



Sand Life
LIFE11 NAT/SE/849

FINIAL Report
Covering the project activities from 01/08/2012 to 31/07/2018

Reporting Date
31/10/2018

Project Data

Project location	Counties of Skåne, Kalmar and Halland in southern Sweden
Project start date	01/08/2012
Project end date	31/07/2018
Total Project duration (in months)	72 months
Total budget	7 850 305 €
Total eligible budget	7 548 226 €
EU contribution:	3 772 603 €
(%) of total costs	49,98 %
(%) of eligible costs	49,98 %

Beneficiary Data

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List of contents

1. List of abbreviations
2. Executive summary
3. Introduction
4. Administrative part
 - 4.1. Description of the management system
 - 4.2. Evaluation of the management system
5. Technical part
 - 5.1. Technical progress, per task
 - 5.1.1. Action A.1 Revision of legal management plans for nature reserves
 - 5.1.2. Action A.2 Site specific action plans
 - 5.1.3. Action A.3 Call for tenders
 - 5.1.4. Action A.4 Analyses of soil chemistry before concrete restoration actions
 - 5.1.5. Action C.1 Clearing of woodland and pine plantations
 - 5.1.6. Action C.2 Creating areas of bare sand
 - 5.1.7. Action C.3 Removal of *Rosa rugosa*
 - 5.1.8. Action C.4 Prescribed burning
 - 5.1.9. Action C.5 Fire breakers
 - 5.1.10. Action C.6. Clearing of encroachment
 - 5.1.11. Action C.7 Fencing
 - 5.1.12. Action C.8. Investments for grazing, other than fencing
 - 5.1.13. Action C.9. Management of heather
 - 5.1.14. Action C.10. Reimbursement for grazing
 - 5.1.15. Action C.11. Constructions of roads
 - 5.1.16. Action D.1 Monitoring the impact of project actions; 1. Habitat structures
 - 5.1.17. Action D.2 Monitoring the impact of project actions; 2. Flora and fauna indicators
 - 5.1.18. Action D.3 Monitoring the impact of project actions; 3. Socio-economic aspects
 - 5.1.19. Project deliverables and milestones
 - 5.2. Dissemination actions
 - 5.2.1. Objectives
 - 5.2.2. Dissemination: overview per activity
 - 5.2.2.1. Action E.1 Information signs
 - 5.2.2.2. Action E.2 Information leaflets and rollups
 - 5.2.2.3. Action E.3 Demonstration sites/Outdoor museum
 - 5.2.2.4. Action E.4 Digital information
 - 5.2.2.5. Action E.5 Field excursions and information meetings
 - 5.2.2.6. Action E.6 Website
 - 5.2.2.7. Action E.7 Layman's report
 - 5.2.2.8. Action E.8 Seminars and workshops
 - 5.2.2.9. Action E.9. Management for visitors; tables and benches
 - 5.2.2.10. Action E.10 Manual for management of habitats on sandy soils
 - 5.2.2.11. Action F.1 Project management
 - 5.2.2.12. Action F.2 Net-working
 - 5.2.2.13. Action F.3 After-Life Plan
 - 5.2.2.14. Action F.4 Financial Audit
 - 5.2.2.15. List of dissemination deliverables
 - 5.3. Evaluation of project implementation

- 5.4. Analysis of long-term benefits
- 6. Comments on the financial report
 - 6.1. Summary of costs incurred
 - 6.2. Accounting system
 - 6.3. Auditor's report/declaration
 - 6.4. Change of bank account
 - 6.5. Summary of costs per action
 - 6.6. Individual and consolidated cost statements
 - 6.7. EC-letters, financial annexes
- 7. Annexes
 - 7.1. Administrative annexes
 - 7.2. Technical annexes
 - 7.3. Dissemination annexes
 - 7.4. Final table of indicators
- 8. Financial report and Annexes
 - 8.1. Standard Payment Request and Beneficiary's Certificate
 - 8.2. The Consolidated Costs Statement for the Project
 - 8.3. Signed Financial Statement
 - 8.4. Full Financial Statement
 - 8.5. CAB Skåne Beneficiary's Certificate for Nature and Biodiversity Projects
 - 8.6. Supporting documents
 - 8.7. Invoice and payment
 - 8.8. Internal audit policy CAB Stockholm and organogram
 - 8.9. New bank and new account number_financial ID_form
 - 8.10. Independent Auditor's report

1. List of abbreviations

CAB Halland	Associated beneficiary, County Administrative Board of Halland
CAB Kalmar	Associated beneficiary, County Administrative Board of Kalmar
CAB Skåne	Coordinating beneficiary, County Administrative Board of Skåne
CP	Common Provisions
EC	European Commission
GA	Grant Agreement / Special Provisions
IAS	Invasive Alien Species
KSTAD	Associated beneficiary, Kristianstad Municipality Vattenriket Biosphere Reserve
LU	Associated beneficiary, Lund University
NEEMO	Monitoring Team
NGO	Non Governmental Organisations
SEPA	Swedish Environmental Protection Agency
SSF	The Scanian Landscape Foundation
ÅGP	National Action Programs for Threatened Species

2. Executive Summary

Project objectives

The sandy habitats of southern Sweden are unique environments with high biodiversity, but also with many threatened species. These environments have disappeared during the last 100 years due to tree plantations, conventional farming, exploitation, infusion of nutrients and encroachment. In Sand Life, the general objectives were to restore, maintain and improve biodiversity according to the Habitat and Bird directives. The main emphasis was to create a more open landscape with necessary structures for plant, fungi and animal life in the habitats. Bare sand provides the wild life with a warmer micro climate in combination with substrate for animals to build nests in or for seeds to germinate in.

The project has been implemented in 23 Natura 2000-sites distributed in the three southern counties of Sweden; Skåne, Halland and Kalmar. The restored environments included the coastal dune landscape from the exposed white dunes closest to the sea to the wooded dunes, and the inland's large sandy fields, which may be more or less lime-rich.

Throughout the project it was important to have continuous dialogues with the land owners and users to establish and plan actions in all the project sites. It was also important to inform the public about the activities that will be implemented in their neighbourhood, as well as to raise the awareness about how valuable the sandy environments are for the biodiversity in the region and how these habitats best can be managed.

Project administration

Sand Life has been a collaboration project between the three County Administrative Boards (CABs) of Skåne (the coordinating beneficiary), Halland and Kalmar, Lund University and the Municipality of Kristianstad. The counties have been responsible for restoration and information, Lund University has monitored the effects on plants and animals and the Municipality of Kristianstad has developed outdoor museums.

The project was funded by the EU's Life + Nature program and had a budget of 7,8 million EUR. The EU accounts for half of the funding and the other half shares partners together with the co-financiers; the Swedish Environmental Protection Agency and the Scanian Landscape Foundation.

Technical implementations, key deliverables and outputs

Preparatory actions

Before implementing the concrete restoration actions a few preparatory actions (A-actions) had to be completed. First, 27 different site-specific restoration plans were established with descriptions of the restorations and disseminations in the sites. Some of the sites included in the project were also nature reserves and needed updated legal management plans. Therefore, early in the project plans were established for four of these sites. For some sites, the soil chemistry was analysed for lime content and for nutrient levels. Prior to the assignments for restoration and dissemination actions, several major calls for tenders were made, for example for machine services, soil chemistry analysis and the production of outdoor museums.

Concrete restoration actions

The main focus in the project, have been the implementation of the concrete restoration actions with loggings, clearings of encroachment, creating bare sand, removing invasive alien species, burnings, fencing and introduced grazing.

Tree plantations or semi-natural wooded dunes have been cleared and /or sun lit gaps created in the wooded dunes. About 478 hectares of pine, mountain pine and other tree-species have been cleared in 15 sites. The trees have been logged, the stumps pulled and the material transported out of the sites or burnt in place. Encroachments with bushes and trees were removed at 222 hectares in 14 sites. In two sites, the encroachment of heather was harvested at 23 hectares and removed from the sites before bare sand could be created.

Invasive alien species (IAS), like *Rosa rugosa*, have been removed from the sand dunes by digging up their whole root systems, sorting out the plant material and transporting it to deposit. In 10 project sites, 44 hectares of the rose-bushes have been excavated. Excavating the plant material was the cheapest method, but in many sites, it was also needed to be deposited. Besides *Rosa rugosa*, other alien plant species that have been removed within the project were *Pinus mugo*, *P. contorta*, *P. strobus* and *Populus balsamifera*.

One of the most important issues was to create bare sand in the landscape as larger or smaller patches or as sparse vegetation. About 241 hectares of bare sand have been created in all 23 project sites by excavating, bulldozing, ploughing or harrowing. Creating bare sand by excavating, reduced the load of surface nutrition best and will result in slower succession of the vegetation and the bare sand will thereby be more long-lasting. An important action was to restore the calcareous sandy grasslands, a habitat that is prioritized in the Habitat directive. To reach favourable condition for this habitat type, calcareous sand was brought up to the surface from calcareous, sandy layers. To know where within the sites and how deep the lime rich sand layers were to be found, the chemistry of the soil was analysed before restoration.

To remove litter, as well as lichens and mosses, several sites have been burnt in early spring. During the project time, 94 burnings were done in 15 sites and some of the burnings were repeated yearly. In some of the cleared areas, future encroachment will be hold back with grazing and therefore 16 172 meters of fences were put up in five sites, together with gates and stiles to make the areas accessible to outdoor life. In two sites, reimbursement for grazing were necessary to get cattle to the site.

Monitoring actions

To be able to communicate the success of the concrete restorations, the development of the structures, the vegetation and different target species were monitored by Lund University throughout the project. Two different strategies were used; before/after actions and by comparing treated areas with nearby controls. Habitat structures, such as the amount of bar sand, as well as the flora and fauna were monitored as indicators of habitat quality.

Despite this early stage in development of the biodiversity in the restored sites we can see; (1) significantly increase of bar sand and reduced bush and tree encroachment in benefit areas, (2) increased populations of tawny pipit and some other key bird species due to restorations, (3) early colonization of a high proportion of nectar species and red-listed plants in restored areas, (4) favoured sand specialist species among insect groups such as

ground beetles, Hymenopterans and moths. Key species have found their way into the restored habitats and become a more dominant part of the communities in benefit areas.

It is too early to see the full response of the different species populations and therefore, it will be important to continue the monitoring of these groups, as well as their future development.

The socioeconomic effects of the project are not easy to measure. However, an inquiry study indicates that the awareness may have been raised and the acceptance to the management in sandy habitats have increased among the public.

Dissemination actions

Communicating the project objectives and raise public awareness of the high biodiversity in sandy areas, as well as the need for restoration and managing of the sandy habitats, were almost as important as the restoration actions per se. Continuous dialogues with land owners and users to establish and plan actions in all the project sites were prioritized throughout the project. It was also important to inform the public about the planned activities in their neighbourhood, as well as to raise the awareness about how valuable the sandy environments are for the biodiversity in the region and how these habitats best is managed.

Different dissemination activities were accomplished including; a project website www.sandlife.se, an Instagram account [#sandlife_sweden](https://www.instagram.com/sandlife_sweden), various kinds of information signs, production of 12 demonstration sites in form of outdoor museums, 13 different leaflets, two workshops, more than 200 information meetings and guided field tours, participation on different events and conferences. Continuous contacts with media have resulted in about 140 articles, radio- and TV-interviews. To summarize the project, the production of a manual for management of sandy habitats and a Layman's report were produced.

Evaluation of project implementation

The methods applied were all best practice to restore sandy habitats and achieve a variable landscape in a state of favourable conditions, with sunlit bar sand, grasslands with flowering herbs, bushes and trees. The landscape in the southernmost Sweden have somewhat been reshaped through the concrete restoration actions; the wooded dunes have become more open, the IAS, *Rosa rugosa* has been removed and the bare sand has increased. Bare, nutrient-free sand was best created by deep excavating and this method also increased the pH-value that is particularly important in calcareous sandy grasslands. This method is expensive, but the results will last longer. Cheaper methods like ploughing and harrowing, can thereafter be used in future management. Litter, mosses and lichens can preferably be burnt before excavating. Open the wooded sand dunes by logging, pulling up stumps and reducing litter is expensive and require heavy machines, however the costs will be much lower to holding the encroachment back in the future. Removing the IAS *Rosa rugosa* was one of the most important action, but also the costliest. The roots were all excavated since the use of herbicides in nature conservation is limited in Sweden. It was difficult to predict how deep the roots were growing in the dunes and therefore it was also impossible to know how much material that had to be excavated. However, manually inspections may be enough in the future and the future management may therefore be much cheaper. In the

future, less restorations of the sandy habitats will be expected and the management of the sites will be included within the ongoing management of Swedish protected areas conducted by the CABs nature units and financed yearly by SEPA.

The remote aerial analysis, as well as the field surveys noted an increase in the amount of bare sand in the project-sites, while monitoring the effects of the restorations on biodiversity is difficult, especially within the short time that have passed since the implementation of project actions. It takes time for the biodiversity to establish and develop into habitat types on a broader scale. Monitoring biodiversity is also difficult and for many organism groups extremely weather dependent. However, an increase in species population sizes, like birds, Hymenopterans, beetles and moths were detected through project-surveys and these results clearly indicate an improvement of the sandy habitats. Future monitoring of habitat types, structures and target species will be included in the national biogeographical monitoring of habitat types coordinated and financed by SEPA.

The most effective way of disseminating a large restoration project depends on the objectives. The outdoor museums have functioned as land marks for the valuable sandy environments and the 234 different signs have also made the project visible. Meeting and having dialogues with stakeholders and site-neighbors when planning the restorations is important to increase the understanding of *why* and *how* the actions will be done. Raising awareness can be done by physical meetings, but also by talks, signs, demonstration sites, printed products and/or digital media. Spreading the results have successfully been done by the manual and through the project final conference.

Analysis of long-term implementation

The conditions for conserving and developing the sandy habitat types and the species targeted has been improved through the project. The sunlit bare sand has increased in the landscape and species have responded positively to the restorations that will improve the status for habitats and species in the Habitat and Bird Directives.

Through the Life-project, the larger scale and more costly restoration actions have been implemented; i.e. removing trees, IAS and encroachment with bushes and smaller trees. The valuable structure, sunlit bare sand, has increased considerably in the open landscape, as well as in the wooded dunes. Less intensive management of the Natura 2000-sites will be necessary in the near future and the future management will be included in the management of protected areas by the CABs, financed by SEPA.

The best practice in restoring sandy habitats is by using various mechanical methods creating sunlit, bare sand in the landscape, like ploughing, bulldozing and/or excavating at various depths. Before excavating, the loads of nutrition and litter are best burnt. Removing IAS, like *Rosa rugosa*, has been done by known methods like excavating and the plant material was eliminated by burrowing it deep in the sand, burning in place or deposition.

To demonstrate the results, the outdoor museums will be used as permanent markers in selected sites. The manual for managing sandy habitats provide good examples and therefore also enable other managers to replicate the restorations made within the project.

The long-term indicators of project success are the positive development of species populations, as well as the amount of bare sand that will remain in the landscape. The sandy habitats and ecosystems in southern Sweden have the potential to once again thrive and the

knowledge and awareness among the stakeholders and the public have increased through the project.

3. Introduction

Background, problems and objectives

The sand dunes and sandy grasslands or heaths of southern Sweden are among northern Europe's most species-rich habitats. However, over the past 100 years, sand dunes and sandy grasslands or heaths in coastal and inland areas have been planted with conifers and non-native species such as *Pinus mugo* and *Rosa rugosa*, converted to agricultural land or commercially exploited. Today, few open sandy habitats remain, but even these are becoming overgrown because of nitrogen deposition and changes in land use.

The objectives of the project Sand Life were to restore, maintain/expand and improve the quality of the sandy environments for the biodiversity in 23 Natura 2000-sites in southern Sweden in the counties of Skåne, Halland and Kalmar (figure 1 and Annexes 7.2.1 to 7.2.25). Several nature reserves were included in some of the Natura 2000-sites. Partners in the project were the CABs of Skåne, Halland and Kalmar, Lund University and Kristianstad Municipality (Kristianstad Vattenrike Biosphere Reserve) and the co-financers were Swedish Environmental Protection Agency (SEPA) and The Scanian Landscape Foundation (SSL).



Figure 1. The Natura 2000-sites in southern Sweden included in SandLife.

The main activities have been to open up sandy habitats and create open sand with different kinds of disturbances. The objectives were to create a mosaic of different sandy habitat types in favourable conditions, with a dynamic of open sand, grasslands, nectar sources, bushes and trees, as well as humid parts. The target habitat types were those, building up the dune system from the embryonic shifting dunes (2110) closest to the sea, via the white dunes (2120), the grey dunes (2130), the fixed dunes with *Empetrum* (2140) or *Salix* (2170), the dune slacks (2190) to the wooded sand dunes (2180) further inland. In Sweden, rare inland sandy habitats were also included, like the inland dunes with grasslands of *Corynephorus* or *Agrostis* (2330), dry heaths with *Calluna/Empetrum* (2230) and the extremely rare "Xeric calcareous sandy grasslands" (6120).

These sandy habitats are extremely rich of species, with the highest numbers of red listed species in the country. Some of these species are also target species in the Habitat directive, like *Lacerta agilis* (1261), *Phengaris arion* (former *Maculinea arion*; 1058), *Dianthus arenarius* ssp. *arenarius* (1954), *Anthus campestris* (A255), *Lullula arborea* (A246) and *Caprimulgus europaeus* (A224). These species, as well as most of the other threatened species in sandy environments, are favoured by a warmer micro climate, by the sandy soils in itself and they are extremely sensitive to encroachment. They have a history of being more common in an opener landscape with much more exposed and sunlit sand.

These structures and functions were common in the traditionally farmed landscape, due to repeated ploughing, fallowing and grazing of a field. In a landscape perspective, different succession stages were always present somewhere. To prevent drifting sand in the landscape during the 18th and 19th centuries and later on, when the agriculture was not profitable on sandy soils, they were planted with trees, or exploited with buildings, roads or summer houses. The exposed sand became rare in the landscape and the species of these habitats were suffering and disappeared from the country.

During the 21st century, nature conservation starts to manage the sandy habitats on a broader scale and this is where Sand Life came in. To prevent further loss of species on sandy soils, sandy habitats have been restored when the sandy areas have been re-opened, patches of bare sand have been created and, sometimes as important as the conservation actions, the knowledge of the sandy habitats and its high biodiversity, as well as the need of continuous management has been raised in the community.

As well as the sandy areas are home for a high biodiversity, they are frequently used for outdoor life and recreation. Many of the sites in Sand Life are popular for bathing and nature tourism, as well as for different cultural events. When the sites have become opener, they have also become more accessible to the public and can gain the tourism and outdoor life in the regions and therefore the restorations may also have contributed in a socioeconomic context.

Expected longer term results

The restorations in Sand Life have improved the qualities of the structures and functions in the sandy habitats and generated a mosaic of open sand in high quantities, sparse vegetation with flowering herbs as nectar sources and possibilities for rejuvenation, open wooded sand dunes with patches of bare sand and sunlit tree stems and dead wood. It is too early to see if the conservation status for these habitats have become favourable, but the conditions that

favour the rare species connected to sandy soils have with no doubts increased and they have become more attractive for species that have disappeared from the country.

The biodiversity usually responds slowly on improvement in the environment however, after creating more open sand in Sand Life we have turned the negative trend for the Tawny pipit (*Anthus campestris*) in Sweden. The decreasing numbers of breeding birds have not only stopped it has turned from 33 breeding pairs in 2013 to 40 pairs in 2017 (see report Olofsson 2017, annexed by the second Progress report at 30/10/2017 and Annex 7.2.65). The abundance of Hymenopterans favoured by sand and the pure sand specialists have increased from 13 % to 47 % of the total Hymenopteran fauna after the implementation of the restorations in the project. The succession of the vegetation goes on, however we can already see that the plant species of high conservation values have increased slightly, as well as the proportion of the plant species that are nectar and pollen sources (see report in Annex 7.2.63).

When increasing areas with open, calcareous sand, the conditions have increased for both the endemic *Dianthus arenarius* ssp. *arenarius* and the other plant species that are typical for the "Xeric calcareous sandy grasslands" (EU-code 6120) in Sweden. The soil analyses provide valuable knowledge of were to dig for calcareous sand in the future. The conditions for *Thymus serpyllum* have increased when the sand have been exposed and in its turn favoured the rare butterfly species *Phengaris arion* in Skåne and on Öland. A mosaic with vegetation and bare sand also favour the Sand lizard (*Lacerta agilis*) that has been shown from scientific studies to increase population size with increased amount of bare sand on a landscape basis.

To enable a more appropriate management in the future, old management plans have been updated for three nature reserves in Skåne and Kalmar, and one new site has been protected in Skåne.

The major efforts throughout the project to raise knowledge about the nature values in sandy habitats and understanding the need for management have hopefully enhanced the future communication about management of sandy habitats. In some sites, the land owners or users have been directly involved in the actions as such, which have increased the understanding for the management after Sand Life. The handbook for managing sandy habitats will also be used, hopefully widely, after the project. The monitoring of the project may also help to understand and improve the best practice of managing sandy habitats in the sense of providing feedback on different management regimes.

4. Administrative part

4.1 Description of the management system

Project phases and actions

Sand Life ended by 31/07/2018 and had then be running for six years. The overall planned activities had been completed as scheduled with minor deviations from the application. At the initial phase, time and effort were put on communication and information about the sandy habitats and why it was necessary to restore them. Information materials were produced and made available as signs, folders, on the website and at the outdoor museums. Action-planning and consultation were made with land owners, tenants and other agencies.

Management plans for some of the nature reserves were up-dated to permit the planned restoration actions. In calcareous sites, the pH-value and the lime content of the soil were measured and the results used to plan the development of the rare habitat type, “xeric sand calcareous grasslands” (EU-code 6120). At an early phase, the pre-monitoring started in most project-sites and in these sites the development of species and habitat-structures were followed up at the end of the project.

During the mid- or restoration-phase of the project, the restoration actions (C-actions) were in full progress. Communication and information were still highly prioritized and discussions with land owners and/or land users and the public were done throughout the project. The development of structures and biodiversity were followed-up in plots every year to see what happens directly after a restoration action was completed. During this phase in the project the net-working accelerated, both to gather new information and to spread the results from Sand Life.

At the final stage of the project, the restoration actions and the monitoring were completed. The dissemination turned from general information about sandy habitats and the project, to spreading the results and planning for the after-life managing of the sites. The networking continued and the final conference in the project was held. Several of the deliverables were completed, as the manual for managing sandy habitats, the Layman’s report and the After-Life conservation plan.

The communication with EC has mainly been through the reports and the EC-letters. Questions raised by EC has been explained and commented in various reports and concluded in the present Final report and in Annexes 7.1.1 to 7.1.4. A list of administrative annexes and which report they were forwarded to EC is seen in Annex 7.1.5.

Partnership agreements

The four Partnership agreements between CAB Skåne and the four different associated partners in the project were all signed in April 2013 and submitted by the Inception report by 30/04/2013.

Amendments to GA

During the project life-time, there have been no amendments made to the Grant Agreement in the project.

Gantt charts

The proceedings of Sand Life and how the project has followed the project plan can be seen in the Gantt charts in Tables 1 and 2.

Table 1. The overall project time table for C and E-actions during the project time from August 2012 to July 2018 are shown in a Gantt chart. Within the chart, the period when the action was in progress is shown in dark orange, while the proposed time is shown in grey.

Year		2012		2013				2014				2015				2016				2017				2018		
Tertial		3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	
Action	Milestones	Project starts		Inception report				Progress report				Mid-term report				Progress report				Final report						
																				Project ends						
C.1	Proposed																									
	Actual																									
C.2	Proposed																									
	Actual																									
C.3	Proposed																									
	Actual																									
C.4	Proposed																									
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C.5	Proposed																									
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C.6	Proposed																									
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C.8	Proposed																									
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C.9	Proposed																									
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C.10	Proposed																									
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C.11	Proposed																									
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E.1	Proposed																									
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E.8	Proposed																									
	Actual																									
E.9	Proposed																									
	Actual																									
E.10	Proposed																									
	Actual																									

Table 2. The overall project time table for A, D and F-actions during the project time from August 2012 to July 2018 are shown in a Gantt chart. Within the chart, the period when the action was in progress is shown in dark orange, while the proposed time is shown in grey.

