemes either, such as the allocation for efforts regarding valuable nature.

Several indicators of grassland biodiversity show that the conservation status is unsatisfactory and that the trend is negative. At the same time, there are several indicators pointing at the need for a lower animal per hectare production process. In a European perspective, there are scientific studies pointing at the rapid decline of the denitrification capacity of soils which contributes to nitrogen pollution in ground water reserves. Intensive animal production also leads to more intense use of antibiotics, that are potentially very harmful to human health. Protected areas can contribute significantly to maintaining the necessary green infrastructure. Around 23 % of the grasslands that need management are part of the Natura 2000 network. Of these grasslands, around 40 % are not included in the payment schemes within the EU CAP – the major source of finance for management of grasslands. Some of these grasslands are not included in the national protection schemes neither. Without active management, biodiversity and many of its connected benefits are threatened (Naturvårdsverket, 2018b).

References

Bartomeus, I., Potts, S.G., Steffan-Dewenter, I., Vaissiere, B.E., Woyciechowski, M., Krewenka, K.M., Tscheulin, T., Roberts, S.P.M., Szentgyorgyi, H., Westphal, C., & Bommarco, R. (2014). *Contribution of insect pollinators to crop yield and quality varies with agricultural intensification*. Peer J 2:e328; DOI 10.7717/peerj.328.

Bio Intelligence Service (2011) *Estimating the economic value of the benefits provided by the tourism/recreation and Employment supported by Natura 2000*. Final report prepared for European Commission – DG Environment.

European Commission (2012). *Blue Growth: Opportunities for Marine and Maritime Sustainable Growth*. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2012)494, European Commission, Luxembourg.

European Commission (2018). *Special Eurobarometer 473: Europeans, Agriculture and the CAP*. Wave EB88.4. TNS opinion and social.

Eugene E. Ezebilo (2016) *Economic value of a non-market ecosystem service: an application of the travel cost method to nature recreation in Sweden*, International Journal of Biodiversity Science, Ecosystem Services & Management, 12:4, 314-327, DOI: 10.1080/21513732.2016.1202322.

Gallai, N. et al (2009). *Economic valuation of the vulnerability of world agriculture confronted with pollinator decline*. Ecological Economics, 68, pp. 810–821

Gantioler, S., Rayment, M., ten Brink, P., McConville, A., Kettunen, M. and Bassi, S. (2014). *The costs and socio-economic benefits associated with the Natura 2000 network*. International Journal of Sustainable Society, Vol. 6, Nos. 1/2, pp 135–157.

Haines, R., Pantzar, M., Hattam, C., Russi, D. (2018) *Study on the economic benefits of MPAs*, European Commission, Contract No EASME/EMFF/2015/1.3.1.8/SI2.737373.

Hasund, Knut & Kataria, Mitesh & Lagerkvist, Carl. (2011). *Valuing public goods of the agricultural landscape: A choice experiment using reference points to capture observable heterogeneity*. Journal of Environmental Planning and Management. 54. 31–53. 10.1080/09640568.2010.502753.

Havs- och vattenmyndigheten (2015) *Ekosystemtjänster från svenska hav. Status och påverkansfaktorer*. Rapport 2015:12.

Havs- och vattenmyndigheten (2017) *Ekosystemtjänster från svenska sjöar och vattendrag. Identifiering och bedömning av tillstånd*. Rapport 2017:17.

Havs- och vattenmyndigheten (2018). *Marin strategi för Nordsjön och Östersjön 2018–2023. Bedömning av miljötillstånd och socioekonomisk analys*. Rapport 2018:27.

Jacobs (2004)” *Environment Group Research Report: An Economic Assessment of the Costs and Benefits of Natura 2000 Sites in Scotland*, 2004 Final Report, The Scottish Government.

Jordbruksverket (2018). *Återvätning av organogen jordbruksmark som klimatåtgärd*. Rapport 2018:30.

Kettunen, M., Illes, A., Rayment, M., Primmer, E., Verstraeten, Y., Rekola, A., Ring, I., Tucker, G., Baldock, D., Droste, N., Santos, R., Rantala, S., Ebrahim, N. and ten Brink, P. (2017) *Integration approach to EU biodiversity financing: evaluation of results and analysis of options for the future*. Final report for the European Commission (DG ENV) (Project ENV.B.3/ETU/2015/0014), Institute for European Policy (IEEP), Brussels/London.

Kettunen, M., Carter, O., Gantioler, S., Baldock, D., Torkler, P., Arroyo Schnell, A., Baumüller, A., Gerritsen, E., Rayment, M., Daly, E. and Pieterse, M. (2011) *Assessment of the Natura 2000 Co-*

financing Arrangements of the EU Financing Instrument: A Project for the European Commission, Institute for European Environmental Policy (IEEP), Brussels. http://www.ieep.eu/assets/791/Assessment_of_Natura_2000_Co-financing.pdf

Kuik, O., Brander, L. and Schaafsma, M. (2006) *Globale Batenraming van Natura 2000 gebieden*. Instituut voor Milieuvraagstukken, Amsterdam, http://www.mkbainderegio.nl/docs/Batenraming_Natura_2000.pdf

Milieu, IEEP, and ICF (2016), *Evaluation to Support the Fitness Check of the EU nature directives*. <http://www.euractiv.com/wp-content/uploads/sites/2/2016/06/draft-FC-study-copy-2.pdf>

Naturvårdsverket (2012). *Sammanställd information om ekosystemtjänster*. NV-00841-12.

Naturvårdsverket (2015). *Guide för värdering av ekosystemtjänster*. Rapport 6690.

Naturvårdsverket (2018). *Kommunikationssatsning om ekosystemtjänster - att få fler att se naturens grattistjänster*. Rapport 6798.

Naturvårdsverket (2018). *Jordbrukarstöd och värdefulla gräsmarker – hur fungerar de för arbetet med gynnsam bevarandestatus?* Rapport 6822.

Sandström, J., Bjelke, U., Carlberg, T. & Sundberg, S. (2015). *Tillstånd och trender för arter och deras livsmiljöer – rödlistade arter i Sverige 2015*. ArtDatabanken Rapporterar 17. ArtDatabanken, SLU. Uppsala.

Skogsstyrelsen (2018). *Skogens ekosystemtjänster – status och påverkan*. Rapport 2017/13.

TEEB (2011). *The Economics of Ecosystems and Biodiversity in National and International Policy Making*. Edited by Patrick ten Brink, Earthscan, London and Washington.

ten Brink P., Badura T., Bassi S., Daly, E., Dickie, I., Ding H., Gantioler S., Gerdes, H., Kettunen M., Lago, M., Lang, S., Markandya A., Nunes P.A.L.D., Pieterse, M., Rayment M., Tinch R., (2013). *Estimating the Overall Economic Value of the Benefits provided by the Natura 2000 Network*. Final Report to the European Commission, DG Environment on Contract ENV.B.2/SER/2008/0038. Institute for European Environmental Policy / GHK / Ecologic, Brussels 2013.

Rensburg, T.V., Kelley H. and Yadav, L. (2009) *Socio-economics of Farming for Conservation in the Burren, Report prepared for the BurrenLIFE Project*, <http://www.burrenlife.com/Userfiles/socioeconomic-report-burrenlife.1.pdf>

Russi D., Pantzar M., Kettunen M., Gitti G., Mutafoglu K., Kotulak M. & ten Brink P. (2016). *Socio-Economic Benefits of the EU Marine Protected Areas*. Report prepared by the Institute for European Environmental Policy (IEEP) for DG Environment.

SCB. 2012. *Varannan svensk bor nära havet*. Välfärd nr 2012:2.

Skogsstyrelsen, 2008. *Kontinuitetsskogar och hyggesfritt skogsbruk*. Meddelande 1 2008. Skogsstyrelsen, Jönköping.

Annex 1: guidance for completing the PAF

Note: all texts in red in the **current** PAF format are for guidance purposes only and should either be replaced or deleted in the final document

A. Introduction

A.1 General introduction

The content of this section of the PAF should not be modified.