Year		2012		2013				2014				2015				2016				2017				2018	
Tertial		3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T	1T	2T	3T	4T		
Action	Milestones	Project starts		Inception report				Progress report				Mid-term report				Progress report				Final report					
																				Project ends					
A.1	Proposed																								
	Actual																								
A.2	Proposed																								
	Actual																								
A.3	Proposed																								
	Actual																								
A.4	Proposed																								
	Actual																								
D.1	Proposed																								
	Actual																								
D.2	Proposed																								
	Actual																								
D.3	Proposed																								
	Actual																								
F.1	Proposed																								
	Actual																								
F.2	Proposed																								
	Actual																								
F.3	Proposed																								
	Actual																								
F.4	Proposed																								
	Actual																								

The structure of the organisation in Sand Life can be seen in the organigram in Figure 2. The project is managed from the coordinating beneficiary CAB Skåne where the project team with the project leader and the financial manager is situated. There have been no changes to the organisation of Sand Life throughout the lifetime of the project. See further descriptions below.

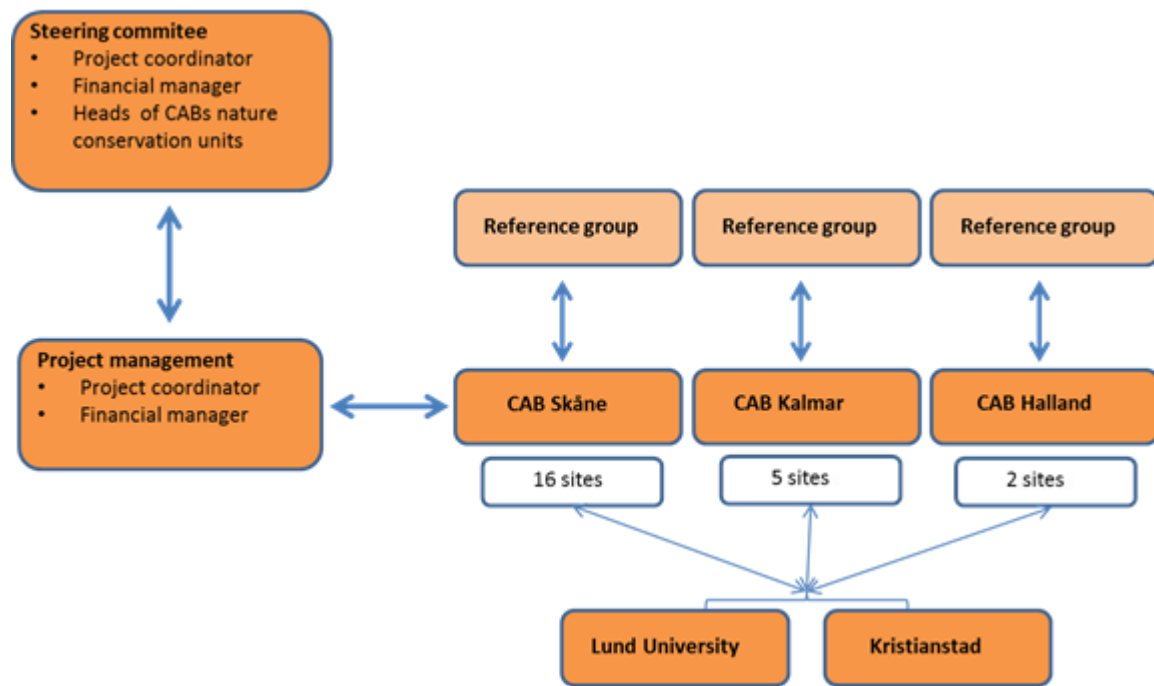


Figure 2. Organigram to show the structure of the project Sand Life. The project owner is CAB Skåne, where the project management team (the project coordinator and the financial manager) is placed. The steering committee is linked to the project management team and consists of the heads of the three different CABs nature conservation units. Each CAB has a reference group and linked to all three CABs is Lund University, responsible for monitoring the project, and Kristianstad Municipality.

Project team

The project management has constituted of the project leader and the financial manager. During the lifetime of the project, Gabrielle Rosquist has been the project leader while the financial manager was initially Sara Sörensen from late December 2015 to 29/02/2016 and Erik Schenström from 01/02/2016 until 31/07/2018.

The project team has facilitated the management of the project, like time reporting system, digital document sharing system, different types of meetings and workshops. Time-reporting by the CABs is made in Agresso and how this system works is explained in the Progress report by 30/10/2014, approved in the EC-letter 26/01/2015 and new directives concerning signing the time-reports in the EC-letter 18/07/2016. LU and KSTAD use time sheets for time-reporting. Partnership agreements were established between CAB Skåne and each of the project partners. The team has also had regularly contacts with the project co-financers, the Swedish Environmental Protection Agency (SEPA) and the Scanian Landscape Foundation (SSF).

To manage the project, discuss the actions and share experiences, the project team has organized 25 project meetings since the start of the project with members from all project partners (i.e. *the project group*). Most of the meetings have been held over video-links and telephones. During these meetings, the progress of the project has been discussed, experiences exchanged, common activities discussed and information about the monitoring has been given. One kick-off workshop and three mini-workshops have been held in different sites to share experiences among the project personnel. At the end, a final conference was arranged to disseminate the project results. The project team has also visited

the CABs, to discuss their progress (CAB Kalmar by 02/10/2013 and CAB Halland by 18/06/2014 and 18/05/2017). The project team has arranged six meetings with the steering committee (see below) and have had yearly discussions with LU about project monitoring.

The project team, as well as project partners, have given general information about the project and the EC Life+ program to media, in articles, on talks and during net-working. Regularly contact has been held with other Life+ nature-projects and the team has participated in 12 international and national meetings concerning Life-administration and project progress (such as Life+ kick-off, platform and national Life-meetings). At CAB Skåne, an internal group for EU-projects has been formed with the purpose of helping running projects and preparing the organisation for new EU-funded projects. The project team has attended eight meetings during the period 08/2012 to 07/2018. At the end of the project, the Layman's report (see section 2.2.7.) and the After-Life conservation plan (see section 2.2.14.) were compiled and published.

The project team has had continuous contact and arranged meetings with representatives from the Life+ monitoring team NEEMO (former ASTRALE); Inga Racinska from project start until 31/07/2017, Kaia Treier from 31/07/2017 to 01/02/2018 and thereafter Inta Dūce. Six monitor meetings have been held; 20/03/2013 in Malmö, 15/05/2014 in Hagestad, 05-06/05/2015 in Kristianstad, 08-09/06/2016 in Malmö (which was a joint meeting with EC and monitor), 30-31/05/2017 in Malmö and 27-28/06/2018 in Malmö. All the monitor meetings included field visits for the monitor to see the progress of the project in practice.

Steering committee

A steering committee was established in November 2012 and consisted of the project team and the heads of the three different CABs nature conservation units; Paul Eric Jönsson replaced by Ingela Lundqvist in 2018 for CAB Skåne, Marie Björkman replaced by Henrik Martinsson in 2015 for CAB Halland and Åsa Johansson for CAB Kalmar. The committee discussed the overall progress of the project, as well as, possible deviations from the project plan. Since the start of the project, six meetings with the steering committee has been held by 20/01/2014, 10/12/2014, 17/06/2015, 04/03/2016, 11/10/2016 and 18/05/2018.

Reference groups

Reference groups in the project were established by each CAB and county to discuss the proceedings and results of the project actions. In Skåne, an already existing group, the Consultation Group for Nature Conservation led by the Deputy Governor, were used as the reference group. The members of the group were persons and organisations working with various aspects of biodiversity and nature conservation. The project was introduced and discussed at three meetings during the project time by 21/11/2012, 04/12/2013 and 13/06/2018. The reference group in Halland consisted of people representing local authorities and organisations with different local connections to the project sites. CAB Halland had one meeting with the group that also have been informed about the proceedings digitally at five occasions; 19/09/2013, 22/09/2014, 18/03/2015, 12/10/2016 and 15/12/2016. In Kalmar, the group consists of people representing CAB Kalmar and local organisations with knowledge about the biodiversity in the project sites. The group have

had two meetings by 17/05/2013 and 26/10/2016 where they discussed the planned actions directly out in the sites.

Coordinating beneficiary (CAB Skåne)

CAB Skåne has been responsible for implementing the project actions within the county of Skåne and followed the work plan as foreseen. The regional project coordinator at CAB Skåne has been Maria Sandell during the whole project. She has also worked with several of the dissemination actions for the whole project. The personnel that worked with the two legal management plans in the project (A1) were Johan Johnmark and Per Carlsson. The personnel responsible for managing the Natura 2000-sites were also the personnel in charge of the restoration actions (actions C1 – C8) in the project, as well as the site-specific dissemination (mainly E5 and E8) and net-working (F2). The managers were Marit Hedlund, Magnus Jönsson, Jörgen Nilsson, Karl-Johan Pålsson, Susanna Isberg, Kenth Ljungberg, Hans Cronert, Pyret Ovesson, Maria Sandell and Anders Hallengren. When implementing prescribed burnings (C4) the managers Bengt-Olof Bergman, Joakim Roswall and Fredrik Ståhlberg also took part. Mona Persson was responsible for the site-specific signs at CAB Skåne and Gunilla Davidsson Lundh supported the implementation of the dissemination actions (i.e. E2, E6, E8 and F2). Isabella Sanchez assisted during the final conference (E8), Sebastian Ivarsson helped compiling the results in D3 and Paul Eric Jönsson assisted as senior advisor at the end of the project. All the persons appointed to the project were permanently employed by CAB Skåne.

CAB Skåne was responsible for implementing the following actions in the project; revision of management plans (A1), compiling restoration plans (A2), call for tenders (A3), the restoration actions C1-C7, socioeconomic effects (D3), information signs (E1), leaflets (E2), dissemination actions E4-E9, project administration (F1), net-working (F2), after life plan (F3) and financial audit (F4). CAB Skåne also took over the production of the manual (E10) from KSTAD.

Associated beneficiary (CAB Kalmar)

CAB Kalmar has been responsible for implementing the project actions within the county of Kalmar and has followed the work plan as foreseen. The regional project leader for CAB Kalmar has been Johan Jansson, from November 2012 to August 2015, and thereafter Åsa Johansson. The personnel that worked with the two legal management plans in the project (A1) was Malin Miller and Johan Thorsén. From September 2015, Jonas Lundquist and Tommy Gustafsson were appointed to the project for the implementation of the restoration actions.

CAB Kalmar was responsible for implementing the analyses of soil chemistry (A4), and management of heather (C9) in the project.

Two of the sites in Kalmar has changed names during the project period and differ to the application; Skede mosse to Skedeås and Gårdby sandstäpp to Gårdby sandhed.

Associated beneficiary (CAB Halland)

CAB Halland has been responsible for implementing the project actions within the county of Halland and has followed the work plan as foreseen. In CAB Halland, there have been

several changes in personnel appointed to the project as regional project leaders that slowed down the start of implementing the restoration actions. From the project start in August 2012, Karin Hernborg and Jeanette Hansson were the regional project leaders until May 2014 and September 2015, respectively. Magnus Nystrand started in March 2014 until March 2017 and Björn Larsson and Mikael Larsson from November 2016 until project end in July 2018. Bengt Johnsson helped with implementing the restoration actions, Nicole Blomstrand and Åsa Ehrnberg with the digital folders (E2) and Sara Bergquist with reporting.

CAB Halland was responsible for implementing the restoration actions investments other than grazing (C8), reimbursements for grazing (C10) and construction of roads (C11).

Associated beneficiary (Lund University)

The scientific coordinator at LU, Professor Pål Axel Olsson, has planned all the monitoring in action D1 and D2. The monitoring has been discussed yearly, before each field seasons, with the CABs during the project group meetings and with the project team during separate meetings. Field workers were employed, the field work was led and the data compiled. In collaboration with Jenny Ahlstrand (also at LU), LU tested and completed the interpretation of aerial photographs. The monitoring was finalized and compiled into two technical reports at the end of the project.

During talks and net-working, LU has informed about the project and the Life-program, as well as raised the knowledge about sandy habitats. LU has also been active in talking to media, attending information meetings and leading field tours.

LU was responsible for implementing the monitoring actions (D1 and D2). LU has provided the beneficiary partner with all relevant material asked for, compiled the regional results to the project reports and took part in the networking done in the project. LU has followed the work plan and successfully completed the monitoring.

Associated beneficiary (Kristianstad municipality)

At KSTAD there have been changes in personnel and Karin Hernborg replaced Carina Wettemark in April 2014. KSTAD has been responsible for the production of the 12 outdoor museums within the project and has during the period finished a call for tender, communicated constructions, texts and the general appearance of the museums with the contractor and the project group. KSTAD has also communicated the placing of the buildings with the CABs and held a press-conference when the first two museums were ready. KSTAD was supposed to coordinate the management manual (E10), but left the responsibility to CAB Skåne. KSTAD has also been involved in the planning of the restoration actions in some of the project sites in Kristianstad municipality in Skåne. KSTAD has provided the beneficiary partner with all relevant material asked for.

4.2 Evaluation of the management system

Project management process

The project management has been well disposed with a project team (the project leader and the financial manager) leading the project and the five partners project managers each responsible for implementing specific actions. The project group-meetings were more

frequent in the beginning and necessary to start up the project, to change experiences and to involve all partners in the project actions. There have been no significant deviations from the arrangements set in the partnership agreements throughout the project.

The problems encountered

There have been no major problems in the management of the project, however changes in personnel and the time spent in the project at the beginning from the CABs may have affected the proceeding of the project slightly. Different actions also take longer time than calculated in the application and resulted in a slight delay of the project restoration and dissemination actions. For example, times for calls for tenders have taken much more time than expected and the time needed for information to reach acceptance for the restoration actions among the public is almost impossible to calculate. The problems with the rules for subsidies for grazing and the risks of unexploded ammunition also slowed down or halted the implementations of the restoration actions.

The partnerships and their added values

The CABs have the same objectives when working with habitat restorations and to collaborate in a joint-project provide a valuable platform to share experiences about methods, techniques, consultants etc, as well as the challenge of disseminate larger restoration projects. CAB Halland had the longest experiences of restoring sandy habitats and their knowledge had both CAB Skåne and CAB Kalmar been benefitting from. KSTAD had experiences from dissemination through their biosphere reserve and the development and production of the outdoor museums was valuable in the project.

There have been advantages in letting scientists evaluating the effects of the restorations on habitats and species. With LU as a partner in the project, the monitoring held a high scientific standard and the possibilities for compiling the results in scientific papers are much higher after-life. In this way, the effects of the restoration action may be used direct in science and the project will have a monitoring with high quality.

CAB Kalmar and CAB Skåne, both have the rare and prioritized habitat "Xeric calcareous sandy grasslands" (EU-code 6120) and the project provided good opportunities to collaborate and exchange knowledge when restoring the habitat, as well as involving the knowledge from former and ongoing research by Professor Pål Axel Olsson and his colleagues at Lund University.

Communication with EC and Monitoring team

During the project time, the monitor has mainly been Inga Racinska (until July 2017) and the communication has been excellent. Thereafter, there have been two changes of monitors and the contacts with both Kaia Treier and Inta Dūce have been to limit to be evaluated. We appreciated the monitor's high knowledge of the Life+ program, being well prepared about our project and, also important, being available almost at any time. The communication with the EC has mainly been through the project reports and the monitor. Feedback on reports and monitor visits has been in form of EC-letters which regards as clear and understandable. The project also had a EC-visit in June 2016 and during that visit we had good opportunities to show the proceedings in the field and discuss problems encountered.

5. Technical part

5.1. Technical progress, per task

PREPARATORY ACTIONS (A-ACTIONS)

Sand Life is a restoration project and to enable the implementation of these actions, preparatory actions were needed. Old management plans for nature reserves were up-dated with new knowledge about the sandy habitats and how to manage them. Restoration plans were compiled and agreed with stakeholders. Calls for tenders were needed to establish new framework for machinery services, burnings, information etcetera. and, in sites with potential for creating functions for rare calcareous habitat, soil analysis was done.

5.1.1. Action A.1 Revision of legal management plans for nature reserves

The revision of three legal management plans for nature reserves and establishing one new nature reserve started by 01/04/2013 and ended by 21/12/2015. No modifications have been made to action A1 that has been completed as foreseen.

Many of the Natura 2000-sites in the project are also nature reserves with management plans. Four out of four plans were officially established in the project. Three of the management plans needed a revision before it was possible to start with the restoration actions and for Möllegården, a new legal management plan was produced within the project. The dates for approval of the new plans were 26/06/2014 for Möllegården and 16/10/2014 for Hagestad within Sandhammaren, both made by CAB Skåne, and 24/02/2015 for Bödakusten östra and 21/12/2015 for Bödakusten västra, by CAB Kalmar. The four management plans within the project have all been remitted and finally approved.

The action of revision of old management plans and establishing one new plan was completed by 31/12/2015, the plans were attached to the Midterm report by 30/04/2016 and in Annex 7.2.26. The new management plans are also visible at the project website www.sandlife.se and the websites of the CABs of Skåne and Kalmar.

5.1.2. Action A.2 Site specific action plans

The action of developing site-specific action plans for each project-site started in September 2012 and ended in to May 2018. No major modifications have been made to action A2, except for the historical investigations at Skedeås (see below), and the development of the plans were completed as foreseen by 31/12/2015.

For all project sites, site specific action plans were established by each CAB and the action was completed by 30/03/2015. The plans include descriptions of the actions, time schedule for the restorations and plans for future management of the sites. When compiling the plans, several meetings have been held with landowners and users to discuss the actions and how they technically are done. In some project sites, it was more convenient with several restoration plans per Natura 2000-site due to different nature reserves included in the sites, i.e. Verkeåns dalgång (SE0420075) and Sandhammaren (SE0430093). The 27 site specific plans (compared to the foreseen 23 plans) are listed in Annex 7.2.27 and attached in the Midterm Report by 30/04/2016, as well as available on the project website www.sandlife.se. The site-specific action plans have also been used, together with the results, when describing the future management in each site in the project After-Life plan (see Annexes 7.3.2.10 and 7.3.2.11).

At Skedeås in the county of Kalmar, there was unforeseen need for investigations of historical remnants before conducting action C2. The report from the historical investigations were included in the Midterm report by 30/04/2016 and discussed in the EC letters dated 01/07/2015 and 27/05/2016. In the later EC-letter, the costs for the investigations was, in principle, accepted (see financial explanations under section 6.1).

Equipment and material for field work and documentation of project proceedings, results and dissemination were needed in the project and under action A2 laptops, GPS and cameras were foreseen. However, today an iPad include these three items in one, as well as maps for digitalizing and for taking notes etcetera. Therefore, CAB Skåne obtained three iPads (justifications explained in the second Progress report by 31/10/2017 and commented in the EC-letter by 15/05/2018; see also Annex 7.1.1). Other field work material that were obtained by CAB Skåne were a drill and a pH-meter (mentioned in the first Progress report by 30/10/2014), as well as a drone and a camera (mentioned in the Midterm report by 30/04/2016 and regarded as technically necessary in the EC-letters by 27/05/2016 and 15/05/2018). CAB Kalmar bought a camera for documentation. See the financial discussions under chapter 6. The drone was used by CAB Skåne to take photographs and small films from above to visualize the actions in 14 different areas in the county. The camera obtained by CAB Skåne was used to take high quality photos of habitats and species to be used in the manual (E10). The photographs and films have mainly been used on the project website to show the habitats before and after restorations and these will be used after the project to communicate how the results after restorations may look like. The purchased equipment in the project will be used by the CABs in the future management and dissemination of the sites.

5.1.3. Action A.3 Call for tenders

The calls for tenders started early in the project and proceeded during the whole project time from September 2012 to May 2018 however, less time were needed during the last year. No modifications have been made to action A3 that was completed as foreseen in May 2018.

Call for tenders are extremely time consuming and, therefore, most of the time spent for the calls are shown in action A3. The total number of calls for tenders made in the project were 41. It was mainly the larger calls that were registered on A3, but also time for agreements or renewal of frameworks. Less time than planned has been registered on the action, mainly because some of the planning, calls and agreements have been put under the C- or E-actions instead.

CAB Skåne has made two major calls for tenders within the project, one for machinery services needed for restoration purposes (i.e. C-actions), that was completed in February 2014, and one for the production of information boards (see action E1 below), that was completed in January 2014. Minor calls or suborders have been made for prescribed burnings, obtaining the ATV and different information services such as the manual (E10) and layout of folders (E2).

CAB Halland has made 5 larger calls for tenders with other parts of the county to establish frameworks and these calls includes, machinery services (used in action C1, C2, C3 and C6) during 2013 and renewed 2017, prescribed burnings (C4) in December 2015 and production of table and benches (action E9) in October/November 2015.

CAB Kalmar has made calls for machinery services (used in action C1, C2, C3 and C6) and for prescribed burnings (C4) together with other parts of the count. In 2013, a call for tender was made for soil analyses (see action A4 below), as well as for fencing in 2014 and sign production in 2013. Thereafter, the CABs have only been making calls from the already existing frame works.

KSTAD has made a call for tender for the production and construction for outdoor museums (see further under action E3 below).

5.1.4. Action A.4 Analyses of soil chemistry before concrete restoration actions

The sampling of soil and analyses of soil chemistry in sites with potential for restoring the habitat “Xeric calcareous sand steppe” started in January 2013 and was completed by 31/05/2014, as mentioned in the first Progress report by 30/10/2014. No major modifications, except for change of sites discussed below, have been made to action A4 that was completed as foreseen.

CAB Kalmar was coordinating the action and the planning and interpretation of the data were done together with CAB Skåne and LU. The consultant ECOCOM was assigned for the sampling and the analyses by 07/11/2013. The planned and the actual sample sizes was shown in the Midterm report by 30/04/2016 (as asked for in in EC-letter 26/01/2015). Sampling for analyzes of lime and nutrition contents were done in a total of 7 sites (the same number as in application) and 254 samplings were taken. Minor changes in the action was done due to the risk of unexploded ammunition in the soil at Rinkaby skjutfält and the site was replaced by Möllegården, where the sampling was unforeseen in application.

The results from the analyses have been used when planning the restoration actions (C-actions) within the sites. Additional pH-measures have been done in four sites (35 measures) in Skåne with the pH-meter bought within the project (see action A2 above and the Midterm report by 30/04/2016; figure 3). The drill and the pH-meter will be used to analyze soil pH-value for the future planning of creating bare, lime rich sand in the sites.



Figure 3. Measuring pH in a patch of bare sand at Bosarp in Verkeåns dalgång, Skåne.

About 40 % of the budget on External assistance has been used and the remaining budget for the action (about 50 000 EUR) was asked to be used for other actions on the monitoring visit at 14-15 May 2014 and accepted in the EC-letter 26/06/2014.

CONCRETE CONSERVATION ACTIONS (C-ACTIONS)

The concrete conservation or restoration actions (C-actions) in Sand Life have been implemented as planned throughout the project time. In the beginning of the project, the preparatory actions had to be finished, the pre-monitoring started and the information activities and dialogues with neighbours and the public had to take its time. Then the restorations started on a broader scale. Changes made in the implementation of the C-actions were requested in the EC-letter by 12/10/2017 (Annex 7.1.3) and details were submitted with the second Progress report by 30/10/2017. See further explanations of the changes made in the C-action under each section below. The changes were expected to enhance the favourable status of habitats and species, which may be seen in the after-life monitoring of protected areas done by the different counties.

The outcome per C-action and site can be seen in Table 3. For most of the C-actions the promised areas or numbers have been achieved. More areas have been done in for example C1, C3 and C6, because it was more cost effective to increase the restorations when the machines already were out in the sites. We were also encouraged to increase action C3 due to the invasive growth of *Rosa rugosa*. The prescribed burnings in action C4 was much cheaper than planned and more burnings could then be done. The extended actions were all disposed within the Natura 2000-sites and were expected to contribute to enhance the status for target habitats and species.

The methods used for completing the C-actions are discussed under each section below and further explanations can be seen in the manual for restoring and managing sandy habitats (see section 5.2.2.10 and Annexes 7.3.2.8 and 7.3.2.9).

The restoration actions (C-actions) have been planned and discussed with stakeholders during the compilation of the restoration plans (action A2) and the revision of the management plans (action A1). The effects the C-actions have had on habitat structures and target species are discussed under the monitoring sections (D1 and D2) below (see sections 5.1.16 and 5.1.17).

In the future, less restoration of the sandy habitats is expected to be needed and the management of the sites will be included within the ongoing management of Swedish protected areas conducted by the CABs nature units and financed yearly by SEPA.

Table 3. The planned and achieved restorations (C-actions) in Sand Life showed per site.