A.2 Structure of the current PAF format

The content of this section of the PAF should not be modified.

A.3 Introduction to the specific PAF of [Member States at national and or regional level]

PAFs are to be submitted by national authorities. However one PAF does not have to cover all administrative regions of the Member States. For this reason, provide a precise description of the geographic scope of the PAF.

In addition, provide any other information that is deemed useful to be presented here. This may include, for example:

- information about the administrative set-up and organisation of Natura 2000 management in the Member state and/or region(s) concerned
- information about the national/regional bodies involved in elaboration of this PAF;
- any stakeholder consultation processes related to elaboration of the PAF, and their results;
- a description of existing national or regional strategies in relation to green infrastructure;
- information about any particular challenges encountered in completing the PAF.

B. Summary of priority financing needs for the period 2021-2027

This section of the PAF shall provide a summary of all financing needs for the period 2021-2027. Figures should be based on a compilation of the financing needs identified in section E of this PAF.

C. Current state of the Natura 2000 network

C.1. Area statistics of the Natura 2000 network

Provide a brief description of the current progress in terms of site selection and establishment of the Natura 2000 network in the Member State or region(s) covered by this PAF. Is the network considered to be complete or is there still a need for identifying and proposing any additional sites?

In the table in this section, provide all relevant area statistics for the network.

For PAFs covering multiple administrative regions, a breakdown per region is recommended if regional-level EU funding programmes are expected under the next MFF.

C.2. Map of the Natura 2000 network in [the Member State or region(s) concerned]

In this section, provide a map of the Natura 2000 network, showing the location and extent of sites designated under the EU Birds and Habitats Directives. If available, this or a separate map shall also show the location and extent of any regional green infrastructure (GI) network, provided this network is designed to contribute to the coherence of Natura 2000.

D. EU and national financing of the Natura 2000 network during the period 2014 – 2020

In the tables in this section, indicate financing relevant for Natura 2000 from the various EU funds and national sources, during the period 2014–2020.

If no funding was available under the specific measure or category of expenditure, please leave empty.

If no precise data on funding exists (particularly in relation to indirect funding, i.e. under measures or projects, which do not primarily target Natura 2000 but which provide co-benefits for nature protection), provide approximate figures, using for example percentage values. The guidance documents on definition and criteria for biodiversity expenditure in the EU, developed for the European Commission¹⁶, provide a methodological background for such analysis. In each case, in the comments section, indicate how the figure was calculated.

Under individual measures or categories of expenditure indicate only the part relevant for Natura 2000 (e.g. under M10 ‘agri-environment climate measures’ extract and aggregate only these sub-measures and actions that are relevant for Natura 2000).

For PAFs covering multiple administrative regions, a breakdown per region is recommended if submission of regional EU funding programmes is foreseen for the MFF 2021–2027.

For individual EU funds provide the following information:

EAFRD

- total current allocation to individual measures (EU contribution and national co-financing);
- current allocation to measures relevant for Natura 2000 (e.g. under M10 ‘agri-environment climate measures’ extract and aggregate only these sub-measures and actions that are relevant

¹⁶ http://ec.europa.eu/environment/nature/biodiversity/financing_en.htm

for Natura 2000). If no funding was available under the specific measure or category of expenditure, please leave empty;

- current spending on measures relevant for Natura 2000 (EU contribution and national co-financing);
- information on the relevance of the measure for maintenance and restoration of Natura 2000 sites (to what extent these measures are tailored to the needs of Natura 2000; to what extent it was possible to secure financing for Natura 2000 under these measures; if changes in allocation levels have been made since adoption the programmes, provide information on their character and justification); provide comments on how the experience with the use of these measures could be useful for programming funds in the next MFF.

ERDF/CF:

- total current allocation to category of expenditure 85 and 86 (EU contribution and national co-financing);
- spending on category 85 and 86 (EU contribution and national co-financing);
- allocation and spending on other measures relevant for Natura 2000 only in so far as they contribute to maintenance and restoration of Natura 2000 (e.g. category 87 adaptation to climate change or 88 risk prevention);
- information on the relevance of the measure to maintenance and restoration of Natura 2000 sites (to what extent these measures are tailored to the needs of Natura 2000; to what extent it was possible to secure financing for Natura 2000 under these measures; if changes in allocation levels have been made since adoption the programmes provide information on their character and justification); provide comments on how the experience with the use of these measures could be useful for programming funds in the next MFF.

EMFF:

Allocations in the EMFF OPs are made at EU priority level. There are six priorities, two of which are particularly relevant for Natura 2000: (1) promoting environmentally sustainable, resource-efficient, innovative, competitive and knowledge-based fisheries and (2) fostering environmentally sustainable, resource-efficient, innovative, competitive and knowledge-based aquaculture. These priorities are implemented by pursuing, among others, the following specific objectives:

- 1(b) protection and restoration of aquatic biodiversity and ecosystems;
- 2(c) the protection and restoration of aquatic biodiversity and the enhancement of ecosystems related to aquaculture and the promotion of resource-efficient aquaculture.

These objectives are implemented by specific measures, several of which are relevant for Natura 2000 (particularly the ones listed in Articles 40, 44, and 54).

List measures that contribute to maintenance and restoration of the Natura 2000 sites and indicate funding allocated to these measures. Provide information on the relevance of the measure to maintenance and restoration of Natura 2000 sites (to what extent these measures are tailored to the needs of Natura 2000; to what extent it was possible to secure financing for Natura 2000 under these measures; if changes in allocation levels have been made since adoption the programmes provide

information on their character and justification); provide comments on how the experience with the use of these measures could be useful for programming funds in the next MFF.

LIFE:

List those LIFE projects co-financed under the current MFF that contribute to maintenance and restoration of Natura 2000 sites and indicate funding allocated to these projects. Explain how the experience with these projects could be useful for programming funds in the next MFF.

Other EU funds including Interreg:

If relevant, provide information about other EU funds contributing to maintenance and restoration of the Natura 2000, wider biodiversity including protected species of EU interest and green infrastructure.

Other national financing for the Natura 2000 network, green infrastructure and species protection in 2014-2020:

Provide information about national financing for the Natura 2000 network, green infrastructure and species protection, other than national co-financing allocated to EU funds.

E. Priority measures and financing needs for 2021–2027

Note on prioritisation of Natura 2000 site related measures: Taking into account the provisions of Article 6(2) of the Habitats Directives, i.e. the obligation to prevent deterioration of the sites, it is expected that any financing needs for those management measures that are required to avoid deterioration of species and habitats in the sites should be identified as priorities in any PAF. This would in particular apply to any Natura 2000-related measures targeting species and habitats that require an active agricultural management (e.g. "agri-environmental measures").

Further priority measures should be identified with the aim to achieve measurable improvements in the conservation status of species and habitats that are currently in an unfavourable conservation status. Taking into account that the EU nature directives do not provide any further guidance on prioritization, it is for to the national or regional authorities to decide on the improvement-related measures that are considered as priorities for the next MFF period.

Note on allocation of financing needs to EU financial instruments: the allocation of financing needs to certain EU programmes will only be possible once the architecture of the future MFF in relation to the structure of the different funds will be known. Therefore, PAFs can only reliably identify the specific future EU programmes from which co-funding is being sought once the scope and their funding rules are being known. As long as this is not the case, the relevant column (on allocation of needs to financing instruments) in the tables listing priority measures and their costs should be left empty.

E.1. Horizontal measures and administrative costs related to Natura 2000

E.1.1. Site designation and management planning

Current status and progress made so far in terms of site identification, designation and management planning (situation: DD/MM/YY)

Provide a synthetic description of the process that has been leading to legal site designation, setting of site level conservation objectives and setting of site-level conservation and restoration measures. Is this process completed or is it still ongoing? Are objectives and measures updated on a regular basis? How detailed and specific are site-level conservation objectives and measures? What is the status of objectives and measures? Etc.