Natura 2000-site	in application (ha)		Clearing of woodland (ha)		in application (ha)		Creating areas of bare sand (ha)		in application (ha)		Removal of Rosa rugosa (ha)		In application, smaller (no)		Prescribed burning, smaller (no)		In application, larger (no)		Prescribed burning, larger (no)		in application (m)		Firebreakers (m)		in application (ha)		Clearing of encroachment (ha)		in application (m)		Fencing (m)		in application (no)		Other investments for grazing (no)		in application (ha)		Management of heather (ha)		in application (ha)		Reimbursement for grazing (ha)		in application (m)		Construction of roads (m)	
	C.1	C.1	C.2	C.2	C.3	C.3	C.4	C.4	C.4	C.4	C.5	C.5	C.6	C.6	C.7	C.7	C.8	C.8	C.9	C.9	C.10	C.10	C.11	C.11																								
Verkeåns dalgång	31	52,5	73	15,6		0,78	1		13	17	8700	475		5,21	400	1739		5 stiles, 1 thread-gate ***																														
Kiviks marknadsplats		10,4	1,5	0,94					2	1	2300				100																																	
Friseboda	32,5	50,8	3	3,58		0,51			2	1	3000	986		24,7																																		
Gropahålet	5,5	21,2	3,15	12,9			1																																									
Möllegården	3	3,31	1,05	1,85											100	1615		1 stiles, 2 thread-gates ***																														
Klammersbäck	1	x	0,5	0,81	1	x							0,5		100																																	
Bjäre-kusten				1,38	2,7	7,57			1	2	1000		2,7	7,6	100																																	
Ängelholms strandskog	11,5	9,65		4,03	4,5	5,21			1	1	1000		2	5,26	100																																	
Lynghby	2	x	2,5	0,07	0,5	x	1				500	569		0,66	100																																	
Rinkaby	3,5	2,33	12,4	10,5			1	1		1					100																																	
Ravlunda		8,92	48	11,9		0,26			3	1	8000	1920			100																																	
Falsterbohalvön				2,04	1,2	18,7				1			1	2,84																																		
Sandhammaren-Kåseberga	40,7	39,5	10,5	13			0	1	0	2		500			1800	1026		4 stiles, 32 m water pipe																														
Falsterbo skjutfält		10,4		0,27									20	8,85	100																																	
Kabusa			46,8	6,04					2	1	1800	153			100																																	
Revingefältet			49,9	43,5	1	0,14			8	25	10000	35465	5	5	500																																	
Åby sandbackar			11	10,9															3	8																												
Gårdby sandstäpp			20	17,4										3					20	15																												
Skedeås	3,3	3,8	4	12,5					5	9	2700	5466	3	8,55	2200	1748	*	5 stiles, 3 lighter gates			22,5	18																										
Bödakusten västra	7	35,1	9	8,3									15	17,5																																		
Bödakusten östra	84	117	5	5,7	1	1			9	8			25	64,7																																		
Laholmsbuktsens sanddynsreservat	82	87,1	42,7	43,5	6,3	4,6	1		13	13			40	43	10050	10044	**	18 smaller gates, 2 coralls, 1 well-repair, 1 water-tank			98	121	1000	800																								
Haverdal	26	26	14	14	5	5,5			4	9			21	25																																		
Total	333	478	358	241	23,2	44,2	5	2	63	92	39000	45534	135	222	15950	16172				23	23	121	139	1000	800																							

* 1 small gate, 1 corral, 1 well

** 19 small and 6 large gates, 4 coralls, 5 wells

*** costs taken under action C7

5.1.5. Action C.1 Clearing of woodland and pine plantations

The clearing of woodland and pine plantation started early in the project by September 2012 and ended in June 2018. The modifications within action C1 are discussed below and was described in the second Progress report by 30/10/2017. The action has been extremely successful and was completed as foreseen.

Trees have been planted in many sand dunes to prevent sand drifting in the landscape and the trees have thereafter spread out in the remaining open sand dunes. Woodlands and pine plantations have been removed, other wooded dunes opened up and the amount of non-native species, such as mountain pine, have been reduced. In the project, 478 hectares of the promised 333 hectares (about 144 %) have been cleared in all promised site except two, Klammersbäck and Lynghby. On the other hand, clearing of woodland was done at Marknadsplatsen, Ravlunda, Falsterbo skjutfält and Skedeås, all unforeseen in the application. The general increases in the hectares of C1 resulted in a slightly lower increase in the budget on External (144 % compared to 128 %) and this increase could be afforded in the total budget for External in the project (see financial explanations in chapter 6). See also the site-specific maps showing the areas of C1 in Annexes 7.2.28 to 7.2.44.

Clearing of woodlands and, especially the trees planted along our costs, can be emotional for the public and tenants, therefore information and dialogues with neighbors and the public have been prioritized. Thanks to the great possibilities in the Life-projects to work with information, there were almost no negative opinion against the logging-actions in most of the sites.

In Skåne, 209 out of the promised 131 hectares were achieved (about 160 %). The sites with the largest clearings of trees were Verkeåns dalgång, Friseboda, and Sandhammaren. In Sandhammaren, Friseboda and Gropahålet large stocks of the alien species *Pinus mugo* were removed and gaps within the remaining wooded dunes was made. The gaps are mainly positioned in sunlit slopes to slow down the regrowth and let the slope-erosions keep the bare sand in the area. At Gropahålet, the actual area that was restored was larger than the planned (21 compared to 5,5 hectares in application) due to positive land owners and the actions also correspond with the planed objectives in the newly created nature reserve at the site. Verkeåns dalgång is a large Natura 200-site and clearings and/or stump pulling has been made at five different subsites. For example, at Vitemölla strandbackar, gaps of various sizes at an area of 18 hectares has been created in the tree covered slope towards the sea.

In three sites in Skåne (Marknadsplatsen, Ravlunda and Falsterbo skjutfält) there were needs for including clearing of woodlands and stump-pulling to get enhanced effects of other C-actions, an action that were unforeseen in these sites. At Marknadsplatsen, the sparse encroachment with bushes and trees has been removed and stumps was pulled at an area of 10,4 hectares. The action was necessary to be able to increase and improve the prioritized habitat “xeric calcareous sandy grasslands (6120)” at the site. Logging and stump pulling has been done at Ravlunda on 8,9 hectares to open the area slightly more and gain for example the unique fauna of dung beetles. At Falsterbo skjutfält, clearing the encroachment of 20 hectares birch were planned in the applications, but the birch trees have grown so fast that there were needs for logging instead. Therefore, parts of the promised clearing of encroachment in action C6 (i.e. 10,4 hectares) were moved to action C1, as explained under action C6 below and in the second Progress report by 30/10/2017.

The one hectare planned clearings of trees at Klammersbäck was meant to increase the areas for grazing at the site to compensate the farmer for lower subsidies due to the former rules in the agro-environmental program when creating bare sand in C2. However, when the rules for the agro-environmental subsidies changed and accepted larger areas of bare sand, clearing woodlands was no longer necessary. At Lyngby, the planned clearings in C1 was supposed to provide new land for creating more areas of the prioritized habitat 6120, however we considered that the already opened areas was enough and it was much more cost-effective to work there with C2. Besides, the municipality was planning to dig down a pipe line in the site and CAB Skåne consulted the municipality to leave the bar, lime rich sand at the surface. The clearings were also needed more in other sites to enhance the possibilities for the habitat 6120 to develop, for example at Gropahålet.

In the two sites in Halland, 113 out of the promised 108 hectares of woodland has been cleared on mainly the IAS *Pinus mugo* (figure 4). The sites were logged and the stumps pulled and the material were mainly chipped to biomass fuel and in some cases left for the insect fauna or transported out of the area with a forwarder, a method that was much costlier.

Generally, not many contractors like to chip or crush stumps and thermal power stations to handle it as fuel. On some surfaces, the stumps have therefore been left in the ground, as the cost of pulling them up and driving them out becomes too high in relation to the nature conservation benefit it would make. There may also be a value for the species with stumps left in some areas. In some of the areas where grazing was introduced, the stumps have been left and bare sand created among the stumps (C2). One extra hectare of the IAS *Pinus contorta* was removed from the site and a slight extension of the benefit area was made (see the Midterm report by 30/04/2016).

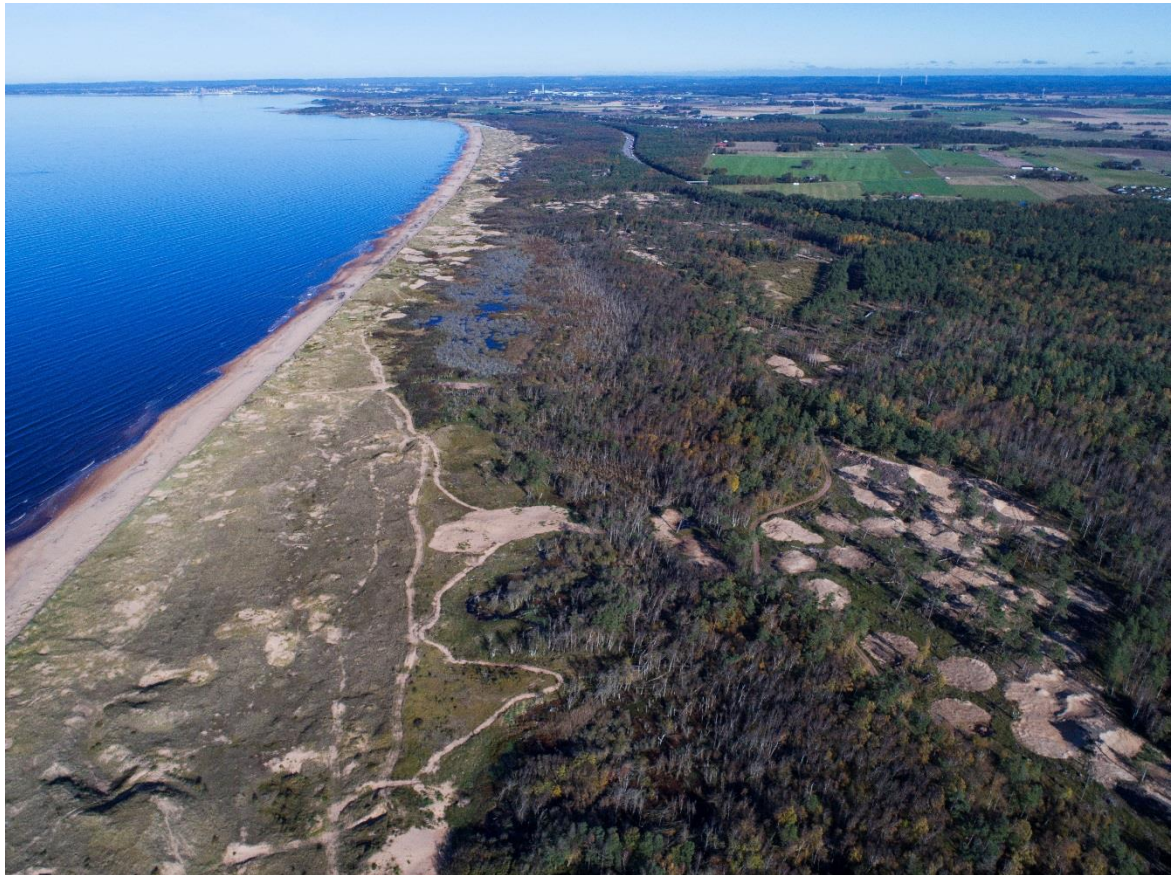


Figure 4. The sunlit open gaps at Tönnersa in Laholmsbuktens sanddynsreservat when *Pinus mugo* has been removed and bare sand created.

In Kalmar, 155,9 out of promised 91 hectares of woodland was cleared during the project time. At Bökakusten östra and västra in Kalmar, clearings of trees in wooded sand dunes started in 2015 and 2017, respectively, to get a sparse pine-wood where the sun could reach the sandy ground and an open dune in the encroached dunes closest to the coast. The clearings have been done in collaboration with the land owner Sveaskog that will take all the costs for the logging and after logging, the areas were cleared from the logging remnants and the stump pulled. The clearing of 3,8 hectares of pine trees at Skedeås was unforeseen in application and discussed in the first Progress report by 30/10/2014 and mentioned in the EC-letter by 26/01/2015. Removing the trees was necessary for preparing the site for future grazing (see further under section 5.1.11).

Impact of action on biodiversity: The remaining wooded dunes along the coasts have become much more open with 56 % more bare sand. The *Pinus mugo* has decreased from 153 to 59 hectares (61 %) in the project sites according to the remote analysis, and the indigenous pine forests decreased with 23 % (see further under section 5.1.16). The monitoring has also shown that two bird species targeted for wooded dunes have increased their numbers; 90 % for *Lullula arborea* in the bird territory survey and 18 % for *Caprimulgus europaeus* in the species survey. For the macro moths, there was a clear tendency to an increase in the cleared areas compared to non-cleared (see further under section 5.1.17).

Complementary actions outside Life: In Skåne, young pine-plantations have been cleared close to the project sites in three new nature reserves; Maglehem, Lillehem and Maglehems Ora. The stumps have been pulled, as well as bare sand created. Maglehems Ora creates a valuable green infrastructure with possibilities for species to disperse between the two nature reserves Drakamöllan and Brösarps norra backar (both within Verkeåns dalgång). Removing mountain pine is an ongoing management action in all coastal areas in Halland to completely eradicate the species from protected areas in the long run. The knowledge gained through Sand Life, now also results in creating areas of bar sand. In Bödakusten östra and västra, additional clearings in the wooded dunes have been made outside the project, as well as removing the alien pine-species, *Pinus strobus*, both within and outside the Natura 2000-sites.

Perspectives for continuing: In the restored wooded dunes, the spread of pine and birch will be repeatedly removed from the open areas and the gaps. In some sites, for example Gropahålet and Laholmsbuktens sanddynsreservat, the loggings will continue to thin out the tree plantations further and to remove remaining stands of *Pinus mugo*. Further perspectives can be seen in the After-Life plan in Annexes 7.3.2.10 and 7.3.2.11.

5.1.6. Action C.2 Creating areas of bare sand

The creation of areas of bare sand in the project sites started in September 2012 and ended in June 2018. It has been difficult to implement the action in some sites and, therefore, the promised areas of the action have not been completed to a full extent. About 67 % of the bare sand in the project, promised in the application, has been created. The modifications within action C2 are discussed below, in the second Progress report by 30/10/2017 and commented in the EC-letter by 15/05/2018. Even though less hectares of C2 were created, the way the action was implemented are expected to result in a more sustainable result.

Creating sun exposed, bare sand in the sites has been one of the main objectives in the project and have been done by various methods as deep digging, excavating, ploughing or harrowing. Bare sand has been created in all sites where it was planned and in four new sites where it was unforeseen in application (i.e. Bjärekusten, Ängelholms strandskog, Falsterbohalvön and Falsterbo skjutfält). During the project time, 241 out of the promised 358 hectares have been achieved (67 %). Almost half of the areas have been created by deep digging, putting the top soil down and the lighter, nutrient poor sand at the top, while about 20 % by bulldozing, where the topsoil was removed. This method is expected to be more long-lasting in maintaining the bare sand. Bulldozing is not cheaper than deep digging because of the challenges and the costs for depositing the removed

topsoil. When the vegetation layer is thinner, harrowing and especially ploughing are good methods for creating bare sand. These methods mimic the old farming in many of these areas, especially those in central and eastern Skåne. The advantages of excavating compared to ploughing/harrowing are that the encroachment goes much slower in the future, the bare sand will remain in the site for a longer time and lime-rich sand can be excavated to increase the pH-value at the surface, while the disadvantage is that the method is more expensive. When driving with caterpillar band on the machines and forwarders in the dunes these actions per se will create bare sand, an activity that has been shown to give good results on the biodiversity on military training areas.

An overview per site of planned and achieved hectares of bare sand can be seen in Table 4, as asked for in the EC-letter by 15/05/2018, as well as an explanation why less amount was made than planned. It was not obvious to find alternative places for implementing C2 in the sites included in the project, but the efforts made is mentioned in the same table. The method with deep excavating used when implementing C2 is meant to result in more long-lasting effects on the habitat structure.

Table 4. The planned and achieved amounts of bare sand created per site in the project, as well as explanations why the amounts were not achieved and if alternative sites were found.

Natura 2000-site	Natura 2000-code	Areas of bare sand (ha)		Explanations	Alternative site
		planned	achieved		
Verkeåns dalgång	SE 0420075	73	15,6	Unfavourable rules for agri-compensation	Möllegården
Kiviks marknadsplats	SE0420077	1,5	0,9		
Friseboda	SE0420136	3	3,6		
Gropahålet	SE0420137	3,15	12,9		
Möllegården	SE0420157	1,05	1,9		
Klammersbäck	SE0420238	0,5	0,8		
Bjärekusten	SE0420232		1,4		
Ängelholms strandskog	SE0420233		4,0		
Lyngby	SE0420234	2,5	0,1	Less need since less C1 were done, the Municipality were laying down a cable resulting in bare sand	
Rinkaby	SE0420236	12,4	10,5		
Ravlunda	SE0420240	48	11,9	Unfavourable rules for agri-compensation, military restrictions	Gropahålet, Rinkaby
Falsterbohalvön	SE0420095		2,0		
Sandhammaren-Kåseberga	SE0430093	10,5	13,0		
Falsterbo skjutfält	SE0430111		0,3		
Kabusa	SE0430112	46,8	6,0	Unfavourable rules for agri-compensation, military restrictions	Sandhammaren-Kåseberga
Revingefältet	SE0430113	49,9	43,5	Unfavourable rules for agri-compensation	
Åby sandbackar	SE0330103	11	10,9		
Gårdby sandstopp	SE0330102	20	17,4		
Skedeås	SE0330104	4	12,5		
Bödakusten västra	SE0330119	9	8,3		
Bödakusten östra	SE0330121	5	5,7		
Laholmsbuktens sanddynreservat	SE0510006	42,7	43,5		
Haverdal	SE0510020	14	14,0		
Total		358	240,61		

In Skåne, 128,3 out of the promised 252,3 hectares of bar sand has been created during the project time. Larger areas of bare sand have been created at the inland dunes at Revingefältet and Verkeåns dalgång, along the coast at Ravlunda and Rinkaby and in the wooded dunes at Sandhammaren and Gropahålet.

At Gropahålet, a larger area of bare sand was created than planned when the litter after the logging and stump pulling in the wooded dunes was excavated and buried in the ground (in C1) and at the same time digging up lime-rich sand to the surface. The presence of lime rich sand was unexpected at the site and provided possibilities for the prioritized habitat type “xeric calcareous sandy grasslands” (EU-code 6120) to evolve.

The sandy soils in central and eastern Skåne were historically used in a fallow system of agriculture and at Drakamöllan, 3 hectares of the heaths were ploughed to mimic this older way of farming. During the project time, this method has been used in most open inland and some of the coastal dunes with little encroachment in Skåne. This is also a comparable cheap method that will be used when managing some of the sites after-life.

For the three military sites, Kabusa, Ravlunda and Rinkaby, it has been difficulties in getting access to the areas due to shooting activities and therefore limited amount of time for completing the restoration actions. The risk of unexploded ammunition in the ground have also delayed the action and made it difficult or impossible to dig or excavate as planned. At Rinkaby and Ravlunda, a special excavator, with protection for splits from the ammunition were needed, however, this machine comes from another part of Sweden and have only been available for a few weeks during the six years of the project. The special protected excavator was not able to go to Kabusa at all. Because of security reasons, the digging and bulldozing at the military training areas were done in close collaboration with the Armed Forces and the Natural Fortifications Administrations. At Kabusa, only a fraction of the planned C2 could be made due to shooting activities and risks of unexploded ammunition. When excavating in the area, we also saw that there was a mosaic of pure sand and parts with clay and, therefore, less parts to dig up sand in than expected.

The need for creating bare sand was much lower at Lyngby when the loggings in C1 was moved to other sites. At the same time, the municipality of Kristianstad planned to dig down wires and cables at the site and due to consultations, new calcareous sand will be laid on the surface and the objectives will still be reached.

Many of the sites were grazed and included in the agro-environmental scheme. The rules for the compensations to farmers for production of nature conservation are not to a full extent accepting the need for managing the areas to get the habitats in a favourable condition state according to the Habitat Directive. However, these rules have changed slightly during 2015, when the new Rural Development Program for 2014 to 2020 was accepted. According to this program, larger patches with bare sand (up to 500 square meters) and a higher amount of bare sand per area (up to 10 %) is accepted, compared to the former program. In some project-sites, these rules have affected the amount of bare sand that was possible to create. For example, at Ravlunda the intention was to harrow larger areas (one sixth each year in the project), but we had to create smaller patches of bare sand with deep excavation instead that are accepted by the rules of the environmental subsidies

(figure 5). The planning of creating bare sand in rural areas has been done in close connection with the Departments of Rural Affairs at the CABs.



Figure 5. Patches with bare sand at Ravlunda, Skåne in 2017

The main reasons for not achieving all the promised hectares of bare sand in Skåne was due to the risk of unexploded ammunition at the military training areas and the limited time that the project has access to the military shooting fields and due to the rules for compensations to farmers within the national program for rural development (see further explanations in the Midterm report by 30/04/2016). For example, at Ravlunda the huge areas planned to be ploughed were not possible due to the regulations. The sites with much less areas of created sand achieved than promised are Verkeåns dalgång (21 % of the promised hectares were achieved), Ravlunda (about 25 %), Lyngby (3 %) and Kabusa skjutfält (about 13 %). However, some of these hectares have been made in other sites instead, as mentioned above.

In Halland, creating bare sand in the open and wooded sand dune system started after the loggings were completed. It was mainly the deep digging, to get the lighter, nutrient poor sand at the top and the litter at the bottom that has been done. The bulldozing's have been placed strategic in the landscape to act as fire breakers at forthcoming burnings, both within and after the project.

In Kalmar, bare sand has been created at Åby sandbackar, Gårdby sandhed och Skedeås. The results from the soil analyzes have directed where and to which depth the bare sand could be created to get as much lime rich sand to the surface as possible. The new knowledge has resulted in more extensive actions than planned at Skedeås, where the lime rich sand was laying closer to the surface than at for example Åby strandbackar (25 compared to 60 centimeters depth). During the restorations at Skedeås, the historical remnants were found, as explained in Midterm report by 30/04/2016 and commented in the EC-letter by 27/05/2016.

At Bödakusten östra and västra, the sand was exposed by bulldozing the top soil of mainly mosses and lichens. The masses were buried to a depth of a few meters at Bödakusten östra and transported out of the sites at Bödakusten västra because of a water protection area and historical remnants at a two hectares large area. The action was slightly limited at Bödakusten västra due to the historical remnants and, therefore, more bare sand was created at Bödakusten östra.

Impact of action on biodiversity: The amount of bare sand has increased by 73 % in the project site benefit areas due to the remote analysis; i.e. 56 % in the sand dune areas and 35 % in the grasslands. However, it is difficult to detect ploughing and harrowing with remote analysis and the ongoing encroachment have also slightly lowered this number (see further under section 5.1.16). In the dunes of Halland, the target plant species appeared immediately after the sand was exposed, like *Viola canina*, *Corynephorous canescens* and *Lotus corniculatus*, where the latter is necessary for one of the red-listed bees in the area, *Osmia maritima*. The most remarkably result is the increase of *Anthus campestris*, the extremely rare bird only found in sandy habitats. The Hymenopterans are the group of organisms that have responded extremely quickly on the created sand patches in the landscape and it is the sand favoured species that increased most (see further under section 5.1.17).

Complementary actions outside Life: The knowledge of the importance of bare sand have resulted in management in several protected areas, as well as within ÅGP in the tree counties through the last 10 years. In Skåne, bare sand has been created within military training areas (not Natura 2000-sites) with bulldozing and several municipalities have been in contact with the project to discuss restorations on their own properties. Bare sand has also been created within the nearby nature reserves Maglehem, Lillehem och Maglehems Ora. All these restorations will most certainly, together with the restorations within the project, favour the biodiversity on sandy soils in a landscape perspective.

Perspectives for continuing: The achieved amount of sun-lit bare sand in the restored areas needs to be maintained in the sites, but not necessarily at the same spots. New patches of sand needs to be created at frequent intervals and allow slow regrowth of the vegetation. In some of the existing sandy patches, plowing and harrowing can be used to halt the encroachment and delay the succession. Further perspectives can be seen in the After-Life plan in Annexes 7.3.2.10 and 7.3.2.11.

5.1.7. Action C.3 Removal of *Rosa rugosa*

The removal of the IAS *Rosa rugosa* started in Winter 2013/2014 and ended in April 2018. The modifications within action C3 are discussed below and the action has been completed as foreseen during the project.