In the table in this section, provide the most up-to-date statistics of the Natura 2000 network of sites, in terms of progress with legal (SAC) designation of sites, setting of conservation objectives and setting of site-level conservation measures, in the frame of management plans or equivalent instruments.

Further measures needed

Describe any additional measures (both in terms of continuation of existing measures, and in terms of any new measures) that are expected to be necessary after 2020 to support designation of Natura 2000 sites and establishment or updating site-level conservation objectives and measures.

Prioritization of measures to be implemented during the next MFF period

Priority measures are those that should be implemented during the next MFF period (2021-2027). If relevant, explain the criteria for prioritization of measures.

(Alternatively, you may indicate that all measures in this specific section are considered a priority)

List of prioritized measures to be carried out, and estimated costs for these measures

In the table in this section, list all prioritized measures to be carried out during the next MFF period. The level of detail in the description of each of the measures should be sufficient to understand how the cost was calculated. Quantified targets should be provided in the description of the measure, whenever available.

For PAFs covering multiple administrative regions, a breakdown of the measures per region is recommended if the use of regional-level EU funding programmes is anticipated under the next MFF.

Expected results

Indicate the expected impact (not to be confused with a description of the measures themselves) of full implementation of the listed prioritized measures.

E.1.2. Site administration and communication with stakeholders

Current status and progress made so far in terms of site administration and communication with stakeholders

Describe the current situation (mid-2018) in terms of the administration of the Natura 2000 network of sites, and communication with relevant stakeholders. If relevant, describe any existing communication strategies or approaches to promote stakeholder engagement, incl. through the use of modern communication technologies.

Further measures needed

Describe any additional measures (both in terms of continuation of existing measures, and in terms of any new measures) that are expected to be necessary after 2020 to ensure effective site administration and communication with stakeholders.

Prioritization of measures to be implemented during the next MFF period

Priority measures are those that should be implemented during the next MFF period (2021-2027). If relevant, explain the criteria for prioritization of measures.

(Alternatively, you may indicate that all measures in this specific section are considered a priority)

List of prioritized measures to be carried out, and estimated costs for these measures

In the table in this section, list all prioritized measures to be carried out during the next MFF period. The level of detail in the description of each of the measures should be sufficient to understand how the cost was calculated. Quantified targets should be provided in the description of the measure, whenever available.

For PAFs covering multiple administrative regions, a breakdown of the measures per region is recommended if the use of regional-level EU funding programmes is anticipated under the next MFF.

Expected results

Indicate the expected impact (not to be confused with a description of the measures themselves) of full implementation of the listed prioritized measures.

E.1.3. Monitoring and reporting**Current status and progress made so far in terms of monitoring and reporting**

Describe the current situation (mid-2018) in terms of compliance with monitoring and reporting requirements, including site level monitoring and reporting, monitoring and reporting under Article 17 Habitats Directive, Article 12 Birds Directive, etc.

Further measures needed

Describe any additional measures (both in terms of continuation of existing measures, and in terms of any new measures) that are expected to be necessary after 2020 to ensure compliance with monitoring and reporting requirements under the EU Nature directives.

Prioritization of measures to be implemented during the next MFF period

Priority measures are those that should be implemented during the next MFF period (2021-2027). If relevant, explain the criteria for prioritization of measures.

(Alternatively, you may indicate that all measures in this specific section are considered a priority)

List of prioritized measures to be carried out, and estimated costs for these measures

In the table in this section, list all prioritized measures to be carried out during the next MFF period. The level of detail in the description of each of the measures should be sufficient to understand how the cost was calculated. Quantified targets should be provided in the description of the measure, whenever available.

For PAFs covering multiple administrative regions, a breakdown of the measures per region is recommended if the use of regional-level EU funding programmes is anticipated under the next MFF.

Expected results

Indicate the expected impact (not to be confused with a description of the measures themselves) of full implementation of the listed prioritized measures.

E.1.4. Remaining knowledge gaps and research needs

Current status

Describe the current situation (mid-2018) in terms of knowledge used for the implementation of the EU Nature directives and Natura 2000.