Removing the IAS *Rosa rugosa* is one of the most important actions within Sand Life due to the species invasive growth in the sand dunes. In the EU-constitution dated 01/01/2015, the member states are committed to start actions against invasive alien species (IAS) that threatened biodiversity and, in these perspectives, removing *Rosa rugosa* in Sand Life is one of the most extensive actions in Sweden in terms of exterminating IAS. However, the action is complicated, since the roots needs to be excavated up from various depths and destructed, and this makes it very time-consuming and costly.

In the project, large efforts have been laid on removing *Rosa rugosa* and 44,2 out of the planned 23.2 hectares have been removed. In EC-letter by 15/05/2018, we were asked for including maps to the Final report on the total areas of the C3 and the Natura 2000-boarders (see Annex 7.2.45 to 7.2.56)

In Skåne, 33,1 out of promised 10,9 hectares of *Rosa rugosa* have been removed in all except two project sites where it was planned. In Lyngby and Klammersbäck there were no *Rosa rugosa* (according to the application, 0,5 and 1,0 hectares, respectively) and these areas were moved to other project sites (Verkeåns dalgång, Friseboda and Ravlunda), where the action was unforeseen.

The largest areas of *Rosa rugosa* were removed at Falsterbohalvön (18, 7 hectares at Flommen), Bjärekusten (7,6 hectares at Stora Hult) and at Ängelholms strandskog (5,2 hectares). Especially at Falsterbohalvön, the amount of *Rosa rugosa* was extremely underestimated and fifteen times more hectares were removed than planned (18,6 compared to planned 1,2 hectares). During the joint visit by the EC and the monitor in June 2016, we visited Flommen (figure 6) at Falsterbohalvön where large areas of the species had been removed and we discussed the further need of removing the remaining plants. We were encouraged by the EC and the project monitor to continue the action at the site, otherwise the work already done may most probably be wasted (see planned changes in C-actions in the second Progress report by 30/10/2017). Therefore, the work continued and more *Rosa rugosa* was removed within the Natura 2000-site.



Figure 6. Removing *Rosa rugosa* at Falsterbohalvön in 2014.

In Halland, 10,1 out of the promised 11,3 hectares of *Rosa rugosa* has been removed at Haverdal and in Laholmsbuktens sanddynsreservat by CAB Halland. At Laholmsbuktens sanddynsreservat, only 4,6 hectares of the promised 6,3 hectares of *Rosa rugosa* was removed. Due to the risk of unexploded ammunition left at the old military shooting ground at Hökafältet, the 1,7 hectares of the roses needed to be left. The action has led to larger

patches of bare sand in the sand dunes and in some of them, *Viola*-species and *Corynephorus canescens* are seen after only one year.

In Kalmar, the promised one hectare of *Rosa rugosa* has been removed 2016/2017 at Bökakusten östra by an excavator with a grind-scoop. However, the method left too many rootparts left in the ground and the species is slowly coming back. The excavations were done within the Natura 2000-site Bökakusten östra, but outside the benefit area. In the first Progress report by 30/10/2014, the EC was informed about the scattered stands of *Rosa rugosa* and a map was annexed by the report and EC mentioned the extension of the action in the EC-letter dated by 26/01/2015.

The project has bought an ATV with caterpillar band for cutting *Rosa rugosa* in places where there were no possibilities to dig, but where holding back the plants still will be necessary both during the lifetime of the project and afterlife (see further in section 6.1). The ATV has, for example, been used to cut roses around the bathing cabins at Falsterbohalvön. The need for an ATV was unforeseen in the application, but could be bought instead of the budgeted deep plough as durable goods in the project. During the project, we saw no need for obtaining a deep plough to reach the objectives of enhancing the calcareous sandy habitats and this was explained in the first Progress report by 30/10/2014 and the replacement with an ATV was discussed during the monitor meeting 05-06/05/2015 and approved in the EC-letter by 01/07/2015.

It has been difficult to estimate how deep the root systems of the plants will go in different dunes and diggings up roots have been made from depths of about 1 to 2 meters. The deeper the roots grow, the larger volumes needs to be dig up and handled afterwards when the roots are separated from the sand in a sorting work. After separation, the sand was returned back into the site and all the plant material was transported away to be burnt. This technique has been developed to get the plant material as clean as possible from sand that it could be burnt in a thermal power station instead of driven to a costlier composting. However, during the project period there were still few power stations that were willing to accept the plant material from sandy areas, because of the high contents of sand. The experiences from the works in Sand Life were new since the sizes of the volumes handled had not been handled in earlier restoration projects where *Rosa rugosa* has been removed. The growth of *Rosa rugosa* was unforeseen when applied for the Life-founds and resulted in higher costs per hectare for the action, as was explained in the Midterm report by 30/04/2016. A few years after the roses have been removed, the areas need to be cleared on remnant plants, but to a much lower effort and cost.

Impact of action on biodiversity: We have not surveyed the effects of removing *Rosa rugosa* exclusively, however in the newly restored areas the bare sand dominated and the species mentioned under C2 above will be favoured. The cut by the ATV have lowered the rose-bushes, the sand has become more sunlit and a sparse vegetation has started to develop.

Complementary actions outside Life: In Skåne, *Rosa rugosa* has been removed at Glimminge plantering close to the project site at Bjärehalvön. In Halland, *Rosa rugosa* is removed on a broad front of CAB in all coastal nature reserves, by ÅGP in sandy habitats with threatened species, but also by the municipalities to keep the species away from popular beaches.

Perspectives for continuing: Huge areas of *Rosa rugosa* have been removed, however further excavations are needed in several areas to combat the species. The restored areas need to be looked over regularly to get rid of new up-coming shoots. The presence of *Rosa rugosa* in the surrounding landscape must be limited to prevent spreading into the sites. Further perspectives can be seen in the After-Life plan in Annexes 7.3.2.10 and 7.3.2.11.

5.1.8. Action C.4 Prescribed burning

The prescribed burnings started March 2013 and ended in April 2018. The action has been completed as foreseen with a higher number of prescribed burnings than planned (94 out of the promised 68) and to a lower cost.

Prescribed burning is a cost-effective way to reduce litter, to lean the vegetation and, as in the old days, to renewal the grazing for the cattle. In some places, it has been necessary to burn the same area several times to reduce the nutrient load at the surface. In the project, 94 of the promised 68 burnings have been achieved (i.e. 138 %). Focus have mainly been on the larger burnings, where 92 out of the 63 promised were completed, while only 2 out of the promised 5 smaller burnings were done. However, in a restoration phase, the larger burnings will reduce more litter, mosses and lichens from the encroached sites and was therefore better to do initially and in the future smaller burnings can be used to improve a mosaic in the vegetation. The prescribed burnings have been made in all sites where they were planned except for Gropahålet and Lyngby. The plans were to burn during spring 2018, but there was no possibilities due to the cold and wet climate. Instead, burnings were made in Sandhammaren (three burnings) and at Falsterbohalvön (one burning), two sites where burnings were unforeseen in the application (see also Midterm report by 30/04/2016 and the EC-letter by 26/01/2015). In the future, there will be less need for larger restoration burnings and smaller burnings for managing the sites will be used. There has also been knowledge about burnings built up and spread through the project, facilitating future burnings.

In Skåne, 56 out of the promised 34 burnings have been completed, including both grasslands and heaths. Among these burnings, 2 were smaller (less than 0.5 hectare) and 48 were larger (up to 27 hectares at Drakamöllan in Verkeåns dalgång). At the military training areas, the Fortifications Administrations are in charge of conducting or planning the burnings due to the security, in some sites the burnings were made by the personnel at CAB Skåne and at other sites the action was done by contracted consultants.

In Halland, 22 burnings out of 18 promised were completed and in Kalmar, 17 out of the promised 14 burnings were made. At Skedås in Kalmar, the numbers of burning were doubled and this repeated burning, in combination with introduced grazing, has effectively reduced the grass vegetation and the amount of litter.

The prescribed burnings were much cheaper than planned, when 138 % of the planned burnings have been completed while only 34 % of the budget on action C4 has been spent. Therefore, the costs for all the prescribed burnings made in the project were covered by the budget in C4 and there was budget left on External that have been used on other C-actions.

Impact of action on biodiversity: The burnings lean out the vegetation and in, for example, the calcareous sandy grasslands a slight increase in nationally red-listed species

and species typical for the habitat can be seen (see further under section 5.1.17). The burnings have also reduced the amount of mosses and lichens in these grasslands.

Complementary actions outside Life: For especially CAB Halland, prescribed burnings are an important and well-used annual care measure. In 2018, for example, a total of 36 nature reserves and ÅGP areas on sandy soils were burnt. At Bödakusten östra, additional burnings were made during 2016 in Life Taiga outside the project areas in Sand Life.

Perspectives for continuing: Prescribed burnings are cost-effective ways to reduce litter and lean out un-grazed fields in the future. The larger burnings will continue yearly and smaller burnings will be used to create a mosaic in the habitats. Further perspectives can be seen in the After-Life plan in Annexes 7.3.2.10 and 7.3.2.11.

5.1.9. Action C.5 Fire breakers

The creation of fire breakers started in February 2013 and ended in early spring 2018. The action has been completed as foreseen with the modifications discussed below.

Before implementing the prescribed burnings, the need for fire breakers to control the fires were considered in the project sites. The natural fire breakers like roads, paths and ditches etcetera have been complimented by ploughed, excavated or other types of fire breakers. Fire breakers were made in 8 out of the 10 planned sites and 45 534 meters compared to planned 39 000 meters (117 %) were made. In most sites, less fire breakers were needed than planned because of the presence of natural breakers, except for two sites, Revingefältet and Skedeås (see Table 3). The excavated fire breakers will serve as fire breakers for several years in the future and can be ploughed when encroached.

In Skåne, 40 068 meters of fire breakers have been made in 6 out of 9 the sites in the application. The needs for fire breakers at Sandhammaren was unforeseen, as explained in Progress report by 30/10/2014 and approved in the EC-letter dated 26/01/2015, and during 2014, 500 meters were made. In most sites, the fire breakers were created by excavating or bulldozing 1-2 meters wide gates where all the vegetation was removed. At Revingefältet, the fire breakers were mainly ploughed.

At Skedeås in Kalmar, 1 930 meters of fire breakers were created in 2014 and 2015 by removing encroachments of smaller bushes and grass-vegetation at two meters and thereafter the remaining vegetation was watered before each yearly burning.

Fire breakers were also made in Halland, however since there was no budget on C5 for CAB Halland, these breakers were made within C2 instead as excavated 2 meter broad gates along the burnt areas.

Many of the fire breakers were ploughed and, therefore, the costs were also less than calculated in budget. The remaining budget left on External for C5 have been used for External in other C-actions.

5.1.10. Action C.6. Clearing of encroachment

Clearing of encroachment started later in the project by December 2014 and ended by February 2018. The modifications within action C6 are explained below and the action has been completed as foreseen.

Clearing encroachment of bushes and small trees is necessary in many sites before creating bare sand. In most sites, there turned out to be much more encroachment to remove than planned and 221,9 hectares have been removed compared to the promised 135,2 hectares (Table 3). Encroachment were removed in all planned sites, except for Klammerbäck in Skåne, where instead blackberries and small bushes were excavated and buried into the ground when creating bare sand in C2. In four sites (i.e. Verkeåns dalgång, Friseboda, Lyngby and Gårdby sandhed), the encroachment was unforeseen and in these sites almost 34 hectares of encroachment were removed.

Clearing encroachment was much cheaper than planned, when 164 % of the planned clearings have been completed while only 79 % of the External-budget on action C6 has been spent. Therefore, the costs for all the clearings in C6 made in the project were covered by the budget on C6 and there was budget left on External that have been used on other C-actions.

In Skåne, the action has doubled the areas of removed encroachment from the promised 31,2 hectares to 60,13. The amount of encroachment in some sites were difficult to estimate at the proposal stage and during the project-time some of the sites have continued to encroach. The presence of small trees and bushes inside the wooded dunes were also difficult to estimate and, for example, at Friseboda almost 25 hectares of encroachment were added. At Falsterbo skjutfält, the birch-trees that were supposed to be cleared had grew so larger that they needed to be logged instead (i.e. C1). This resulted in an increased cost for the action and, therefore, we moved half of the promised 20 hectares from C6 to C1. An ATV was bought in action C3 to cut *Rosa rugosa* at places where it was not possible to dig (see further explanation under C3 in the Midterm report by 30/04/2016). Rose plants were cut in Flommen at Falsterbohalvön during two years at an area of 2,84 hectares and the roses bushes were both lowered and grew slightly thinner. To be able to plough at Drakamöllan in Verkeåns dalgång, the heather was removed at an area of 1,7 hectares and transported away from the site.

In Halland, encroachment has been cleared after the loggings in the two sites and 43 hectares were removed at Laholmsbuktens sanddynsreservat and 25 hectares at Haverdal, compared to the planned 40 and 21 hectares, respectively. The material that was removed from the sites were chipped to biomass fuel. In the bare sand that were created after the encroachment was removed, there was a fast immigration of the legume *Lotus corniculatus*.

At Skedeås in Kalmar, encroachment of bushes was cleared on a narrow strip, 1 748 meters long, when preparing for fencing. At both Gårdby sandhed and Skedeås, more hectares of encroachment have been removed than promised to be able to create bare sand in action C2. After logging in C1 at both Bökakusten östra and västra, the sites were cleared on smaller trees and bushes at 64,7 hectares and 17,5 hectares, respectively. Especially at Bökakusten östra, the encroachment was much larger than expected, 64,7 compared to the promised 25 hectares. The invasive alien species *Populus balsamifera*, was removed from a 1,5 kilometers strip along the beach at Bökakusten västra and the area was thereafter cleared for remnants and parts have been dug deep and the sand cleared for *Populus*-roots in a sorting-work (figure 7).



Figure 7. Removing *Populus balsamifera* at Bökakusten västra, Kalmar in 2017; Before and after.

Impact of action on biodiversity: See section 5.1.5 and 5.1.6 above.

Complementary actions outside Life: Removing encroachment is a large issue within the nature reserves in Halland and in 2018, CAB Halland exceeded the budget for the management measure.

Perspectives for continuing: The cleared areas will be controlled regularly and cleared to avoid future encroachment. Further perspectives can be seen in the After-Life plan in Annexes 7.3.2.10 and 7.3.2.11.

5.1.11. Action C.7 Fencing

Fencing started in autumn of 2014 and ended in spring 2018. The fencing has been completed as foreseen with the modifications for Skåne discussed below, including the unforeseen needs for fencing for grazing and that there was no need for excluding grazing animals in most of the areas where it was planned. The fenced areas will be managed by grazing in the future due to the loggings in C1 and fencing in C7.

Fences are not only important for keeping the grazing cattle in the corrals, but also for keeping the cattle out, while increasing the nectar sources within an area. During the project time, 16 172 meters of fences have been put up in five project sites compared to the promised 15 950 meters. In Annexes 7.2.57 to 7.2.62, the fences and other investments for grazing can be seen for the five different sites. Permanent fences for grazing has been put up in 5 project sites in Halland and Skåne to a length of 15 773 meters compared to the promised 12 250 meters. However, there were much less need for temporary fences than planned and the of the promised 3 700 meters, only 270 meters were established, both at Verkeåns dalgång in Skåne. The sites where the fences were planned and the achieved meters of fences can be seen in Table 5, as requested in the EC- letter by 15/05/2018.

Table 5. The sites where fences were planned, the achieved fences and comments on types of fences or why no fences were put up.

Natura 2000-site	Natura 2000-code	C.7 Fencing (m)		
		In application	Achieved 31/07/2018	Comments
Verkeåns dalgång	SE 0420075	400	1 739	Permanent fence (1453 m) with oak poles and electric wire. Smaller wooden fences in two sub-sites for increasing the amount of flowering plants (270 m).
Kiviks marknadsplats	SE0420077	100		No grazing to exclude
Möllegården	SE0420157	100	1 615	Permanent fence, oak poles and electric wire
Klammersbäck	SE0420238	100		Enough flowering plants
Bjärekusten	SE0420232	100		Enough flowering plants
Ängelholms strandskog	SE0420233	100		No grazing to exclude
Lyngby	SE0420234	100		No grazing to exclude
Rinkaby	SE0420236	100		Enough flowering plants
Ravlunda	SE0420240	100		Enough flowering plants
Sandhammaren-Kåseberga	SE0430093	1 800	1 026	Permanent fence, oak poles and electric wire
Falsterbo skjutfält	SE0430111	100		No grazing to exclude
Kabusa	SE0430112	100		Enough flowering plants
Revingefältet	SE0430113	500		Enough flowering plants
Skedeås	SE0330104	2 200	1 748	Permanent fence, electric with wires
Laholmsbukts sanddynsreservat	SE0510006	10 050	10 044	Permanent fence, oak poles and electric wire
Total (m)		15 950	16 043	

In Skåne, a total of 4 380 meters of fences were put up during 2015 in three project sites. Most of the fences were mainly permanent with oak poles and electric wire in areas that have been cleared from pine-plantations in C1 and grazing were introduced to avoid future encroachment. The poles are of fine wood (mainly oak) that make them more sustainable and the oak may in the longer term be habitat for rare species of lichens. To facilitate for farmers and the public, 11 stiles, 4 simple thread-gates and 32 meters of water pipe were established. The permanent fences were unforeseen in application and replaced the planned temporary fences (see below), therefore also the stiles and the water pipe were unforeseen and the costs were reported under C7.

CAB Skåne applied for 3 700 meters of temporary fences in 13 project-sites and the purpose of these fences were to keep grazing cattle out from the areas to increase the flowering herbs and nectar sources. For managing the temporary enclosures, 2 larger and 8 smaller solar cell-driven batteries were bought. However, in most of the sites, the amount of flowering plants was sufficient and therefore, the temporary fences were only put up at two subsites at Verkeåns dalgång; Drakamöllan and Kumlan. Unfortunately, the planned electric fences needed to be replaced by wooden fences in these site because of the presence of highly valuable horses. The solar cell-driven batteries and the electric fences will be used to exclude grazing animals in other sandy sites after-life. In four of the sites in Skåne, there were no grazing animals to exclude.

At Skedeås in Kalmar, 1 748 meters of fences compared to the 2 200 meters promised were put up during spring 2015. The costs for 3 smaller gates and 4 stiles was put under C7, see further under section 5.1.12.

At Laholmsbuktens sanddynsreservat in Halland, 10 044 meters of fences (compared to 10 050 meters in application) have been put up at two subsites, Hökafältet in spring 2015 and Tönnersa in winter 2017/2018. Hökafältet has been grazed during 2017 and 2018 (figure 8), while Tönnersa was grazed during 2018.

Impact of action on biodiversity: It is too early to see any effects on biodiversity due to grazing. However, the areas will be kept open that favour the species connected to the open sandy landscape.

Complementary actions outside Life: In Skåne, similar actions outside the project has been made at Maglehem, in close connection with Möllegården, where a new nature reserved has been logged and the area are fenced and ready to be grazed in the summer of 2016.



Figure 8. Grazing cattle at Hökafältet in Laholmsbuktens sanddynsreservat, Halland in 2017.

5.1.12. Action C.8. Investments for grazing, other than fencing

The actions providing investments for grazing (i.e. gates, corals, wells etcetera) started in autumn 2014 and ended in spring 2018. The modifications within action C8 are discussed below and the action has been completed as foreseen.

Grazing is a cost-effective way to manage open grasslands and when fencing there are needs for other investments to facilitate for the farmers and animals, as well as, for the outdoor life. Therefore, in the 8 fenced areas in C7, a total number of 16 stiles, 25 smaller gates (whereof 22 thread-gates), two corrals, one restored well, one water tank and 32 meters of water pipe lines have been installed (Table 6). For the exact location see the maps in Annexes 7.2.57 to 7.2.62.

Table 6. Investments for grazing, other than fencing, in the project sites.

County	Natura 2000-site	Sub-site	In application	Achieved by 31/07/2018				Comments
				Stiles (no)	Smaller gates (no)	Corall (no)	Water supply (no)	
Skåne	Verkeåns dalgång	Bosarp		5	1			Costs taken under action C.7
Skåne	Möllegården			2	2			Costs taken under action C.7
Skåne	Sandhammaren-Kåseberga	Hagestad-Järarna		4	1		water pipe	Costs taken under action C.7
Kalmar	Skedeås		*	5	3			Costs taken under action C.7
Halland	Laholmsbuktens sanddynsreservat	Hökafältet	**		9	1	old repaired	
Halland	Laholmsbuktens sanddynsreservat	Tönnersa			9	1	water tank	

* 1 small gate, 1 corral, 1 well

** 19 small and 6 large gates, 4 coralls, 5 wells

In Kalmar, 5 stiles and 3 smaller gates were put up at Skedeås. During the communication with the farmer, lighter gates with wire was agreed and the low costs for these were included in the costs for fencing under C7. The farmer also saw no need for neither corrals or wells at the site.

In Halland, 18 smaller gates for walkers were put up (figure 8 under C7) compared to the 19 applied for. In discussions with the farmers, none of the promised 6 larger gates were put up, instead 14 openable parts in the fences were made with a thread and handle. No extra costs were incurred. The two corrals for collecting the animals are movable and put up where they are needed and the water tank are put on wheeler and can be transported between the 4 corrals where the animals are kept. No new wells were needed because of the movable water tank, the reparation of an already existing well and one already functioning well. The gates, corrals and wells in Halland were completed during autumn 2017 or spring 2018.

CAB Skåne had no planned investments for grazing and the costs for the stiles, corrals, water pie produced have been reported under put under C7 above, where it also is explained.

5.1.13. Action C.9. Management of heather

Managing heather started and ended in December 2016. There were only minor modifications within action C9 that did not affect the total areas harvested and the action was completed in 2016 as foreseen, reported in the second Progress report by 30/10/2017.

Management of heather by forager harvester was done during the autumn 2016 (figure 9), with 8 hectares at Åby sandbackar (compared to 3 hectares foreseen) and 15 hectares at Gårdby sandhed (compared to 20 hectares foreseen). The amount of heather at the two sites differed between the application and real life, therefore more hectares were made at Gårdby sandhed and less at Åby sandbackar than planned, but the promised total amount of 23 hectares has been achieved. The action was also combined with harrowing in the same patches (i.e. C2).



Figure 9. Cutting and removing heather at Åby sandbackar, Kalmar in 2016.

Impact of action on biodiversity: The year after the heather was removed, in May 2017, the rare species *Antennaria dioica* and *Polygala comosa* were found on Gårdby sandhed in the managed patches where only heather grew earlier.

Perspectives for continuing: The technique to harvest heather may be used in the future if necessary. Further perspectives can be seen in the After-Life plan in Annexes 7.3.2.10 to 7.3.2.11.

5.1.14. Action C.10. Reimbursement for grazing

The reimbursements for grazing were disbursed with start in 2015 and ended in July 2018. The action has almost been completed as foreseen and the objectives fulfilled.

Reimbursements to the farmers was needed to get anyone that accepts keeping cattle in these areas with little feed values and this was also planned for the two areas in Kalmar and Halland. After the project, the grazed areas with reimbursements have higher quality for the grazing animals and may fit into the system of subsidizes within the national agro-economical scheme. In Halland, it is too early to have a sufficiently good growth and in the meanwhile, CAB Halland will compensate the farmer for grazing. The total areas that have got reimbursements during the project time were 139 hectares compared to the promised 120,5 hectares.

The area of 18 hectare, that where fenced at Skedeås during spring 2015, has been grazed for three years 2015 to 2017 and during that time an agreement for grazing was been signed between CAB Kalmar and the farmer. The reimbursement was about 5 500 EUR per year and corresponds to the compensation that a farmer can get according to the rural

subsidies for similar pastures. The compensations were paid for three years instead of the planned four. However, the areas will be included in the national agro-economical scheme within after-life and the farmer has already applied for the subsidies.

Two areas were fenced and grazed at Laholmsbuktens sanddynsreservat in Halland; Hökafältet, with 88 hectares fenced during winter 2016/2017 and reimbursements were agreed for the grazing season 2017 (figure 8 under C7), and Tönnersa, with 33 hectares fenced during 2017 and reimbursements were agreed for May to June 2018. Due to delays in the clearing of woodland and the fencing, the grazing was only made for one and ½ seasons, respectively, compared to the two years planned, and therefore, the compensations for grazing paid were 5 513 EUR compared to the planned 24 500 EUR. However, the areas will continuedly be grazed after-life with subsidies from CAB Halland and the plan is that they will be suited for the national agro-economical scheme within a few years.