Further measures needed

Describe any additional measures (both in terms of continuation of existing measures, and in terms of any new measures) that are expected to be necessary after 2020 to fill remaining knowledge gaps.

Prioritization of measures to be implemented during the next MFF period

Priority measures are those that should be implemented during the next MFF period (2021-2027). If relevant, explain the criteria for prioritization of measures.

(Alternatively, you may indicate that all measures in this specific section are considered a priority)

List of prioritized measures to be carried out, and estimated costs for these measures

In the table in this section, list all prioritized measures to be carried out during the next MFF period. The level of detail in the description of each of the measures should be sufficient to understand how the cost was calculated. Quantified targets should be provided in the description of the measure, whenever available.

For PAFs covering multiple administrative regions, a breakdown of the measures per region is recommended if the use of regional-level EU funding programmes is anticipated under the next MFF.

Expected results

Indicate the expected impact (not to be confused with a description of the measures themselves) of full implementation of the listed prioritized measures.

E.1.5. Natura 2000-related communication and awareness raising measures, education and visitor access

Current status

Describe the current situation (mid-2018) in terms of Natura 2000 related general communication and awareness-raising measures, education, access to visitors, etc.

Further measures needed

Describe any additional measures (both in terms of continuation of existing measures, and in terms of any new measures) that are expected to be necessary after 2020 for Natura 2000-related general communication and awareness-raising measures, education, access to visitors, etc.

Prioritization of measures to be implemented during the next MFF period

Priority measures are those that should be implemented during the next MFF period (2021-2027). If relevant, explain the criteria for prioritization of measures.

(Alternatively, you may indicate that all measures in this specific section are considered a priority)

List of prioritized measures to be carried out, and estimated costs for these measures

In the table in this section, list all prioritized measures to be carried out during the next MFF period. The level of detail in the description of each of the measures should be sufficient to understand how the cost was calculated. Quantified targets should be provided in the description of the measure, whenever available.

For PAFs covering multiple administrative regions, a breakdown of the measures per region is recommended if the use of regional-level EU funding programmes is anticipated under the next MFF.

Expected results

Indicate the expected impact (not to be confused with a description of the measures themselves) of full implementation of the listed prioritized measures.

E.1.6. References (for horizontal measures and administrative costs related to Natura 2000)

Provide a list of key references (if possible with web-links) to underpin the above information about current situation, additional needs, prioritization, cost estimates and expected results.

E.2 Site-related maintenance and restoration measures, within and beyond Natura 2000

Note on the level of detail of information to be provided in the PAF: When presenting the requested information on current situation, additional measures needed, prioritization and listing of priority measures, national/regional authorities completing the PAF are advised to remain sufficiently synthetic, so as to avoid that the PAF becomes an excessively long document.¹⁷ Simplification can be achieved for example by grouping measures and financing needs for several habitat types and species into "measure clusters" with similar types of management requirements and similar costs per hectare. When creating such clusters, care should be taken to provide the most relevant information on area to be covered by the measure.

Note on allocation of habitat types, species, priority measures and associated costs to large ecosystems categories: An essential component of the current PAF format is the required breakdown of the Natura 2000 and green infrastructure-related conservation and restoration measures per broad ecosystem category. The proposed ecosystem typology of 8 classes is very largely based on the MAES typology, which was established as a conceptual basis for an EU wide ecosystem assessment. A comprehensive database allocating individual species and habitat types of EU importance to the MAES ecosystems is available for download from the European Environment Agency website¹⁸. It is recommended that the allocation of measures and costs to ecosystem types should wherever possible follow this typology¹⁹.

Current status of habitats and species, conservation measures taken until now and their impact so far, remaining pressures and threats

Provide a synthetic overview of the current status of species and habitats for which Natura 2000 sites are designated (you may refer to relevant web-links such as the EEA's Article 17 web tool <https://bd.eionet.europa.eu/article17/reports2012/> or the Article 12 web tool <https://bd.eionet.europa.eu/article12/>). Provide a brief description of measures already undertaken, and of their impacts.

Relevant elements for this summary are notably available from the following information sources:

- information on conservation status, trends and favourable reference values (based on Article 17 and 12 data, national, regional or site-level conservation objectives);
- total area of a habitat/ total population of a species (based on Article 17 and 12 data);
- % coverage of habitats/ species by the Natura 2000 network of sites (based on Article 17 and 12 data; Natura 2000 database, etc.);
- key pressures and threats to be addressed.

¹⁷ Any more detailed documentation about priority measures and their costs can be added as annexes to the PAF.

¹⁸ Linkages of species and habitat types to MAES ecosystems <https://www.eea.europa.eu/data-and-maps/data/linkages-of-species-and-habitat#tab-european-data>

¹⁹ For example, Natura 2000-related measure targeting the maintenance or restoration of species living in orchards shall be listed under the section on "Other agroecosystems (including croplands)".

Measures needed to maintain or restore favourable conservation status

Describe any measures (both in terms of continuation of existing measures, and in terms of any new measures) that are expected to be necessary after 2020 to maintain or restore favourable conservation status of species and habitats for which Natura 2000 sites are designated. Insofar as possible, use figures in line with the Favourable reference values, as reported in the most recent report according to Article 17 of the Habitats Directive.

Prioritization of measures to be implemented during the next MFF period

Priority measures are those that should be implemented during the next MFF period (2021-2027). If relevant, explain the criteria for prioritization of measures.

List of prioritized measures to be carried out, and estimated costs for these measures

In the tables in this section, list all prioritized measures to be carried out during the next MFF period. The level of detail in the description of each of the measures should be sufficient to understand how the cost was calculated. Quantified targets should be provided in the description of the measure, whenever available.

For Natura 2000 sites in relation to which site management plans or other relevant planning documents have established the necessary maintenance or restoration measures, a full coherence of priority measures listed in the PAF with these documents shall be ensured.

In the tables in this section, ensure a clear distinction between Article 6.1 measures (i.e. measures required for achieving site-level conservation objectives for species and habitat types for which the sites are designated, incl. measures for bird species in SPAs) and wider green infrastructure measures.

For PAFs covering multiple administrative regions, a breakdown of the measures per region is recommended if the use of regional-level EU funding programmes is anticipated under the next MFF.

Expected results for targeted species and habitat types

Indicate the expected impact of full implementation of the listed prioritized measures on the targeted habitat and species, using for example parameters such as range and area of the habitat, structures and functions, future prospects (for habitat types), or range, population size, habitat of the species and future prospects (for species).

Expected results: other benefits

Indicate the expected results of full implementation of the listed prioritized measures, taking into account any additional socio-economic (jobs and growth, recreational and tourism, education, etc.) and environmental benefits (ecosystem services, climate change mitigation, etc.)

E.2.10. References for site-related maintenance and restoration measures within and beyond Natura 2000

Provide a list of key references (if possible with web-links) to underpin the above information about current situation, additional needs, prioritization, cost estimates and expected results.

E.3. Additional species-specific measures not related to specific ecosystems or habitats

E.3.1. Species-specific measures and programmes not covered elsewhere

Note: this section is specifically designed for the identification and listing of priority measures and associated costs for species protection measures covering species of EU importance under the EU Birds and Habitats Directive, other than those measures related to Natura 2000 or associated wider green infrastructure. Possible examples of measures that could be covered under this section include species protection measures for species covered by Annex IV of the Habitats Directive (e.g. agri-environment programmes or measures for the hamster), any horizontal measures in the wider countryside benefiting widespread species such as skylark or turtle dove, etc.

Current status of the species

Summarize the current status of relevant species not covered elsewhere in this PAF (incl. species listed in Annex IV and V of the Habitats Directive) and provide a brief description of the measures undertaken already and of their impact. Relevant elements for this summary are notably available from the following information sources:

- total population of a species (based on Article 17 and 12 data);
- information on conservation status, trends and favourable reference values (based on Article 17 and 12 data, national, regional or site-level conservation objectives);
- key pressures and threats to be addressed.