There have been some modifications within the action due to late fencing in the project and the areas were not grazed during the planned time, four years for CAB Kalmar and two years for CAB Halland. However, the objective was to prepare the areas for the national subsidies for grazing and this is on its way. The compensations were paid during fewer years than planned and the total budget in C10 was not used, especially for CAB Halland. Therefore, the remaining budget was used in other C-actions, for example C3.

Perspectives for continuing: The action has been completed in both planned project sites and the feeding values of these areas have increased and will, hopefully, fit into the national agro-economical scheme with subsidies in the future. Further perspectives can be seen in the After-Life plan in Annexes 7.3.2.10 to 7.3.2.11.

5.1.15. Action C.11. Constructions of roads

The planning of the road started in Halland in 2014 and the construction was made in 2015. CAB Halland was responsible for constructing the road and no modifications were made to action C11 that was completed in 2015 as foreseen and reported in the Midterm report by 30/04/2016.

In Halland, there were need for a road to bring the machines into the dunes and to transport the timber, stumps or the chippings out from the dunes. Therefore, an 800 meters long road were constructed in the inner parts of the dune systems the site Laholmsbuktens sanddynsreservat. The road was finished in 2015, used during the project and will also be used in future managing of the site.

CAB Halland was responsible for construction the road and no modifications were made to action C11 that was completed in 2015 and reported in the Midterm report by 30/04/2016.

MONITORING ACTIONS (D-ACTIONS)

The monitoring was performed with two different strategies: before/after actions and by comparing treated areas with nearby controls. We surveyed the changes in extent of habitat types and key structures such as the amount of bar sand as an indication of habitat quality. The early results of the actions show: (1) significantly increase of bar sand and reduced bush and tree encroachment in benefit areas, (2) increased populations of tawny pipit and some other key bird species due to restoration, (3) early colonization of a high proportion

of nectar species and red-listed plants in restored areas, (4) favoured sand specialist species among insect groups such as ground beetles, hymenopterans and moths. We conclude that most indication are positive already this early after restorations. Key species does find their way into restored habitats and becomes a more dominant part of the communities in benefit areas. The results indicate that continued monitoring of these groups is important and the monitoring gives important indications for the future management in the areas.

5.1.16. Action D.1 Monitoring the impact of project actions; 1. Habitat structures

The planning of monitoring habitat structures started in autumn 2012, while the surveys were done from spring to autumn each year during the project time and the pre-monitoring was done and finished in June 2018. The monitoring of the flora and fauna have been completed in time and there have been no modifications within action D1.

To measure the effects on the conservation status after the habitat restorations in the project, the development of the habitat structures, such as bare sand, species composition and nectar sources, have been monitored. These structures were documented in the beginning of the project (during the years 2013 and 2014) along grid systems in all the project sites and this documentation have been repeated in 2017 after the restoration actions have been completed. The development of the habitat structures was also studied directly after selected restoration actions and compared with non-treated control areas. For the monitoring set-up, see further explanations in the Midterm report by 30/04/2016 and in the Technical report in Annex 7.2.63.

During 2017, the habitat structures were surveyed in grid systems (a total of 15 grids) in dunes and grasslands, the same grids that had been surveyed in the years 2013 and 2014 before the habitat restorations. A total number of 25 point surveys were also made in dunes and grasslands during 2017, each with one treated plot and one control plot.

The interpretations of structures from aerial photographs (remote sensing), from before and after restorations, started during the summer 2017. New aerial photographs were provided from Lantmäteriet (Land Survey) in Sweden. The photographs used were taken in 2010 and 2016 for Skåne and in 2011 and 2015/2017 for Kalmar and Halland. The aerial photo analysis of the whole benefit areas was finished during spring 2018 and the results were interpreted, the data analyzed and compiled into a project report together with the surveys of the habitat structures above (see Annex 7.2.63).

During 2017, eight persons were temporary employed in the project by CAB Skåne to do the field work in the actions D1 and D2. Action D1 was completed by field survey during 2018 to better cover the actions and to be able to follow vegetation for one more year. We completed the grid analysis by using band profiles from aerial photos for all 15 grids. This was done since field analysis proved incomplete to compare with insect transects.

The aerial photo analysis showed that the amount of bare sand in benefit areas of sand dunes had increased with 107 hectares and in grassland benefit areas with 44 hectares, this corresponds to an increase with 127 % and 35 %, respectively. At the same time, the cover of mountain pine hade decreased from 153 to 59 hectares.

Perspective for continuing: Remote sensing proved to be the most efficient method to follow up the development of habitats and their structures. Validation through field visits may prove efficient to even better monitor habitats and structures within them. Detailed remote sensing can be made for selected areas of particular importance, and can then be more precise than remote sensing for whole Natura 2000-sites.

5.1.17. Action D.2 Monitoring the impact of project actions; 2. Flora and fauna indicators

The planning of monitoring flora and fauna started in autumn 2012, while the surveys were done from spring to autumn each year during the project time and the pre-monitoring was done and finished in June 2018. The monitoring of the flora and fauna have been completed in time and there have been no modifications within action D2.

Different organism groups were monitored in the same way as the habitat structures above, in a grid system before and after restorations, as well as, directly after restorations with control areas. During 2017, the different organism groups were surveyed in grid systems (a total of 15 grids) in dunes and grasslands, the same grids that had been surveyed in the years 2013 and 2014 before the habitat restorations. A total number of 25 point surveys were also made in dunes and grasslands during 2017, each with one treated plot and one control plot. The organism groups surveyed were vegetation, birds, wild bees, butterflies, moths and beetles. The surveys were completed, the data analysed and compiled into a project report during spring 2018 (see Annex 7.2.64).

Vegetation

The vegetation was measured along the same grids as the habitat structures in D1. In dunes, we found increased proportion of nectar and pollen source species after restoration by removing mountain pine and creating areas of bare sand. The restoration also favored plants considered of conservation value. When creating areas of bare sand in grassland we found early colonization by species of high conservation value, and a succession that favored nectar and pollen sources. Prescribed burning had less of an effect on the vegetation but caused less cover of lichen and mosses, and slightly increased species richness and species of conservation value.

To improve the flora in Hagestad at Sandhammaren, seeds of the threatened plants Weasel's snout (*Misopates orontium*) and Smooth Cat's ear (*Hypochaeris glabra*) were sown at a ploughed area in spring 2017. During the summer of 2017, 300 plants of *M. orontium* and about 70 plants of *H. glabra* were counted. The seeds have been collected from natural, regional populations and grown at a botanical garden in Skåne. The work with Ex situ conservation of threatened vascular plants in the County, is a collaboration among CAB Skåne, NGO and regional botanical gardens and financed by action plans for threatened species (ÅGP). The spring and summer 2018 was extremely dry and less than 10 plants of *Misopates orontium* was seen. However, there are still a high possibility that there will be a seedbank for coming years.

Another planting of seeds was done in the dunes of Ängelholms strandskog, where seeds of *Eryngium maritimum* from the nearby Bjärekusten were sown in the autumn of

2016. In 2018, 40 seedlings were counted and most of them in the restored sections of the white dunes.

In Bökakusten östra, seeds were collected from *Hypochoeris radicata*, *Pilosella officinarum* and *Jasione montana* to be sown out in Bökakusten västra during autumn 2018.

Perspective for continuing: In the future, it is important to continue monitoring the species of EU-concern and the threatened species in the restored sites. In many sites, they have already colonized the restored areas and the population development of for example *Dianthus arenarius* and *Koeleria glauca* is important to follow. Also, a rather common species such as *Thymus serpyllum* may be a good indicator of restoration success due to its indications of a habitat with low nutrient content and high pH-value. In addition, in dunes the nectar sources are often lacking and needs further attention in monitoring.

Birds

A total survey of the Tawny pipit in Sweden was commenced during 2017 to follow up the survey done in 2013, before the restoration actions (figure 10). The survey was a collaboration with the framework of the Action plans for threatened species in Sweden that financed half the survey. What we can see is that the number of breeding pairs have increased from 33 to 40 between the years. This is a fantastic result on a bird species that have had a steady population decline since the late 20th century, the trend has now been stopped and turned. See special report in Swedish in Annex 7.2.65 and a shorter summary in English in the technical report for D2 (see Annex 7.2.64).



Figure 10. Tawny pipit (*Anthus campestris*) found during the survey 2017 at Brösarps norra backar in Verkeåns dalgång, Skåne. Photo: Patrik Olofsson.

During 2017, the Tree lark and the European nightjar have been surveyed in 9 and 8 sites, respectively, to repeat the survey of the two species in 2014, before the restoration actions. The data collecting during the surveys of the European nightjar and the Tree lark have been completed and the results are now included in a chapter in the technical report D2 (Annex 7.2.64). In this survey, nightjar increased from 33 to 40 territories with males, but for woodlark there was a decrease from 53 to 41 singing males. Many of the nightjars were observed in areas where pine had been thinned out in the dune landscape. The survey of the tree lark was mostly done at the same time as the night jar, since woodlark also sing during the night. However, our surveyor made a remark that a special focus on woodlark in early spring before breeding might have been a better method and that activity of singing mails would have been more constant.

Perspective for continuing: A new survey of the tawny pipit would be desirable. The positive response we saw is interesting, in addition to further spread observed during 2018 in Sand Life sites. Large areas have been restored in places where the tawny pipit already have disappeared, and we can expect a further spread during the coming years. Therefore, it is important to follow these, yet uncolonized, areas in particular and within a few years make a new survey. The results from the woodlark was partly contradictory and further survey may prove important, although this is not a threatened species in the area.

Hymenopterans, butterflies, moths and beetles

Wild bees have been surveyed along 17 grids in sand dunes and grasslands in all three counties, during 2017. The same grids had been surveyed in the years 2013 and 2014 before the habitat restorations. Wild bees were also surveyed in 25 different restored points during 2017, with a control point at each site. In addition, wild bees were analysed in dune systems using yellow pan traps to compare restored areas with control sites. The surveys have been completed and the results summarized in a chapter in the technical report D2 (Annex 7.2.64). The results were very clear that the creation of areas of bare sand increased the diversity and abundance of hymenopterans in dunes, calcareous grasslands, and dry grasslands.

Butterflies have been surveyed along 15 grids in sand dunes and grasslands in all three counties, during 2017. The same grids had been surveyed in the years 2013 and 2014 before the habitat restorations. In addition, butterflies were surveyed along two routes in the dune landscape of Bödakusten östra and västra in 2013 and 2017. Butterflies were also surveyed in 25 different restored points during 2017, with a control point at each site. The surveys have been completed and the results summarized in a chapter in the technical report D2 (Annex 7.2.64). The results showed that abundance and species richness of butterflies was higher in plots where bare sand had been created in dunes and calcareous grassland compared to controls, but lower than controls in dry grassland. The areas of bare sand are still at an early successional stage and the nectar sources show an increasing trend which is expected to favour butterflies in the long run. The summer of 2017 was comparable cold when most butterflies are active, which may explain a lower species richness of butterflies after compared to before actions. However, the abundance of butterflies was higher after restoration in dunes, depending on mainly one very abundant species, *Melitaea athalia*.

Six sites with sand dunes have been monitored for moths. In each there were 2 to 3 replicates of treated areas that were compared to control areas. The surveys have been completed and the results summarized in a chapter in the technical report D2 (Annex 7.2.64). There was a high proportion of sand specialist species in areas of pine removal, while the overall abundance and species richness was similar between control plots and restored plots. There was also a tendency for higher numbers of red-listed moth species in cleared areas.

Beetles have been surveyed along 3 grids in sand dunes in Skåne and Halland, during 2017. The same grids had been surveyed in the years 2013 and 2014 before the habitat restorations. Outside of this program, a survey of “beetles on newly dead pine” has been monitored at the two sites in Halland. It has been financed by ÅGP and will add another aspect to the management of the two sites. The surveys have been completed and the results summarized in a chapter in the technical report D2 (Annex 7.2.64). The abundance of beetles in the dunes was clearly higher after the clearing of pine, and in particular sand specialist species had increased.

Beetles were surveyed in 2013 and 2017 and the results are summarised in the final Technical report (Annex 7.2.64). In early succession after restoration it proved difficult to survey beetles since pit fall traps were exposed in the open landscape and often destroyed by animals. We used this experience for the final survey, and selected treated areas where the succession had gone reasonably far.

In 2017, five sand plots at two the two Xeric calcareous grasslands sites Gårdby sandhed and Åby sandbackar at the eastern side of Öland were surveyed for beetles, with one control plot beside each of them. In 2017, 15 sand plots at three Dry Grasslands areas at Revingefältet in Skåne were surveyed for beetles. In areas of created bare sand in calcareous and dry grassland there was higher abundance of sand specialist species and lower abundance of generalist species. Also, the abundance and species richness of red-listed species was higher in sand plots than in control plots in grasslands.

Perspective for continuing: Insect diversity proved to be very responsive to restoration actions. The focus on different functional groups gave very important information. Continued focus on indicator species that are easy to identify is probably an efficient way to monitor the habitat status.

5.1.18. Action D.3 Monitoring the impact of project actions; 3. Socio-economic aspects

The planning of monitoring socioeconomic aspects of project actions started in 2013 and finished in June 2018. The action D3 has been compiled in the report seen in Annex 7.2.66 and has been completed as foreseen.

Monitoring the impact of project actions on socio-economic aspect has been done in different ways during the project and the overall activities are compiled in a report in Annex 7.2.66. One aspect that has been in focus is to raise knowledge and awareness of the high biodiversity in sandy habitats and the need of management. Information has been provided during the project on various kinds of meetings, where dialogues with land owners, users, NGOs and the public were possible to achieve this issue. Within the project 163 information meetings and 87 guided field tours were held (see section 5.2.2.5), as well as several lectures

and talks. From the dialogues for nature conservation held within the project we gather experiences of how to change attitudes about nature conservation that may be used in other sites within the project, but mainly in the long-term work with managing the Swedish protected areas. As explained in the first Progress report by 30/10/2014, with the example from Haväng and Vitemölla strandbackar in Verkeåns dalgång, the former insufficient information about restoration objectives resulted in tensions between the public and the site managers. How these tensions were solved and how the experiences from this work have then been used in other sites in the project to prevent conflicts will be compiled in the final report.

In an examination paper from Kristianstad University the changes of attitudes were surveyed at Haväng and Vitemölla strandbackar (in the project site Verkeåns dalgång). The results show that the neighbors to the site had a negative attitude to the project at start (i.e. in 2012) due to lack of information and to, what the neighbors thought, was too extensive restoration actions. However, the attitude after the project (i.e. in 2017) had changed and showed many of the neighbors are positive to the project (figure 11). The examination paper can be seen in Annex 7.2.67.

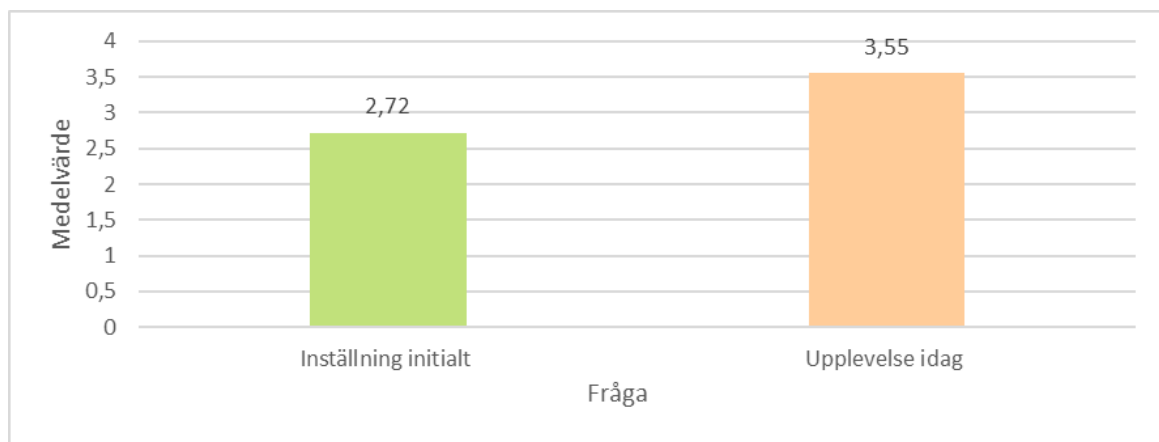


Figure 11. The mean values for the neighbours attitude to the restoration actions in Haväng and Vitemölla strandbackar in Verkeåns dalgång before Sand Life (initial) and the experience today (2017).

To evaluate if the project sites have been more attractive to visitors, the numbers of visitors was counted before (i.e. 2013) and after restorations (i.e. 2017). The counting's were done at six places in the three project sites Ängelholms strandskog, Friseboda and Verkeåns dalgång. The results show no clear trends if the number of visitors have changed at the sites. The areas were popular for recreation, outdoor activities and tourism even before the project and the results show no increase in the number of visitors. In addition, the number of visitors seems to vary depending on the weather (see further in Annex 7.2.66).

During the project period, several job opportunities have been created in the three counties (see also Annex 7.2.66). This includes contractors, landowners or users that have been involved in the restoration activities in the project, as well as, people that have been involved in the monitoring, held lectures or guided tours. The project has also involved people that have been long-term unemployed and refugees through the teams provided to nature conservation by the Swedish Forestry Agency.

Five of the newly restored areas that have been fenced within the project, can now be used by the farmers to let their animals graze. These areas will most probably develop a standard to fit into the subsidies in the agro-economical scheme in the near future. Beside the economic value for several people, the awareness of the values of the sandy habitats have increased and the knowledge of how to manage them.

During the project, the effects of the restoration actions on ecosystem services have been measured by evaluation the pollination service by insects. This can be done in two different ways; by surveying the pollinators (i.e. Hymenopterans) and/or the nectar sources, the later as an indirect measure for pollination. The data has been collected within action D2 in the project. The results show that the pollinating Hymenopterans were slightly more common in restored areas than in nearby control areas. However, the Hymenopterans that predate or parasitize on the pollinators were both much more common in the restored areas. The explanation can be that the pollinators spend more time on the flowers in the surroundings than in the areas with bare sand, while the predators and the parasites spend their time in areas with bare sand where the pollinators build their nests. So, the conclusion is that the restorations in the project have provided the pollinating Hymenopterans with bare sand to build their nests. See further discussion in the report in Annex 7.2.66. It is too early after the restorations to evaluate if the amount of flowering plants has increased. The patches of bare sand, the succession of the vegetation and through time various plant species will establish and increase the plant diversity.

The ecosystem services can also be artistic and the project collaborated with an American artist in creating Land art. At Revingefältet, the set-up “*Broken kilometers*” can be seen (see more in Annex 7.2.66).

5.1.19. Project deliverables and milestones and outcome indicators

The project deliverables and milestones for actions A to F can be seen in Table 7 below. The project outcome indicators can be seen in Annex 7.4.1.

Table 7. Lists of all the project deliverables and milestones for actions A to F.

Deliverable products of the project	Action	Original due date	Date of completion	Delivered by
Website up and running	E6	31/01/2013	31/01/2013	Inception report 30/04/2013
Legal management plans completed	A1	31/12/2015	21/12/2015	Midterm report 30/04/2016
Site-specific restoration plans completed	A2	30/03/2015	30/03/2015	Midterm report 30/04/2016
Management manual completed	E10	31/12/2017	22/05/2018	Final report 31/10/2018
Technical report completed	D1	31/07/2018	31/07/2018	Final report 31/10/2018
Technical report completed	D2	31/07/2018	31/07/2018	Final report 31/10/2018
Layman's report	E7	31/07/2018	30/06/2018	Final report 31/10/2018
After-life plan completed	F3	31/07/2018	31/07/2018	Final report 31/10/2018
Milestones of the project	Action	Original due date	Date of completion	Status
Project coordinating team start up project	F1	31/08/2012	15/08/2012	completed
Reference groups in all counties	F1	30/11/2012	27/02/2013	completed
Steering group formed	F1	30/10/2012	07/12/2012	completed
First workshop	E8	28/02/2013	19/03/2013	completed
Soil chemistry analyses completed	A4	30/06/2014	11/11/2013	completed
Five project meetings completed	E8	31/12/2017	05/04/2013	completed
Monitoring completed	D1	31/10/2017	30/06/2018	completed
Monitoring completed	D2	31/10/2017	30/06/2018	completed
Monitoring completed and data analyzed	D3	31/10/2017	31/07/2018	completed
Second workshop	E8	31/07/2018	24/05/2018	completed

5.2 Dissemination actions

5.2.1 Objectives

To disseminate the project and to raise awareness of the biological values of sandy habitat and the needs of management have been important throughout the project. The actual meeting with landowners, users and the public has been a priority and possible through various information meetings, guided field excursions and workshops. A broader public have been reached through contacts with the media. Talks and lectures have been held, see an example from a talk to Rotary in Annex 7.3.2.1. At all sites, general information signs have been put up, as well as site specific signs in some sites. Leaflets with general information, site-specific information or thematic information have been produced, as well as, roll-ups and posters. Demonstration sites have been established at 12 different sites in the shape of outdoor museums and sets of tables and benches have been put up for visitors. Digital information has been given through the website, Instagram and Face book. The project has also been concluded in a manual for management of sandy habitats and a Layman's report. For the project deliverables and milestones see Table 7.

5.2.2 Dissemination: overview per activity

INFORMATION ACTIONS (E-ACTIONS)

5.2.2.1 Action E.1 Information signs

Information at site have been provided through information signs during the project time, with start in early 2013 and end in July 2018. During the project time, 80 of the promised 72 general information signs and 154 of the promised 66 site-specific signs were produced and put up in the project sites. The signs will be up in the sites afterlife and contribute to increased knowledge and awareness about the sandy habitats. No modifications have been made in the action and the action has proceeded as planned.

One *general information sign* was produced by CAB-Skåne in 2015 and put up in each project site. Each sign has a general text about the project, as well as a smaller text about the specific site where the sign was placed. CAB Halland and CAB Kalmar developed their own site-specific texts. In Skåne, the signs were up in 18 sites during 2015 and for Halland and Kalmar, the signs were up in 2 and 5 sites, respectively, during 2016. Examples of signs were attached in the Midterm report by 30/04/2016.

Site-specific signs were used to inform about the specific values per site and to update old inadequate signs, especially when restorations reshaped the landscape in the areas. The site-specific signs were produced between 2013 and 2018 by the three CABs; 10 signs by CAB Skåne, one sign by CAB Halland and 3 signs by CAB Kalmar (for details see Table 8). The signs for Backåkra and Hagestad in Sandhammaren can be seen in Annexes 7.3.2.2 and 7.3.2.3, respectively, and all the other signs were attached in the Midterm report by 30/04/2016 (i.e. Hagestad-Järarna, Bjärekusten, Drakamöllan, Kumlan, Vitemölla, Ängelholm, Gårdby sandhed, Åby sandbackar and Skedeås) and the second Progress report by 30/10/2017 (i.e Friseboda, Møllegården and Haverdal).

Table 8. The 14 different site-specific signs produced in Sand Life, placed in 93 different locations and printed in 154 different numbers.

County	Project site	Sign place (no)	Printed signs (no)	Year
Skåne	Friseboda	14	20	2016
Skåne	Möllegården	1	2	2016
Skåne	Sandhammaren - Hagestad Järarna	3	6	2014
Skåne	Sandhammaren - Hagestad	11	30	2018
Skåne	Sandhammaren - Backåkra	2	4	2015
Skåne	Södra Bjärekusten	28	40	2014
Skåne	Verkeåns dalgång - Drakamöllan	4	8	2013
Skåne	Verkeåns dalgång - Kumlan	3	6	2013
Skåne	Verkeåns dalgång - Vitemölla	3	6	2014
Skåne	Ängelholms strandskog	4	8	2013
Halland	Haverdal	14	15	2016
Kalmar	Gårdby sandhed	2	3	2015
Kalmar	Åby sandbackar	2	3	2015
Kalmar	Skedeås	2	3	2015

5.2.2.2. Action E.2 Information folders and rollups

The project has been disseminated by different information materials like folders, roll-ups, posters and give away. The action started January 2013 and ended in June 2018. The produced folders and roll-ups will be used after the project to continue to raise awareness of the sandy habitats. The digital folders may also be updated with new information if necessary. The changes in the action are discussed below and the action has almost been completed as foreseen.