Measures needed to maintain or restore favourable conservation status

Describe any additional measures (both in terms of continuation of existing measures, and in terms of new measures) that are expected to be necessary after 2020 to maintain or restore favourable conservation status of these species.

Prioritization of measures to be implemented during the next MFF period

Priority measures are those that should be implemented during the next MFF period (2021-2027). If relevant, explain the criteria for prioritization of measures.

List of prioritized measures to be carried out, and estimated costs for these measures

In the tables in this section, list all prioritized measures to be carried out during the next MFF period. The level of detail in the description of each of the measures should be sufficient to understand how the cost was calculated. Quantified targets should be provided in the description of the measure, whenever available.

For PAFs covering multiple administrative regions, a breakdown of the measures per region is recommended if the use of regional-level EU funding programmes is anticipated under the next MFF.

Expected results for targeted species

Indicate the expected impact of full implementation of the listed prioritized measures on the targeted species, in relation to parameters such as species' range, population size, habitat of the species, or any other relevant parameters.

Expected results: other benefits

Indicate the expected results of full implementation of the listed prioritized measures, taking into account any additional socio-economic (jobs and growth, recreational and tourism, education, etc.) and environmental benefits (ecosystem services, climate change mitigation, etc.)

E.3.2. Prevention, mitigation or compensation of damage caused by protected species

Note: this section is specifically designed for the listing of priority measures and their associated costs related to prevention mitigation or compensation of damage caused by species that are protected under the EU Birds and Habitats Directives. Typical examples of measures under this section include measures for preventing damage caused by large carnivores, cormorants, herons, etc., compensatory or mitigation measures for damage to private property caused by beavers, etc. Both the actual measures and their administrative costs may be presented under this section.

Current status in terms of prevention, mitigation and compensation for damages

Summarize the current status of implementation of prevention, mitigation and compensation measures for damage caused by species that are protected under the EU Birds and Habitats Directives. For each of the species or species groups that are subject to such measures, describe briefly:

- key pressures and threats to be addressed;
- the main measures taken and their annual costs;
- the effectiveness so far of the measures undertaken in terms of prevention, mitigation or compensation of damage;
- the impact of the measures on the conservation status taken of the species / species group.

Measures needed

Describe any measures (both in terms of continuation of existing measures, and in terms of any new measures) that are expected to be necessary after 2020 to prevent, mitigate or compensate damage by protected species.

Prioritization of measures to be implemented during the next MFF period

Priority measures are those that should be implemented during the next MFF period (2021-2027). If relevant, explain the criteria for prioritization of measures.

List of prioritized measures to be carried out, and estimated costs for these measures

In the tables in this section, list all prioritized measures to be carried out during the next MFF period. The level of detail in the description of each of the measures should be sufficient to understand how

the cost was calculated. Quantified targets should be provided in the description of the measure, whenever available.

For PAFs covering multiple administrative regions, a breakdown of the measures per region is recommended if the use of regional-level EU funding programmes is anticipated under the next MFF.

Expected results for targeted species

Indicate the expected impact of full implementation of the listed prioritized measures on the targeted species, in relation to parameters such as species' range, population size, habitat of the species, or any other relevant parameters.

Expected results: other benefits

Indicate the expected results of full implementation of the listed prioritized measures in terms of socio-economic impact and stakeholder acceptance.

E.3.3. References for species-specific measures not related to specific ecosystems or habitats

Provide a list of key references (if possible with web-links) to underpin the above information about current situation, additional needs, prioritization, cost estimates and expected results.

G. Further added values of the prioritized measures

List all additional benefits (not already covered elsewhere) that would be achieved through a full implementation of the prioritized measures identified through this PAF (e.g. on sustainable tourism, employment and other socio-economic impacts, ecosystem services, climate change mitigation and adaptation, air and water quality, disaster risk prevention and management, health, research, education, knowledge and promotion of co-operation (including cross-border)). Please quantify, if possible.