One general project folder, 8 thematic folders and 6 site specific folders (including four digital folders made in Halland) have been produced and are available on the project website www.sandlife.se. The folders have been handed out on different information meetings, on guided field tours or during networking and have also been available at certain information centers. CAB Skåne has been responsible for the production of the project folder, the thematic folders and two of the site-specific folders, while CAB Halland has been responsible for the production of the digital folders. During 2018, a folder about the sandy sites in eastern Skåne was produced by CAB Skåne and can be seen in Annex 7.3.2.4. The different folders, their languages, the number of printed copies and by which report they were attached can be seen in Table 9. The digital folders from Halland had 398 readers from October 2017 to June 2018.

Table 9. Folders produced in Sand Life with name, language and number of printed copies.

Folder	Name of folder	Languages	Printed (no)	Attached by report to EC
Project	Myllrande liv i sandmarkerna	SWE	5400	Midterm report by 30/04/2016
Project	Unique diversity in sandy habitats	ENG	1500	Midterm report by 30/04/2016
Project	Buntes lebenin den sandbereichen	GER	1500	Midterm report by 30/04/2016
Thematic	Sanddyner	SWE	2000	Progress report by 30/10/2017
Thematic	Sandfält i inlandet	SWE	1000	Progress report by 30/10/2017
Thematic	Sandstäpp	SWE	5000	Progress report by 30/10/2017
Thematic	Blommande växter	SWE	3000	Progress report by 30/10/2017
Thematic	Buksvampar	SWE	3000	Progress report by 30/10/2017
Thematic	Vilda bin	SWE	3000	Progress report by 30/10/2017
Thematic	Oönskade arter i sanden	SWE	5000	Progress report by 30/10/2017
Thematic	Alla kan hjälpa sandens växter och djur	SWE	5000	Progress report by 30/10/2017
Site	Drakamöllan-Kumlan	SWE, ENG, GER	10000	Progress report by 30/10/2014
Site	Sandmarker i östra Skåne	SWE	5000	Final report by 30/10/2018
Site	Haverdal	SWE, ENG, GER	digital	Progress report by 30/10/2017
Site	Tönnersa	SWE, ENG, GER	digital	Progress report by 30/10/2017
Site	Gullbranna	SWE, ENG, GER	digital	Progress report by 30/10/2017
Site	Hökafältet	SWE, ENG, GER	digital	Progress report by 30/10/2017

There has been a slight change in the numbers of folders produced from the numbers promised in the application, where 1 project folder, 3 thematic folders and 9 site specific folders were promised, while 1, 8 and 6 folders were produced, respectively. The numbers of folders were increased from the planned 13 to the achieved 15, without any increase in costs. There was no need for developing the promised amount of the site-specific folders since there is less demand for printed information nowadays. However, the different thematic folders were very useful in dissemination the project on meetings and guided tours. The digital site-specific folders produced by CAB Halland, are also a way to disseminate the project in new ways and is in line with the CABs intention of reducing the number of printed folders (discussed in the second Progress report by 30/10/2017 and commented in the EC-letter by 15/05/2018).

Other dissemination materials that had been produced by CAB Skåne within the project are 2 roll ups and 3 posters (attached in the Midterm report by 30/04/2016 and as Annex 7.3.2.5) and one beach flag in 4 copies. Outside the project budget we have produced caps, T-shirts and 300 scoop-shaped drinking vessels. The roll-ups were produced in 2014 and 2015 and used on various exhibitions and meetings, for example, the EU-meeting about Natura-2000 in Luxemburg (2015), at and at the SER-conference in Munich (2016) and at the international platform-meetings in Rovaniemi (2014), Aalborg (2015) and Amsterdam (2016). In the application, 24 posters were promised, however, the dissemination of the project had not been more successful compared to the 2 roll-ups and 3 posters that have been produced.

A draft to a mobile exhibition with information of the project and the sandy habitats was produced to Falsterbo Bird Show in 2015 and was shown in the Midterm report by 30/04/2016.

5.2.2.3. Action E.3 Demonstration sites/Outdoor museum

Outdoor museum, that demonstrate the biodiversity of sandy areas and the need for management of sandy habitats, are accessible for visitors on 12 locations in the project sites. The action started in January 2013 and ended in spring 2018. The action has been completed as foreseen, with the change of placement for one of the museums as explained below. KSTAD has been coordination the planning, the tendering process and the production of the outdoor museums, while the counties have been assisting the production and in charge of the establishment in each county. Naturcentrum AB was contracted to develop the construction, the design and the information on the museums were put together in collaboration with all project partners. The consultant was also in charge when the outdoor museums were put up in the project sites. The outdoor museums will be managed by the CABs nature management units and the signs can be updated with new information if needed.

In Skåne, the first two outdoor museums were up at Rinkaby and Friseboda during 2014 and the last four at Revingefältet, Falstebo skjutfält, Ängelholms strandskog and at Hagestad in Sandhammaren during 2015. To the museum in Friseboda a footbridge with a platform was constructed in 2014 that makes it accessible to people with functional limitations. The change in placement of one of the outdoor museums in Skåne from Verkeåns dalgång to Sandhammaren were asked for in the first Progress report by 30/10/2014 and accepted in the EC-letter 26/01/2015.

The last six museums were up during 2016, in Laholmsbukten (3) and Haverdal in Halland and one each at Bödakusten östra and västra in Kalmar, and completed with site-specific signs at the back-sides during autumn 2017.

During spring 2018, the outdoor museums were complemented with two or three small sculptures each picturing a Tawny pipit, a Tree lark, a Nightjar, a beetle or a head of a bee (figure 12). At Revingefältet, the museum was completed in 2018 with adjacent areas (2 x 10 meters) of various way to create bare sand; digging, excavating, ploughing, harrowing and mowing. These areas will now slowly encroach to show the natural succession in the sandy habitats.

The information signs on the first two museums were attached in the first Progress report by 30/10/2014 and the signs can also be seen at the project website on http://sandlife.se/?page_id=436. When the first museum was ready, a press-meeting was held by KSTAD and CAB Skåne (which was mentioned in the first Progress report by 30/10/2014).



Figure 12. A tree lark at the outdoor museum at Tönnersa in Laholmsbuktens sanddynsreservat, Halland.

5.2.2.4. Action E.4 Digital information

The action started in January 2015 and ended in July 2018. The action has not been completed as foreseen, but modified as explained below.

To disseminate the project results and arise awareness of sandy habitats, the use of digital media is important in these days. An Instagram account (**#sandlife_sweden**) with 180 posts was started in May 2015, through which the project and the ongoing actions was visualized with pictures. When the project finished by the end of July 2018, we had 245 permanent followers, however, there are more users than followers hashtagging and liking the images put out from the project.

CAB Halland has used their already functioning Facebook account “Naturreservat i Halland” to report progress and upcoming actions within the Sand Life sites (see more on <https://www.facebook.com/search/top/?q=naturreservat%20i%20halland>). For example, one post about the digital folders made in Sand Life reached 1 078 persons 49 liked it. In Halland, they have also produced four digital folders as mentioned under cation E2 above.

CAB Skåne has also used the present Facebook account to spread news about upcoming events. During the project time, 13 events were announced on the Facebook-account that reached the over 1 500 followers. We also used the Facebook-advertisement function to reach more people and in total about 5 000 people were reached by the Facebook ads. How many persons that were reached by the paper-advertisements is on the other hand unknown.

At Hagestad in Sandhammaren, photo-points have been established, with permanent iron-stands for placing a mobile phone and taking a picture. Through these photo-points the changes in the landscape, caused by the restoration actions in Sand Life, can be followed and seen on CAB Skåne website (see the development at <https://www.lansstyrelsen.se/skane/besok-och-upptack/naturreservat/ystad/hagestad.html>).

When applying for the project, we intended to develop applications for mobile phones that were innovative by then. However, a mobile phone application about sites with sandy

habitats will drown in the huge app-flora today and this was explained in Progress report by 30/10/2017. We then intended to make smaller films about different targets of the project, but, unfortunately, the time was lacking. Instead, we are convinced that we have reached a wide audience through digital media through our Instagram account, the Facebook accounts, the digital folders developed by CAB Halland and by the photo-points in Skåne.

5.2.2.5. Action E.5 Field excursions and information meetings

The field excursions and information meetings started in September 2012 and ended in June 2018. The meetings and tours were held as planned and no modifications have been made in action E5.

Information and physical meetings are important to raise knowledge and acceptance for the needs of restorations of the sandy habitats. Therefore, several field excursions, courses and information meetings have been held in the project with land owners, land users and the public to discuss the planned specific actions, the ongoing restorations and the final results. During the six years of Sand Life, 163 information meetings (out of 109 promised) that has reached about 54 000 people and 87 guided field tours (out of 69 promised) with about 1 900 participants have been held in the project. Many of the guided field tours have been announced in newspapers, as well as in regional activity programs (mentioned and annexed in the second Progress report by 30/10/2017).

The need for site specific information meetings varied between sites, depending on the scale of the restoration actions and how well visited a sit used to be (see Table 10). Information meetings have also been held for different target groups, for example, the regional entomology association Sydostentomologerna and Böda local history society at Öland by CAB Kalmar, the Lund Botanic society and the Entomological Society of Lund by CAB Skåne and Halland Botanical Society by CAB Halland.

Besides the information meetings, there were also exhibitions, courses, working days and talks included in the action (example mentioned during former reports; the first Progress report by 30/10/2014, the Midterm report by 30/04/2016 and the second Progress report by 30/10/2017). Examples of other kind of meetings are listed below:

- The project has attended 8 different exhibitions; 3 times at “The day of the military regiment” (Regementets dag) at Revingefältet, 3 times at Falsterbo Bird Show and at “O-ringen” the world’s biggest orienteering festival (at Friseboda in 2014). In these different events thousands of visitors pass the Sand Life exhibition and many stops for further information.
- Larger information events have been arranged, like the “Day of the Sand” (Sandens dag) in Laholsmbuktens sanddynsreservat and at Haverdal during May 2015 (mentioned in the Midterm report by 30/04/2016).
- The project has held 3 courses with 74 participants in different parts of Skåne to raise the knowledge of prescribed burnings.
- At Vitemölla strandbackar in Verkeån three working days for the neighbors and the management council have been arranged for information, but also for participating in the actual restorations.

- The CABs and LU have held 25 talks with 710 participants about the project to different kind of audiences, like students, NGOs, open site-specific meetings, to regional Agencies, villa-associations and civil servants. The mean number of auditors at these meetings was 28.

Table 10. The total numbers of information meetings and guided tours per project site during the project life time between August 2012 and July 2018.

Natura 2000-area	Information meetings	Guided field tours
Verkeåns dalgång	21	10
Marknadsplatsen		
Friseboda	9	2
Gropahålet	3	2
Möllegården	1	1
Klammersbäck		
Bjärekusten	1	4
Ängelholms strandskog	8	4
Lyngby	1	3
Rinkaby	10	2
Ravlunda	17	2
Falsterbohalvön	13	2
Sandhammaren-Kåseberga	6	5
Falsterbo skjutfält	1	1
Kabusa	2	1
Revingefältet	19	3
Åby sandbackar	2	3
Gårdby sandhed	5	5
Skedeås	5	3
Bödakusten västra	8	3
Bödakusten östra	8	3
Laholmsbuktens sanddynsreservat	2	15
Haverdal	8	11
<i>General meetings</i>	<i>13</i>	<i>2</i>
Summary	163	87

The field tours have had different thematic subjects where different experts on biodiversity and sandy areas have been used as guides (Figure 13). During these meetings personnel from Sand Life were present to inform about the project and the Life-program. These tours were well-attended and appreciated by the participants. The mean number of visitors was about 22 on these tours, and all together 1 917 persons have participated on a guided field tour. Many of the guided field tours have been announced in newspapers, as well as in regional activity programs, in social media (see action E4 above) and in NGOs yearly excursion-programs for their members (mentioned in the Midterm report by 30/04/2016 and the second Progress report by 30/10/2017).



Figure 13. A guided field tour at Bödakusten östra in June 2017, held by the project manager Tommy Gustavsson and the field guid Niklas Johansson.

5.2.2.6. Action E.6 Website

The work with the project website started in late 2012 and ended in July 2018. Time table for the project website has been kept as foreseen and no modifications have been made in action E6.

The website for Sand Life www.sandlife.se was up in January 2013 and an English version was ready in March 2014. Thereafter, the website has constantly been improved and frequently updated throughout the project period. The website is build up exclusively for Sand Life and is maintained by CAB Skåne. The partners have links to the webpage from their respective homepages. The numbers of visitors to the website have varied though time and in Table 11, the numbers of visitors per year and the average numbers per month can be seen. The website has been used frequently since start and will be up during five years after the project ended.

Table 11. Numbers of visitors at the website; per year, average per month and the month with most visitors.

Year	Visitors per year (no)	Average number of visitors per month (no)	Month with highest number of visitors
2014	2254	188	November
2015	6987	582	July
2016	4151	346	July
2017	3756	313	July
2018*	3078	440	June

* only January to July

5.2.2.7. Action E.7 Layman's report

The work with the Layman's report started in March 2018 and ended in June 2018. The action has been completed as foreseen and no modifications have been made.

At the end of Sand Life, a Layman's report was developed including the objectives, actions and outcome of the project. The report was produced in Swedish (Annex 7.3.1.1) and English (Annex 7.3.1.2), where the Swedish version was printed in 100 copies. Both versions of Layman's report are available on the project website www.sandlife.se.

5.2.2.8. Action E.8 Seminars and workshops

The action started in August 2012 and ended in June 2018. The action has been completed as foreseen, with the objectives fulfilled.

To raise knowledge and share experiences among managers of sandy habitat, there have been two major workshops (or conferences) and three mini-workshops held during the project time. The first workshop, in Halland by 19/03/2013, was directed to people working with nature conservation on sandy soils or people interested in biodiversity. The program and the participant list of the workshop was included in the first Progress report by 30/10/2014.

Three mini-workshops have been held with personnel working in the project. The first in eastern Skåne at 13-14/05/2014 with 19 participants (program and participant list was including in the first Progress report by 30/10/2014), the second at Öland in 9-10/06/2015 with 12 participants (program and participant list was including in the Midterm report by 30/04/2016) and the third in Halland in 16-17/08/2016 (program and participant list was including in the second Progress report by 30/10/2017). During these three meetings, experiences from previous restoration methods and results, disseminations, monitoring and project administration were shared and discussed. Visiting the project sites and to be able to discuss the actions in the field were of high value to the participants.

The project's final conference took part in Kristianstad and eastern Skåne during three days from 22nd to 24th of May 2018. The 81 participants from six different countries were informed about the project and its outcome and took part in discussions about biodiversity in sandy habitats, management, monitoring and dissemination. For one day, three project sites were visited and the restoration actions showed (figure 14). The program for the conference and the participant list can be seen in Annex 7.3.2.6, as well as the field trip in Annex 7.3.2.7. For the overview of the conference with the presentations, see the information at the project website at <http://sandlife.se/?p=2192>.

According to the application, project meetings were also planned within action E.8, however, these were discussed under the administrative part in section 4.1.



Figure 14. The final conference in Sand Life visiting Hagestad in Sandhammaren, Skåne. Photo: Holger Roessling, Life Sandrasen.

5.2.2.9. Action E.9. Management for visitors; tables and benches

The project-sites are also popular for outdoor recreation and to facilitate the visit and make it more convenient, tables and benches were produced and placed at well-chosen spots. The tables and benches were placed in different sites during 2015/2016 by CAB Skåne and CAB Halland (figure 15). The numbers of table/bench sets that have been produced were 17 in Skåne and 35, as well as, 20 benches in Halland as foreseen. All sets are marked with the three logotypes; Sand Life, Life and Natura 2000 (figure 15).

The tables and benches will be managed by the CABs nature management units in the future. The action has been completed in time, with no modification according to the plan.

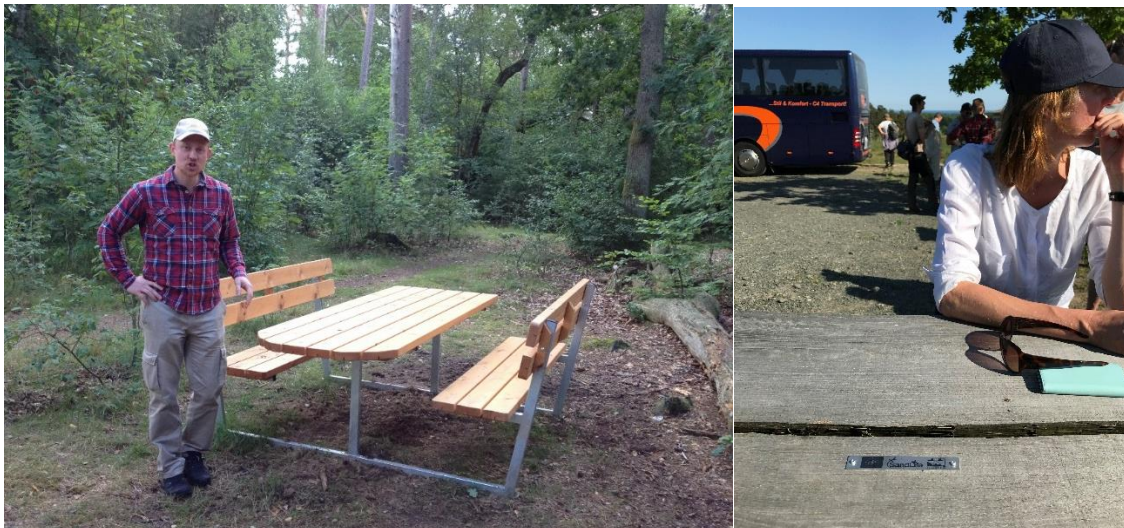


Figure 15. A set of tables and benches at Haverdal in Halland and the placard with the logotypes at a table at Möllegården in Skåne.

5.2.2.10. Action E.10 Manual for management of habitats on sandy soils

The development of the management-manual started in 2013 and ended in May 2018. The action has been completed as foreseen, with the change of responsibility explained below.

The outcomes from the habitat restorations, the monitoring and the disseminations in the project have been compiled in a manual about how to manage sandy habitats. The purpose of the manual is to make the techniques used while restoring the sandy habitats available to a wider audience, as well as, spreading the new knowledge that has developed during the project.

The planning process and gathering of material to the manual accelerated during autumn 2017, with CAB Skåne as coordinator and KSTAD as assisting part. The change of responsibility for the action was explained in the second Progress report by 30/10/2017. The editor-ship was done by CAB Skåne that also were writing the texts together with KSTAD.

The manual was produced in Swedish (Annex 7.3.2.8) and in English (Annex 7.3.2.9) that were printed in 750 and 150 copies, respectively. It was ready in time to the project final conference (see action E8 above) and was handed out to all the participants. The manual was also strongly supported by the SEPA and spread during their contact channels. After the release, we have heard many positive words about the manual and it has also been requested from both Swedish, as well as, international managers. It is also available on the project website.

PROJECT MANAGEMENT (F-ACTIONS)

5.2.2.11. Action F.1 Project management

See the administrative part in chapter 4.

5.2.2.12. Action F.2 Net-working

During the project time net-working with other projects with similar approaches has been important to exchange experiences and to inform about the Life-project. Therefore, the project members have made 21 net-working activities during six years between 2012 to 2018 (Table 12). However, in the application we did not foresee the importance of networking and the emphasis the EC lays on this, as well as, all the possibilities for networking that are available within the various platform-meetings and seeing other Life-project and, therefore, the budget for networking was underestimated.

To start the project, Sand Life was present at the LIFE kick-off meeting in London in November 2012, represented by the chief of the nature unit at CAB Skåne, Per-Magnus Åhrén and the intended financial manager, Sara Sörensen.

To improve the implementation of the project, Sand Life have attended 4 international LIFE-platform meetings provided by the EC, NEEMO EEIG – ELLE (former ASTRALE) and various LIFE-projects, as well as, 5 national LIFE-meetings where Swedish project leaders and financial managers attend together with SEPA. The representation on these meetings have been by the project leader Gabrielle Rosquist and/or by the financial manager Sara Sörensen or Erik Schenström. Presentations or roll-ups have been provided and examples have been attached in the Midterm report by 30/04/2016.

Table 12. Networking within Sand Life during the years 2012 to 2018.

Net-working	Where	Date
International LIFE plattform-meeting	Sorö, Denmark	16-18/09/2012
National LIFE-meeting	Ystad, Sweden	2-3/10/2012
Kick-off LIFE-meeting	London, UK	19/11/2012
Sand dune hydro-ecology meeting	Wales, UK	9-11/09/2013
International LIFE plattform-meeting	Östersund, Sweden	24-26/09/2013
National LIFE-meeting	Vindeln, Sweden	8-9/10/2013
International LIFE plattform-meeting	Rovaniemi, Finland	10-12/06/2014
National LIFE-meeting	Söderköping Sweden	4-5/11/2014
Study trip to Danish LIFE-projects on Jylland	Jylland, Denmark	16-17/04/2015
Networking with LIFE Sandrasen i southern Sweden	Skåne, Halland	1-3/06/2015
National LIFE-meeting	Gotland, Sweden	25-26/05/2015
Continental Biogeographical Region Kick-off Seminar	Luxemburg	29/06-01/07/2015
Final conference of LIFE-Grace	Göteborg, Sweden	26-28/08/2015
International LIFE plattform-meeting	Jylland, Denmark	15-17/09/2015
Dune management workshop	Jammerbugten, Jylland	20-22/10/2015
International LIFE plattform-meeting, sand dunes	Amsterdam, Netherlands	15-17/06/2016
Sand-workshop on SER2016-conference	Munic, Germany	22-25/08/2016
Meeting with erosion researchers	Lund, Sweden	01/12/2016
National LIFE-meeting	Örebro, Sweden	9-10/11/2016
Joint study-trip with Sandrasen to other LIFE-projects	Czech, Slovakien	7-13/05/2017
International LIFE plattform-meeting, IAS	Milano, Italy	29-30/11/2017

The project has been invited to attend other LIFE-platform meetings to present the results, such as the sand dune meeting in Amsterdam by 15-17/06/2016 and the IAS-meeting in Milano by 29-30/11/2017, represented by CAB Skåne (Magnus Jönsson and Gabrielle Rosquist, respectively). CAB Skåne participated at the final seminar of Life-GRACE in Gothenburg in 26-28/08/ 2015 and discussed similar restoration activities, as well as, the importance of communicating with landowners, utilizers and the public.

Sand Life has completed two study-trips (report was attached by second Progress report by 30/10/2017 and on the project website www.sandlife.se) and hosted another Life project, the German LIFE Sandrasen during the project time. During 16-17/04/2015, project members (Maria Sandell, Gabrielle Rosquist, Magnus Jönsson, Marit Hedlund) were networking with Naturstyrelsen in Thy at Jylland in Denmark that are working in Life Redcoha and the former Life Overdrev. Removing Pine-plantations and *Rosa rugosa* were discussed and the restorations of the costal heaths with different kinds of methods was shown. We also discussed the different types of methods that they used for removing *Rosa rugosa* from the sand dunes. During 7-13/05/2017, a joint study-trip was completed by the project (Jörgen Nilsson, Karl-Johan Pålsson, Gabrielle Rosquist, Magnus Jönsson, Marit Hedlund, Gunilla Lundh) to Czech and Slovakia together with Life Sandrasen from Germany. Several Life-projects that have restored various sandy habitats was visited (figure 16). Experiences from our different projects were discussed and knowledge were shared. During 1-3/06/2015, the German Life-project Sandrasen visited Sand Life and discussed large scale restorations of sand dunes in Halland together with CAB Halland (Magnus Nystrand) and monitoring, scientific work, dune restorations, the challenge of mimicking the traditional

farming in sandy habitats and the public attitude to large restoration projects together with CAB Skåne (Maria Sandell, Gabrielle Rosquist, Marit Hedlund, Magnus Jönsson, Sara Sörensen) and Lund University (Pål Axel Olsson).



Figure 16. Sand Life visiting Zahorie military field in Slovakia in May 2017.

Lund University (Pål Axel Olsson) was invited to talk about reintroducing disturbance in coastal dunes and sandy grasslands and how to monitor the effect on disturbance adapted species at a dune management workshop in Jammerbukten in Denmark during 20-22/10/2015 and had a meeting with researchers about coastal erosions during 01/12/2016.

CAB Halland (Karin Hernborg and Jeanette Hansson) attended the Sand dune hydrology meeting in Wales with a talk during 9-11/09/2013 and restorations in dune systems were discussed (see presentation in first Progress report by 30/04/2014). During 29/06 – 01/07/2015 CAB Skåne (Maria Sandell) attended the Continental Biogeographical Region Kick-off Seminar in Luxemburg (presentation provided by Midterm report by 30/04/2016). The project was also invited on a sand-workshop at the SER 2016 conference in Munich, Germany, where CAB Skåne (Gabrielle Rosquist and Maria Sandell) attended with a presentation attached by the second Progress report by 30/10/2017.

The action has been very successful and the knowledge gained and the contacts established during the net-working have been valuable during the implementation of the project but also for the after-life work. The action is completed in time, with the change of placement for one of the museums explained above.

5.2.2.13. Action F.3 After-Life plan

Compiling the After-Life plan started in May 2018 and ended in July 2018. The time table for the After-Life plan has been kept as foreseen and no modifications have been made.

How the future management of the sandy habitats should be planned and designed are explained in an After-Life plan for the project. The focus in the plan is how to maintain the amount of sun-lit bare sand in the restored areas. Another large challenge is how to combat the IAS *Rosa rugosa* in the future. A slow succession of the vegetation will be allowed, but not the encroachment and, therefore, future monitoring will be important. There will also be need for continuing the information and dialogue around the sandy habitats. The future management of the protected areas, where the project sites are included is the CABs.

The After-Life plan was compiled at the end of the project and is available in Swedish (Annex 7.3.2.10) and English (Annex 7.3.2.11). Both versions are also available on the project website www.sandlife.se.

5.2.2.14. Action F.4 Financial audit

See the financial part in chapter 6.3.

5.2.2.15. List of dissemination deliverables

- Life-logos and Natura 2000-logos have been put on restoration plans, various agendas, participation lists, slides, roll-ups, posters, information signs, leaflets, demonstration sites, website, Instagram account, beach flags, roll-ups, table and benches etcetera (see further under actions A1, A2, D1, D2, D3, E1, E2, E3, E4, E5, E6, E7, E8, E9, E10, F2, F3).
- A total of 254 notice signs were produced according to plan (E1)
- Fifteen project folders and site-specific folders were produced (see further under E2)
- Two roll-ups and three posters (see further under E2)
- Beach-flag (see further under E2)
- Technical report of monitoring of habitat structures 2018 (D1)
- Technical report of monitoring of fauna and flora 2018 (D2)
- Plant report 2014 (see further under D2)
- Two reports about the Tawny pipit in 2013 and 2017 (see further under D2)
- Socioeconomic report 2018 (D3)
- Twelve outdoor museums produced (see further under E3)
- An Instagram account has started and was regularly used (E4)
- Information meetings and guided field tours held (see further under E5)
- Websites in Swedish and English (E6)
- Layman's report in Swedish and English (E7)
- Two workshops and three mini-workshops have been held (see further under E8)
- 52 benches and tables (E9)
- Manual of managing sandy habitats in Swedish and English (E10)
- After-life conservation plan in Swedish and English (F3)
- Overview of press cuttings (Annex 7.3.2.12) and the last press cuttings (Annexes 7.3.2.13 to 7.3.2.15)
- Social Media used (Instagram, Facebook)
- A selection of photographs (see memory stick)

5.3 Evaluation of Project Implementation

Methodology applied

The methodology applied aimed to restore the sandy habitats in the habitat directive to reach a state of favourable conditions and to create habitats that will be much easier to manage in the long term (i.e. after -life). The most important structure in the sandy habitats is warm bare sand that is mainly created by mechanical activities. Through the dissemination activities, the awareness has been raised among the public of the biologic values of sandy habitats and how the habitats need to be managed. Below, the success and failures of the different methodologies applied, the results of the actions conducted and the cost-efficiency of various actions is discussed.

Increasing the amount of bare sand in the sites and reducing the nutrition in the field surfaces:

- Deep excavations to get the nutrient free sand to the surface gives the best results, because the succession moves slower after-life and the results become more long-lasting. In calcareous areas, the lime content at the surface will also increase by deep excavations that in turn will favour the rare vegetation. Bulldozing is cheaper, but leave more nutrition at the surface and it is costly to remove the bulldozed material from the sites. To plough and harrow are the cheapest methods and give good results if the fields are lean from the beginning, otherwise the succession of the vegetation goes to fast and the action needs to be repeated shortly.
- The challenge was also how to reduce the nutrition loads in the sandy soils in cost-efficient ways. The most cost-efficient way to reduce litter and layers of mosses and lichens was through prescribed burnings, but the nutrition load in the soils will not be affected and burning is not always possible. Therefore, the top soil was removed by bulldozing and/or digging down the nutrient rich surface layers.
- The prescribed burnings should be done in a short period in early spring and the implementation is highly dependent on the weather, therefore, the burnings were not always possible as planned. Fire breakers needs to be created before burning and were in many areas done by top soil removal and bare sand was created that also contributed to the structures necessary for improving biodiversity in the sandy habitats.
- The possibilities to implement the action was limited due to various reasons unforeseen during the application. The rules of the subsidies to the farmers for grazing set limitations to create both the amount of bare sand at the grazed sites and the size of the patches. Historical remnants were much wider disposed in some sites than known from the beginning and resulted in limitations of how much digging that could be done or in pre-surveys of the remnants. We also had difficulties in getting access to military shooting areas, as well as the risk of unexploded ammunition left in the ground.

Creating a more open dune-landscape by removing planted or semi-natural trees and pulling stumps:

- The clearings in the coastal dunes have resulted in much more variable wooded dunes that approach the lighter open natural environments with sunlit forest gaps.
- It has been both difficult and costly to remove the logged material from the coastal dunes. Therefore, the stumps and the litter were excavated deep in the dunes in some sites and the created large amounts of bare sand as a positive result. However, this method is also costly, but give a more long-lasting result for the flora and fauna.
- Removing stumps was not possible in some sites due to historical remnants and the areas may be kept open by burnings in the future.
- Removing trees was sensitive in some coastal areas due to the historical problems with overexploitation leading to sand drift. Therefore, dissemination activities were of high value to raise awareness among the public of the biologic values of sandy habitats and how it needs to be managed.

Removing invasive alien species (IAS), especially Rosa rugosa:

- Several alien species (i.e. *Rosa rugosa*, *Pinus mugo*, *P. strobus*, *P. contorta* and *Populus balsamifera*) have been removed in the project sites and future spread has been stopped.
- When removing *Rosa rugosa* it is difficult to predict how deep the plant roots goes and therefore how large the volume is to be removed. Therefore, the diggings have been much costlier than originally calculated. It has also been a challenge to remove the root parts, especially when the roses grow on stony beaches. If the plant material had to be transported to deposit the costs also increase heavily.
- There will always be need for manually inspections after the roses have been removed to pull remnant plants, but this cost is insignificant compared to the actual excavating
- A positive side-effect when removing *Rosa rugosa* is the large amounts of bare sand that were created in the open sand dunes.

Removing encroachment mechanically or by grazing:

- Encroachment with bushes and smaller trees have been removed with machines and to avoid future encroachment, grazing has been introduced in some of the areas. Grazing is a cheap way to manage the open sandy habitats in the future.
- The permanent fences for grazing installed in the newly restored areas facilitates for the authorities to get farmers interested in having animals on these lean lands and in the project, all the fenced areas have also been grazed. In the start, the reimbursements to the farmers for keeping animals is necessary and well invested money for the future.

Increasing knowledge and awareness:

- The awareness among the public of the biologic values of sandy habitats and the acceptances for the restoration actions were raised through various dissemination activities. The result was much less or no protests to the actions and experiences to use in other areas.

The methods used to create a more open landscape with bare sand and less IAS are all meant to be best practice, however the methods needed some adaptations to certain habitats and conditions (see also the manual in Annexes 7.3.2.8 and 7.3.2.9):

- When removing tree plantations, the stumps needed to be pulled up and the litter removed and these actions did not follow a standard logging regime. The sand dunes were also more difficult to work in and needed heavier machines.
- The need for reducing IAS in the sandy habitats turned out to be more extensive than planned. To reduce the amount of material transported to deposit, the sand had to be sorted out and a sorting work needed to be adapted for this.
- To create bare sand, especially in the dune systems, a combination of dumper and caterpillar that bury the litter and the sand rich in nutrition seemed to be the most effective way of restoration.
- Due to collaborations with the Armed forces we managed to use splinter-protected dumpers when digging on the military fire fields, where there is a risk for unexploded ammunition in the ground.
- Prescribed burnings are easy and cost-efficient ways to reduce litter and the nutrition in the soil.
- It has not been easy and almost impossible to influence or change the system of subsidies for grazing, so that the system accepts the structures needed for the sandy habitats in the habitat directive.

Comparisons of results achieved against project objectives

When running a larger restoration project there are many challenges that may approach along the way and plans have to be adjusted to the realities out in the field and to a changing world. However, the results achieved at the end of the project overall shows that the objectives presented in the application were met (Table 13).

Table 13. Comparisons of results achieved against project objectives and evaluation of the actions.

Task	Foreseen	Achieved	Evaluation
Preparatory actions			
Revision of legal management plans (A1); no of sites	4	4	The revised plans were necessary to allow the full implementation of the restoration actions.
Site specific action plans (A2); no of sites	23	27	The restoration plans were necessary to determine the restoration and dissemination actions in the sites and have been successfully compiled together with stakeholders.
Call for tenders (A3)	not stated	41	A separate action for calls for tenders was necessary to show the time-consuming work with the action.
Analyses of soil chemistry (A4); no of sites	7	7	The knowledge about the lime content in the soil was necessary when planning the excavations in C2 to create the rare habitat 6120.
Restore, maintain and improve biodiversity in 23 Natura 2000-sites			

Clearing of woodland (C1); ha	333	478	Removing the alien tree species <i>Pinus mugo</i> was successful, as well as the clearing and stump pulling of other trees in the sand dunes. The calls for tenders to get new frameworks takes time and is partly out of control for the project. It is both difficult and costly to transport the wood out from the dunes.
Creating areas of bare sand (C2); ha	358	241	Bare sand has been created with various methods to obtain a mosaic of different kinds of sand patches that will have variable successions. The limitations by the subsidies to the farmers and the risk of unexploded ammunition restrained the action somewhat, but resulted in an implementation by deep-digging that will be more long-lasting.
Removal of <i>Rosa rugosa</i> (C3); ha	23,2	44,2	Removing the IAS <i>Rosa rugosa</i> is very important and the objectives was well achieved, however there are still more plants that needs to be removed. The action turned out to be more time-consuming and costly than planned. It was difficult to calculate the volumes to excavate, as well as the costs for depositing.
Prescribed burning (C4); no	68	94	Burning old vegetation and mosses/lichens is a cost-effective way to improve the sandy habitats. The burnings were also made by personnel at the CABs and therefore the internal knowledge has increased during project time, which will facilitate for future management. Good relationships have also been built up with the fire services in the counties and more consultants have the knowledge about burning through the project courses.
Firebreakers (C5); m	39 000	45 534	Fire breakers may be created by various methods and can preferably be made when creating bare sand. The excavated fire breakers will be more long-lasting and used for future burnings.
Clearing of encroachment (C6); ha	135,2	222	Removing encroachment was much cheaper than planned and therefore, larger areas were cleared.
Fencing (C7); m	15 950	16 172	There was less need for temporary fences in the sites, but advantages for future management were seen in introduced grazing and therefore, temporary fences were put up in Skåne. These fences also include other investments for grazing and resulted in significantly higher costs than planned.
Other investments for grazing (C8)			The investments were made when needed.
Management of heather (C9); ha	23	23	Removing the heather facilitates the future management with creating bare sand on the calcareous grasslands.
Reimbursement for grazing (C10); ha	120,5	139	Reimbursement were necessary to get grazing animals to the newly cleared areas. Since the fencing were done later than planned in the project, all the reimbursement could not be payed.
Construction of roads (C11); m	1 000	800	The road was constructed and used as planned. It will also be used for future restorations and managements.
Monitoring the impact of the project actions			

Monitoring habitat structures (D1)			The remote analysis was done by already existing aerial photographs, however, the after-action pictures were not available from the last years of the project and all actions could not be included.
Monitoring flora and fauna indicators (D2)			Monitoring flora and fauna is not easy because the species usually respond slowly to restoration activities. The results are also weather dependent and the last monitoring year 2017 was extremely cold and rainy. The corporation with LU have been a guarantee for a high standard on the surveys.
Monitoring socio-economic aspects (D3)			How to monitor socio-economic aspects has not been obvious in the project, therefore the conclusions were drawn from various aspects, each describing minor parts of the issue.
Increased awareness and acceptance			
Information signs (E1); no	138	200	The signs have been a key factor when increasing the knowledge directly in the sites.
Information leaflets (E2); no	13	15	The thematic folders have been very popular and handy to bring out on various meetings. The digital folders were a new way to disseminate information, they can easily be updated and have a longer duration.
Outdoor museums (E3); no	12	12	Producing the outdoor museums went well due to the great knowledge from KSTAD. The public has payed attention to the buildings and the media has picked it up.
Digital information (E4)			The digital technique changes too quickly and the suggested applications for mobile phones were already outdated when we were granted. Therefore, we were active on Facebook and Instagram instead and most probably reached a much wider audience.
Field excursions and information meetings (E5); no	178	250	The information meetings and guided field tours were successful to meet the landowners, stakeholders and public to discuss project objectives, the actions planed and the results.
Website (E6); no	1	1	Through the website, the ongoing activities were displayed, as well as the results. The number of visitors has been unexpectedly high.
Layman's report (E7); no	1	1	A good way to summarize the project, the results and the future.
Seminars and workshops (E8); no	2	2	The first workshop gave a good project-start for project partners and other participants. The final seminar was an excellent forum to disseminate project results to experts, decision-makers and the public. In between, appreciated mini-workshops were held in the tree counties to discuss the implementation of project action.
Management for visitors: tables and benches (E9); no	60	52 + 20	The tables and benches have provided the outdoor life with facilities to enjoy the restored areas.
Manual for management of habitats on sandy soils (E10); no	1	1	The manual was praised on the final conference and has thereafter been handed out on meetings and on request. A good way to summarize the project.
Project operation			

Project management (F1)			Partner meetings were held when needed, with many meetings in the beginning when starting all the project actions - first physical and thereafter mainly via Skype. Digital communication has facilitated the contacts between partners.
Net-working (F2)			Networking, international and national, has been an extremely valuable action and increased the knowledge of restoration and dissemination among the project partners, as well as spreading the results from Sand Life. However, too little time was planned for networking in the application.
After LIFE-plan (F3)	1	1	Produced at the end for future management.
Financial audit (F4)	1	1	The external auditor (approved by EC) has checked, inspected and reviewed the accounts and management of the project.

The preparatory actions were implemented as planned without any deviations. The process of creating new nature reserves is a challenge that succeeded within the project, but normally the process is difficult to complete in a limited amount of time. The content of the restoration plans was discussed during various meetings, a common template was established among the counties and the compiling was facilitated. Call for tenders takes time and slowed down the implementation of the restoration actions, but when the contracts are in place less time needs to be used for callings.

Restoring, maintaining and improving biodiversity in 23 Natura 2000-sites was done when implementing the actions shown in Table 13 above, where the respective results are displayed. The work has mostly been successful, but in some actions more difficult to implement due to different problems that were not foreseen in the application. This is discussed further under each action in sections 5.1.5 to 5.1.15 above.

Monitoring biodiversity is difficult and for many organism groups extremely weather dependent. The idea of letting the partner not responsible for the restoration actions be in charge of the monitoring is a good way to get independent results, but claims good corporation on the other hand. The monitoring was performed as planned in the application and despite the slow response on biodiversity after restoration actions there are very positive results shown in section 5.1.16 and 5.1.17 above. Within the short time since the implementation of project actions it is too early for the biodiversity to establish and develop into habitat types on a broader scale. Therefore, it has not been possible to map the extension of the different habitat types within the project. However, the mapping of habitat types will be included in the national bio-geographical monitoring of habitat types coordinated and financed by SEPA.

The most important way of increasing awareness of the biodiversity in sandy habitats and acceptance for the management methods has probably been the meetings with land owners, users and the public to discuss the sandy habitats and the need for management, actions that should not be underestimated. See the report on how the project has reached out to land owners and the public in section 5.1.18 above.

Visible project results

The actual restoration actions (C-actions) within the project are all clearly visible in the landscape. The wooded sand dunes have been much lighter due to the logged gaps and the

patches with white bare sand. The dunes have also been much more assessable to the outdoor life, because it is almost impossible to walk through areas with dense stands of *Pinus mugo* and, in the open dunes, *Rosa rugosa*. Removing encroachment have also resulted in an opener environment and have perceived positive by the public. The patches of bare sand in itself are highly visible and result in a more variable and warmer environment. During the springs, the prescribed burnings cannot be avoided by any visitors and during the burnings, there have also been possibilities to communicate the project with the public that have shown interests by asking questions. The fencing and the areas that now are grazed have created a new landscape.

Due to information directly out in field, with about 254 different kind of signs, the 12 outdoor museums and the guided field tours, it has been visible for the public that the restorations are going on, who is responsible and by whom it is funded. At the webpage, the Instagram and through various printed reports and leaflets, the results have been disseminated to a broader public.

The changes in habitat structures and target species diversity have been more difficult to show. Firstly, it takes time for biodiversity to respond on various kinds of restorations. For some organism-groups, like the Hymenopterans they can respond quickly on changes in the environment, while others, like the Gasteromycetes can take up to 20 years to show any changes. In the newly opened areas, the succession will start of the vegetation that slowly will develop into new stages and create new environments for the insect and bird fauna, as well as the sand lizard. Secondly, the weather has been another factor that has restricted the surveys. Unfortunately, the summer of 2017, when all the “after restoration” surveys were done, was rainy and cold. Especially the butterflies, that is extremely weather dependent, were almost impossible to monitor and the results could hardly be compared to the prior-restoration surveys. See also the two monitoring reports in Annexes 7.2.63 and 7.2.64.

However, there still are many visible biological results at the end of Sand Life. For example, the ongoing decrease in the population of the rare species *Anthus campestris* not only stopped, it even increased during the project time. Directly after creating bare sand in eastern Skåne the birds have been observed visiting the larger patches. The numbers of red-listed Hymenopterans were also observed patrolling the newly dug sand patches or even building nests within them the same spring after the restorations.

Effectiveness of dissemination

Reaching out to the target audience through different dissemination activities is important in such large restoration projects. It has been hard work with many ours spent on different activities and dissemination products, but gave good results. For example, the indignation from neighbors, including many with summer residences, at the nature reserve “Vitemölla och Havängs strandbackar” in Verkeåns dalgång before the project began. Through information meetings, guided field tours, dialogues, practical involvement and a slightly slower restoration process, the opinion changed and the actions were completed as planned. These experiences were used at another project site with many neighbors and summer residences, Hagestads naturreservat in Sandhammaren. A similar approach was used and combined with bus tours and talks to media with information about the objective habitats,

before starting with the actual restoration actions. At this site, the restorations resulted in almost no negative opinion.

Raising awareness among the public has also been an objective, but is almost impossible to evaluate. Contributions to the awareness raising have been through information meetings, press releases, articles in various papers, talks to different audiences, and the webpage that has a continuous raising number of visitors. The project has been present at several larger events where up to 40 000 visitors have attended, but it is difficult to know how many persons that leave the event with information from the project.

Information may fade away quickly and must be updated continuously. Despite larger information campaigns through various media, negative opinion may still pop-up after a while. For example, at Bökakusten there have been several information activities but when the opposition began immediately after the restorations started.

Building information centers as the outdoor museums have also been a success when informing the public, because people recognize the buildings from place to place. The signs that have been put up at several entrances to the sites have a similar, but smaller, effect.

The thematic leaflets produced in the project have been appreciated and successful and several requests of the leaflets have been made. However, the use of printed materials will be less in a more digitalized world and the possibilities to up-date the digital information is higher. Therefore, the digital leaflets made by CAB Halland will be more up-dated.

Information has been provided digitally by the project webpage and through Instagram. The webpage had between 200 and 600 visitors each month and must be regarded relatively successful, while the Instagram account had its followers (245 when the project ended) and may in the longer turn reach a wider audience. It is much more important to be digital today than when the project started, however the digital way change steadily and so must the project dissemination.

One of the most successful product was the manual produced at the end of the project. It was handled out on the project final conference and after that requested nationally, as well as from other countries. Through this manual the synthesis and the results from the project may spread broader and will be more long lasting.

5.4 Analysis of long-term benefits

Environmental benefits

The sandy habitats and sand specialists in Sweden used to be in poor condition, as could be seen in the national unfavourable status and negative trends reported through Article 17 to EC every six years. To enhance the status, large scale and in many cases drastic restorations of the sandy habitats have been done through Sand Life, as well as increased awareness and acceptance for the restorations. The acceptance for the most important structure, sunlit bar sand, in these habitats have most probably increased and resulted in restorations and management regimes outside Natura 2000-sites.

Through Sand Life, the conditions for conserving and developing the habitat types and species targeted within the project in the long term are thus good. However, biological processes respond slowly to changes in the environment and it will take time to see the full results from the restoration activities made in the project. Still we have shown that species respond positively to the restorations and this will improve the status for habitats and species

in the Habitat and Bird Directives. The southern Swedish sandy habitats make a substantial part of the sandy areas in the continental region of the country and the development will, hopefully, result in more positive results in forthcoming Article 17 reporting. These actions will also contribute to the EU's goal of halting the loss of biodiversity.

Sand Life has been one of the larger projects in Sweden focusing on removing IAS. Removing and eradicating IAS is in line with the EU-directive about invasive alien species (1143/2014) and will be of higher priority in the future, especially due to climate changes. The knowledge and acceptance about IAS has increased through the project.

Increasing the sunlit bare sand in the landscape have favoured the development of the amount of flowering plants, as well as the animal and fungi life in the sandy habitats. This improved condition of the sandy habitats may lead to more stable ecosystems that will be more resilient to changes in the climate.

Long term benefits and sustainability

Restoring a habitat is far more expensive than continuous management. Through the Life-project the larger scale restorations like removing forests, IAS and encroachment with bushes and smaller trees have been done. Valuable structures like bare sand has been created on various scales in the open landscape, as well as in the wooded dunes. Maintaining the bare sand is much easier and less costly than removing forests, encroachment or a dense root-cover of grasses. The future, less intensive management of the Natura 2000-sites are included in the management of protected areas in Sweden that are financed by SEPA. The management of the sites after-life will continue through the nature conservation units at the CABs. Information of the biological values in sandy environments and the need of management will be given by the CABs and others that are interested in the future development of the sandy habitats.

Through Sand Life the targeted habitats have been improved through increasing the amount of bare sand, as well as, some of their functions, like nectar sources. The species, such as the Tawny pipit, the Hymenopterans and the conservation values of the plants have increased in numbers. The ecosystems, where these species are included, will have become much more resilient that will result in long term sustainability of the species and become more equipped for today's and future climate changes.

The work of removing IAS in the landscape, especially *Rosa rugosa*, have been making large progress through the project. In some of the sites, the species is almost totally eradicated and the ongoing management will pull up remaining plants. Still there are sites with more *Rosa rugosa* that needs to be removed so that they do not spread further. However, even if we managed to remove them from the project-sites there will still be a threat from the remaining plants in the surrounding landscape. To handle IAS on a landscape scale, there will be need for national legislation and efforts need to be improved to be an effective tool to hold back IAS that are already established in the Swedish landscape.

Many consultants have been contracted during the project and have had opportunities to develop knowledge, equipment and machines for managing sandy habitats. After-life, many of these contractors may be contracted by the CABs or by others that work with nature conservation and restoring sandy habitats. For example, several Municipalities are working with similar restoration actions and for them then there will be contractors ready to help.

In the future, the threats from encroachment to the sandy habitats, especially due to atmospheric loads of nutrition, will remain and the yearly budget for managing habitats relative to the actual needs of management is uncertain. However, less large-scale restorations of sandy habitats in southern Sweden is expected and the management of the sites will be cheaper and less time-consuming and guided by the manual and the After-life plan (Annexes 7.3.2.10 and 7.3.2.11).

Best practice, replicability, demonstration, transferability, cooperation

Best practice in restoring and managing sandy habitats is still various mechanical methods creating sunlit, bare sand in the landscape. Best method depends on the conditions at each site and the type of target habitat. Loads of nutrition and litter are best burnt and the knowledge of prescribed burning of open grass- and heathlands has increased in the project. Thereafter can different methods be used to create patches of bare sand, like ploughing, bulldozing, excavating at various depths. Encroached sites need to be cleared first and wooded dunes opened and thinned. Removing the IAS *Rosa rugosa* needs planning and insight in how deep the roots can grow. If it is not possible to hide the root parts deep in the soil, they have to be burnt or deposited and to do this they need to be sorted out in a sorting plant. The methods used are mainly site-specific and leads to no major adjustments of the best practices. To demonstrate the project results various kinds of dissemination tools have been used (explained in section 5.2).

The manual for managing sandy habitats will provide good examples and therefore also enable other managers to replicate the restorations made within the project. Project staff have frequently been contacted by other managers that manage similar habitats. Through the After-life conservation plan, the intentions from the CABs on how to manage the sandy habitats in the future is shown.

The demonstration sites established with the permanent outdoor museums will be permanent marks in the landscape that inform about the need for managing sandy habitats and will tell about Sand Life as a good example. The restored sites will also serve as demonstration examples for others that will restore sandy habitats. The removal of an IAS is also one of the larger efforts in combating alien plants in Sweden and will therefore not only be a good example, but also an example of how costly it is.

Some of the experiences in how to handle pressure from the public has already been used within the project, but will also be useful in future dialogues for nature conservation.

Long term indicators of project success

The development of the sandy habitats and the target species for these habitats in the Habitat and Birds Directives are dependent on the restorations made in the project. The structures like bare sand will favor the nest digging bees and beetles, the germination of herbs and the development of the unique fungi-society on dry sandy soils. The improved micro climate, with a warmer temperature will favor species with a south eastern European distribution. The removal of IAS is as important as the creating bare sand and will create larger areas of habitat and reduce the future threats in the sites. The long-term effect of the project on the sandy habitats and target species in the Habitat and Bird

Directives will be shown in future surveys (outside the project period) of protected areas by the CABs.

The sandy habitats and ecosystems in southern Sweden are once again thriving and the project has had positive feedback from experts and national authorities on the results. Through information signs, outdoor museums and leaflets, knowledge regarding the investment from the Life-project and the importance of biodiversity has reached the public.

6. Comments on the financial report

6.1. Summary of Costs Incurred

The costs incurred are summarized in Table 14 below covering 01/08/2012 project until 31/07/2018. The total cost for the project is EUR 7 548 226, which is 96,2 % of the total budget.

Table 14. The summarized costs per budget category incurred in the project during the period 01/08/2012 and 31/07/2018.

PROJECT COSTS INCURRED			
Cost category	Budget according to the grant agreement*	Costs incurred within the project duration	% **
1. Personnel	2 103 378	1 771 034	84,2 %
2. Travel	133 977	74 153	55,3 %
3. External assistance	4 801 215	5 034 515	104,9 %
4. Durables: total <i>Equipment</i>	7568	17 618	232,8 %
5. Consumables	184 040	134 081	72,9 %
6. Other costs	106 709	49 177	46,1 %
7. Overheads	513 418	467 649	91,1 %
TOTAL	7 850 305	7 548 226	96,2 %

Personnel costs

The total personnel cost for the project EUR 1 771 034 (84,2 % vs. budget) is a bit lower than budgeted for CAB Skåne (76,2 %), LU (94,8 %) and KSTD (77,0 %). Moreover, CAB Halland (100,5 %) and CAB Kalmar (106,3 %) has spent a bit more than budgeted. Since the Midterm report our spending level has increased as expected, mostly because of all the work in the end of the project.

CAB Skåne

The wage rate of Paul-Eric Jönsson (Senior Advisor during 2018) exceeds the budgeted rate (EUR 326 vs actual rate EUR 518) because he worked as Senior Advisor in the end of the project to help wrap the end of the project. The wage rate of Mikael Sörensson (Field Guide

during 2014 and 2015) exceeded the budgeted rate (EUR 326 vs actual rate 2014 EUR 563 and 2015 EUR 528) due to his wage level was a bit higher. We hired Mikael because of his expertise within entomology and species knowledge. In 2016, Sara Sörensen (Financial Manager) had an overall low number of annual productive hours because she was on sick leave for most of the year. Therefore, she has exceeded the budgeted daily rate (EUR 345 vs actual rate EUR 633). According to Swedish employment law (statutory local reference: 1991:104) sick-pay must be paid to employees, even if they are not working.

The worked hours during 2013 and the salary for Johan Johnmark are adjusted accordingly with the exact hours reported to cover the period for which the personnel costs were reported. This is reflected in the CAB individual cost statement.

CAB Halland

The wage rate of Karin Hernborg (Coordinator) in 2014 are higher than the budgeted rate (EUR 345 vs actual rate EUR 465) because of Karin has had sick-leave for 120 hours during the year. The base salary includes retroactive salary of 3 000 SEK, on top of that is vacation pay (according to local law). There is also costs for sick-pay equal to 13 554,05 SEK.

CAB Kalmar

The salary costs for Åsa Johansson (Coordinator) in 2016 was higher than the budget rate (EUR 345 vs actual rate EUR 422) and this was because of her Manager salary. She covered during vacancy when the former project Coordinator, Johan Jansson, quit his job.

2%-rule

We comply with the 2%-rule as a project. The total salary costs for permanent staff in the project is EUR 1 571 203 and the total own financing and contribution for all beneficiaries is EUR 1 722 675. The financing rate is 109,6 %. The total cost for temporary staff is EUR 199 831 (for CAB Skåne EUR 56 166 and for LU EUR 143 665).

Travel costs

Travel costs has a final spending rate of 55,3 %. The low spending is mostly because of being cost-efficient when having meetings within the project, for example discussing the implementation of several actions in the project during the same meeting. In the budget, the travel costs were calculated per action based on a standard rate and the efficiency reducing the number of travels was unforeseen in the application, so therefore the lower spending.

There was a late payment in August 2018 of the travel invoices Seq. no. 278 – 279 for CAB Skåne. The late payment was due to lack of project reference. The invoices arrived in June 2018, but due to the missing project reference, they were sent back and new invoices were requested. Since there were several invoices sent to CAB Skåne at the same time there become misunderstandings from the hotel and when everything was sorted out, the date of payment has passed the end of the project, the 31st of July 2018.

The travel costs for LU in the Seq. no 15 – 20 and 22 were paid after the project ended due to costs reported during the summer holiday season, when the approval of costs took longer than usual during the rest of the year.

The calculations of travel costs when using private cars for CAB Skåne, CAB Kalmar, CAB Halland and LU is based on Swedish tax law (rules in English about per diem and car allowances can be found here:

<https://www.skatteverket.se/download/18.b1014b415f3321c0de4f00/1512649533335/per-diem-and-car-allowances-skv315-6B-utgava08.pdf>).

External assistance

External costs are 104,9 % of the total budget for this budget category. We have spent more than EUR 1,1 million since the second Progress Report, which is more than forecasted (EUR 900 000) when that report was written.

The restoration actions in invoice 2815-00002341 (CAB Skåne) is relating to the creation of smaller sandy areas (action C2) within a larger area where trees and bushes were removed (action C1). JKN was the cheapest contractor for removing trees and stumps and was contracted for this action. For environmental reasons, we decided that JKN would also make the smaller C2-action when already out in the dunes to avoid the transportation of an additional machine from another contractor. In the hilly dune-landscape, it was necessary to use the special equipment (long reaching arm). However, JKN and CAB Skåne agreed on a cost of 820 SEK/hour, instead of 1030 SEK/hour (in contract). The evaluation committee report and all framework contracts signed with JKN Entreprenad is attached in Annex 8.7.5.

CAB Skåne external invoices Seq. no 255 was paid after the project end due to a combination of an invoice that arrived in the last minute and the vacation of the person at CAB Skåne. The work resulting in invoice Seq. no 259 was done in May/June, but the invoice did not arrive in time from the vendor (Naturcentrum) in order for the payment to be made in June and was therefore payed after the project end. The invoice with Seq. no 266, the printing of folder made in June 2018, was sent to us in August 2018, when the company reopened after the summer vacation during July and early August.

CAB Halland, the invoice Seq. no. 367-368 with the invoice number 14466 was delayed due to the invoiced amount being incorrect. After discussion with the contractor it was agreed that he would send a credit-invoice (see Seq. no 369, 14482) to correct this. The credit was also delayed because it turned out that the contractor didn't fulfill some of the demands in the contract. Until this was cleared up we could not pay the contractor. The payment was eventually done 30/08/2018.

The need for investigating historical remnants at Skedeås (discussed under section 5.1.2 above) generated a cost of EUR 8 962, unforeseen in the budget. Explanation was included in the Midterm report by 30/04/2016 and mentioned in the EC letters dated 01/07/2015 and 27/05/2016.

Equipment

The costs for equipment were budgeted up to EUR 7 568, while the expenditure was EUR 16 794 Euro, i.e. 232,8 % of the budget category. The higher expenditure was due to the purchase of an ATV, unforeseen in application, instead of the budgeted deep plough as durable goods. The costs for an ATV was almost double compared to the deep plough. However, during the monitor meeting 05-06/05/2015, we were encouraged to report the

whole cost of the ATV by the monitor and the replacement was approved in the EC-letter by 01/07/2015. The ATV purchased in 2015 was stolen and a new was bought in 2016 as also stated in the EC-letter by 18/07/2016 under the bullet 11. However, the xx did not result in higher costs for the ATV in the project. Further explanations are given in the Midterm report by 30/04/2016 and in the Technical part in this report.

Consumables

Total cost for Consumables in the budget is EUR 134 081 or 72,9 % spent in this category.

For CAB Skåne, the payment of Seq. no. 106 was paid late due to that the bills for our internet subscription only bills us every second month. The invoice therefore came in one month later and was paid by 31/08/2018.

The iPads, drone and two cameras bought for the project are according to Swedish accounting regulations not treated as equipment and are therefore booked in the consumables budget category.

Other Costs

The total of Other Costs is EUR 49 177 which is equal to 46,1 % of the budget spent.

Actions C10 and E1, equals an increase of cost of about EUR 10 000 since the second Progress Report.

6.2. Accounting system

The accounting systems are the same as stated in section 6.2 of the Midterm Report by 30/04/2016. The same is for processing invoices and partnership arrangements described under the same section.

6.3. Auditor's report/declaration

We have described in the Midterm report by 30/04/2016 that the Independent supervising financial auditor Peter Ohlson, CAB Stockholm, Regeringsgatan 66, 111 39, Stockholm, Sweden will audit the Final financial statements of all partners. The full audit report according to common provisions is found in Annex 8.10.

6.4. Change of bank account

CAB Skåne has changed bank account from Nordea to Danske bank. Accordingly, an updated financial identification form can be found in Annex 8.9.

6.5 Summary of costs per action

Table 15 below shows the costs incurred per action from the start of the project up to 31/07/2018.

Table 15. The costs incurred per action and budget category from 01/08/2012 to 31/07/2018.

Action no.	Short name of action	1. Personnel	2. Travel and subsistence	3. External assistance	4.b Equipment	6. Consumables	7. Other costs	TOTAL
A.1	Revision of legal management plans for nature reserves	40 838	870	-	-	-	1090	42 798
A.2	Site specific action plans	88 622	2 841	10 989	-	11477	-	113 929
A.3	Call for tenders	50 645	69	-	-	-	-	50 714
A.4	Analyses of soil chemistry	6 707	489	37 586	-	-	-	44 782
C.1	Clearing of woodland and pine plantation	83 699	5 683	1546 698	-	2 281	-	1 638 361
C.2	Creating areas of bare sand	148 982	4 163	1456 006	-	-	-	1 609 151
C.3	Removal of Rosa rugosa	20 735	1408	1053 228	17 618	-	-	1 092 989
C.4	Prescribed burning	39 166	1 159	80 105	-	-	-	120 450
C.5	Fire breakers	2 912	115	10 219	-	-	-	13 246
C.6	Clearing of encroachment	39 814	1285	302 664	-	798	-	344 561
C.7	Fencing	15 352	493	114 644	-	2 953	363	133 805
C.8	Investments for grazing, other than fencing	3 661	436	16 882	-	-	-	20 979
C.9	Management for heather	10 444	444	26 103	-	-	-	36 991
C.10	Reimbursement for grazing	1367	-	3 376	-	-	18 258	23 001
C.11	Construction of roads	169	29	16 919	-	-	-	17 117
D.1	Monitoring the impact of project actions; 1. Habitat structures	42 065	1254	16 977	-	-	-	60 296
D.2	Monitoring the impact of project actions; 2. Flora and fauna indicators	212 285	11200	28 754	-	259	-	252 498
D.3	Monitoring the impact of project actions; 3. Socio-economic aspects	1878	-	-	-	-	-	1 878
E.1	Information signs	39 236	87	115 535	-	-	9 866	164 724
E.2	Information leaflets and rollups	15 273	-	35 979	-	623	3 471	55 346
E.3	Demonstration sites/Outdoor museum	36 144	326	79 908	-	97 160	-	213 538
E.4	Digital information	1602	90	-	-	-	-	1 692
E.5	Field excursions and information meetings	79 960	5350	18 368	-	2 495	13 202	119 375
E.6	Website	7 289	3 108	3 065	-	-	229	13 691
E.7	Layman's report	537	-	-	-	-	-	537
E.8	Seminars and workshops	47 625	8360	1691	-	11320	1349	70 345
E.9	Management for visitors: tables and benches	4 343	167	48 057	-	-	-	52 557
E.10	Manual for management of habitats on sandy soils	36 020	342	2 094	-	4 212	-	42 668
F.1	Project management	647 316	4 091	467	-	194	230	652 300
F.2	Net-working	46 326	20304	-	-	309	1116	68 057
F.3	After LIFE-plan	-	-	-	-	-	-	-
F.4	Financial audit	-	-	8 200	-	-	-	8 200
Over-heads								467 649
	TOTAL	1771 034	74 153	5 034 515	17 618	134 081	49 176	7 548 226

A-Actions

The preparatory actions finally reached 76 % in spending, compared to 74 % reported in the second Progress Report by 30/10/2017. The difference of about EUR 8 000 between the second Progress Report and the Final report is mainly due to an increase in action A2. This is as planned and mentioned in the Midterm report by 30/04/2016.

C-Actions

We have spent 108,8 % of the total budget for the C-actions. In the second Progress Report by 30/10/2017, our intention was to spend the remaining budget. The increase in costs (EUR 1 135 076) since August 2017 is mostly due to costs in actions C1 and C2 but also about EUR 260 000 in C3 and C6 altogether.

D-Actions

A total of 79 % of the budget in the D-actions has been spent. The costs of actions D1 and D2 have increased, that was as forecasted in the second Progress Report by 30/10/2017, with approximately EUR 124 000 since 31/07/2017. The increase in action D3 was comparably large since last report (increase by EUR 1 528).

E-Actions

The information actions have a total cost of EUR 738 452, which is 69 % of the budget on the E-actions. The manual for habitats on sandy soils (E10) has now been finalized and E8 costs increased approximately 30 000 EUR since the second Progress Report by 30/10/2017. Moreover, E3 has increased with about EUR 12 000 for CAB Halland, EUR 10 000 for CAB Kalmar and 4 000 for KSTD since 31/08/2017. In total, 78 % of the E8 budget was spent, including the final project conference in May 2018.

F-Actions

The final spending vs budget in the F-actions section is 81,04 %. In the second Progress report by 30/10/2017, we have spent EUR 566 015 compared to EUR 728 558 in this report.

A total of 79 % on Project Management (F1) has been spent. The Project Coordinator (CAB Skåne) and the Financial Manager (CAB Skåne) has in total worked 1 195 days vs the budgeted 1 646 days. The Project Coordinator was budgeted 100 % on the project but less time were needed. The Financial Manager (Sara Sörensen) started to work in the project in February 2013 and therefore, no costs were obtained during the period from August 2012 to January 2013. and was in April 2016 replaced by Erik Schenström. The low costs for the Financial Manager compared to budget was also due to the sick-leave in 2015 and 2016 for Sara Sörensen.

The auditor Peter Ohlson of CAB Stockholm, mentioned in the Midterm Report by 30/04/2016 (as chosen auditor according to regulations in common provisions) has done the audit of the project (F4). He paid two visits to the CAB Skåne's office in Malmö, during his pre-audit on 11th– 13th of June 2018 and final audit on 1st – 3rd of October 2018 (Audit Report attached in Annex 8.10).

6.6. Individual and consolidated cost statements

Signed Financial statements is found in Annexes 8.1, 8.2 and 8.3.1 to 8.3.5. Full financial statements (induvial- and consolidated) as USB-key is found in Annexes 8.4.1 to 8.4.5 and 8.5.

6.7. EC-letters, financial annexes

Requested supporting documentation mentioned in the EC-letter can be found in the Annexes 8.6.1 – 8.6.5, 8.7.1 – 8.7.5, 8.8.

7. Annexes

7.1 Administrative Annexes

- 7.1.1 EC-letter by 27/05/2016
- 7.1.2 EC-letter by 18/07/2016
- 7.1.3 EC-letter by 12/10/2017
- 7.1.4 EC-letter by 15/05/2018
- 7.1.5 List of the administrative annex submitted to EC from August 2012 to July 2018

7.2 Technical Annexes

- 7.2.1 Location-map Verkeåns dalgång
- 7.2.2 Location-map Kiviks marknadsplats
- 7.2.3 Location-map Friseboda
- 7.2.4 Location-map Gropahålet
- 7.2.5 Location-map Möllegården
- 7.2.6 Location-map Klammersbäck
- 7.2.7 Location-map Bjärekusten
- 7.2.8 Location-map Ängelholms strandskog
- 7.2.9 Location-map Lyngby
- 7.2.10 Location-map Rinkaby
- 7.2.11 Location-map Ravlunda
- 7.2.12 Location-map Falsterbohalvön
- 7.2.13 Location-map Sandhammaren
- 7.2.14 Location-map Falsterbo skjutfält
- 7.2.15 Location-map Kabusa
- 7.2.16 Location-map Revingefältet
- 7.2.17 Location-map Åby sandbackar
- 7.2.18 Location-map Gårdby sandhed
- 7.2.19 Location-map Skedeås
- 7.2.20 Location-map Bödakusten västra
- 7.2.21 Location-map Bödakusten östra
- 7.2.22 Location-map Laholmsbuktens sanddynsreservat - Gullbranna
- 7.2.23 Location-map Laholmsbuktens sanddynsreservat - Hökafältet
- 7.2.24 Location-map Laholmsbuktens sanddynsreservat - Tönnersa
- 7.2.25 Location-map Haverdal
- 7.2.26 List of nature reserves produced
- 7.2.27 List of site-specific action plans produced
- 7.2.28 Map C1 Verkeåns dalgång
- 7.2.29 Map C1 Kiviks marknadsplats
- 7.2.30 Map C1 Friseboda
- 7.2.31 Map C1 Gropahålet
- 7.2.32 Map C1 Möllegården
- 7.2.33 Map C1 Ängelholms strandskog
- 7.2.34 Map C1 Rinkaby
- 7.2.35 Map C1 Ravlunda
- 7.2.36 Map C1 Sandhammaren

- 7.2.37 Map C1 Falsterbo skjutfält
- 7.2.38 Map C1 Skedeås
- 7.2.39 Map C1 Bödakusten västra
- 7.2.40 Map C1 Bödakusten östra
- 7.2.41 Map C1 Laholmsbuktens sanddynsreservat - Gullbranna
- 7.2.42 Map C1 Laholmsbuktens sanddynsreservat - Hökafältet
- 7.2.43 Map C1 Laholmsbuktens sanddynsreservat - Tönnersa
- 7.2.44 Map C1 Haverdal
- 7.2.45 Map C3 Verkeåns dalgång - Vitemölla
- 7.2.46 Map C3 Friseboda
- 7.2.47 Map C3 Bjärekusten
- 7.2.48 Map C3 Ängelholms strandskog
- 7.2.49 Map C3 Ravlunda
- 7.2.50 Map C3 Falsterbohalvön
- 7.2.51 Map C3 Revingefältet
- 7.2.52 Map C3 Bödakusten östra
- 7.2.53 Map C3 Laholmsbuktens sanddynsreservat at Gullbranna
- 7.2.54 Map C3 Laholmsbuktens sanddynsreservat at Hökafältet
- 7.2.55 Map C3 Laholmsbuktens sanddynsreservat at Tönnersa
- 7.2.56 Map C3 Haverdal
- 7.2.57 Map C7/C8 Verkeåns dalgång at Bosarp
- 7.2.58 Map C7/C8 Möllegården
- 7.2.59 Map C7/C8 Sandhammaren at Hagestad-Järarna
- 7.2.60 Map C7/C8 Laholmsbuktens sanddynsreservat at Hökafältet
- 7.2.61 Map C7/C8 Laholmsbuktens sanddynsreservat at Tönnersa
- 7.2.62 Map C7/C8 Skedeås
- 7.2.63 Rapport D1 - EN
- 7.2.64 Rapport D2 - EN
- 7.2.65 Rapport Fältpiplärka - SWE (D2)
- 7.2.66 Rapport D3 -SWE
- 7.2.67 Slaget om talldungen, Sebastians examensarbete (D3)

7.3 Dissemination Annexes

7.3.1 Layman's report

- 7.3.1.1 Layman's report SWE (E7)
- 7.3.1.2 Layman's report ENG (E7)

7.3.2 Other dissemination Annexes

- 7.3.2.1 Presentation (example)
- 7.3.2.2 Sign Sandhammaren-Backåkra
- 7.3.2.3 Sign Sandhammaren-Hagestad
- 7.3.2.4 Sandmarksfolder (E2)
- 7.3.2.5 Poster *Rosa rugosa* (E2)
- 7.3.2.6 Final conference program and participant list (E8)
- 7.3.2.7 Final conference field-trip program (E8)
- 7.3.2.8 Manual SWE (E10)
- 7.3.2.9 Manual ENG (E10)

- 7.3.2.10 After Life Skötselplan (F3)
- 7.3.2.11 After Life Conservation Plan (F3)
- 7.3.2.12 Overview of press-cuttings
- 7.3.2.13 Press-cuttings 1
- 7.3.2.14 Press-cuttings 2
- 7.3.2.15 Press-cuttings 3
- 7.3.2.16 A selection of photographs (memory stick)

7.4 Final table of indicators

- 7.4.1 Outcome indicators in Sand Life

8. Financial report and Annexes

8.1 Standard Payment Request and Beneficiary's Certificate

8.2 The Consolidated Costs Statement for the Project

8.3 Signed Financial Statement

- 8.3.1 Signed Financial Statement of the Individual Beneficiary CAB Skåne
- 8.3.2 Signed Financial Statement of the Individual Beneficiary CAB Halland
- 8.3.3 Signed Financial Statement of the Individual Beneficiary CAB Kalmar
- 8.3.4 Signed Financial Statement of the Individual Beneficiary KSTAD
- 8.3.5 Signed Financial Statement of the Individual Beneficiary LU

8.4 Full Financial Statement

- 8.4.1 Full Financial Statement of the Individual Beneficiary CAB Skåne (USB-key attachment)
- 8.4.2 Full Financial Statement of the Individual Beneficiary CAB Halland (USB-key attachment)
- 8.4.3 Full Financial Statement of the Individual Beneficiary CAB Kalmar (USB-key attachment)
- 8.4.4 Full Financial Statement of the Individual Beneficiary KSTAD (USB-key attachment)
- 8.4.5 Full Financial Statement of the Individual Beneficiary LU (USB-key attachment)

8.5 CAB Skåne Beneficiary's Certificate for Nature and Biodiversity Projects

8.6 Supporting documents

- 8.6.1 CAB Skåne, Supporting documents personnel costs for Gabrielle Rosquist – 2012-2018
- 8.6.2 LU, Supporting documents personnel costs for Pål-Axel Olsson – 2012-2018
- 8.6.3 CAB Kalmar, Supporting documents personnel costs for Johan Jansson – 2012-2018
- 8.6.4 CAB Halland, Supporting documents personnel costs for Magnus Nystrand – 2012-2018
- 8.6.5 KSTD, Supporting documents personnel costs for Carina Wettemark – 2012-2018

8.7 Invoice and payment

- 8.7.1 CAB Skåne, copy of the invoice and payment of proof External assistance transactions seq. no. 89, 90, 100, 101 and 151
- 8.7.2 CAB Halland, copy of the invoice and payment of proof External assistance transactions and 119 and 121

- 8.7.3 CAB Halland, the supporting documentation for the selection of the two subcontractors mentioned (procurement documents Seq. no. 119 and 121)
- 8.7.4 CAB Halland, the publication notices to VISMA or justify it was not published via this tool and should also annex the evaluation committee report together with all framework contracts signed with OSKARSBERG ENTREPRENAD AB.
- 8.7.5 Evaluation Committee report together with all framework contracts signed with JKN ENTREPRENAD AB

8.8 Internal audit policy CAB Stockholm and organogram

8.9 New bank and new account number_financial ID_form

8.10 Independent Auditor's report