



LIFE Project Number  
**LIFE15 NAT/CZ/000818**

**Mid-term Report**  
**Covering the project activities from 07/07/2016<sup>1</sup> to 30/09/2018**

Reporting Date  
**21/12/2018**

LIFE PROJECT NAME or Acronym  
**LIFE for Minuartia**

Data Project

<b>Project location:</b>	Želivka SCI and Hadce u Hrnčír SCI
<b>Project start date:</b>	07/07/2016 <sup>1</sup>
<b>Project end date:</b>	31/12/2020 <b>Extension date:</b> non applicable
<b>Total budget:</b>	735 940 €
<b>EU contribution:</b>	551 954 €
<b>(%) of eligible costs:</b>	75%

Data Beneficiary

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<sup>1</sup> Expected project start date was 07/07/2016, but the Grant agreement was signed on 27/07/2016

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## 2. List of key-words and abbreviations

AOPK	- Nature Conservation Agency of the Czech Republic
B1	– old mine in Želivka SCI near Želivka stream
B2	– part of Želivka SCI on the steep slopes of Želivka stream
CP	– Central part of Želivka SCI
CSOP	–The Czech Union of Nature Conservation, Vlašim Basic Organization
DK1, DK2, DK4 and DK5	– parts of Želivka SCI on the steep slopes of the Sedlice stream
DK3	– part of Želivka SCI near the road to Borovsko
GA	- Grant Agreement The rescue of endemic priority plant species <i>Minuartia smejkalii</i> , LIFE15 NAT/CZ/000818
IBOT	– Institute of Botany of the Czech Academy of Sciences
MŽP	- Ministry of Environment
SCI	- Site of Community Interest
PR1	- the first Progress Report of this project
MtR	- the Mid-term Report of this project

## 3. Executive Summary

Priority objective is setting up sustainable and feasible management of sites with *Minuartia smejkalii* (*M. smejkalii*) populations and to enhance its population size by about 40%. Two activities were already finished and the remaining once are in progress. The project aim is thus realistic and effective and will be achieved.

Under the A activities, we annually mapped the distribution of single individuals of the species and their size and flowering under different habitat conditions and used this information for description of plant life cycle under different habitat quality. This knowledge was used to guide management interventions (A2). We prepared more than 11 000 seeds and almost 3 000 juvenile plants for enhancement of population size in-situ and for setting ex-situ populations (A3 activity). One of the populations (DK1) produced very few seeds. We thus decided to prolong the activity A3 and C2 until the autumn 2020 to ensure that the population DK1 will be self-reproductive after the project end. Evaluation of genetic diversity of the populations and reproductive ability of inter-population hybrids showed that it is possible to mix populations within regions for ex-situ conservation. The two regions should, however, be kept separately. Rock outcrop was built in the external exposition of the Visitor Centre of Želivka SCI Vodní dům (A4). The action A5 - Rescue planting in private garden focused on developing legal framework for the action (its compliance with the Law about Conservation of Nature and Landscape) and concept of convention with involved people. New questions about the

protection of the second generation of plants (F2) and ownership of the individuals arose and will be solved in 2019. We prepared the draft of the methodology and instruction leaflet for the gardeners. Up to know, 18 people expressed their interest in the program and the rock outcrops were built on 14 places and planted with the species (715 individuals in total). The people were trained prior obtaining the plants.

Revitalization of habitats (C1 action) started on both SCI areas. Mowing was applied twice a year on Central part of Želivka SCI on area 6 ha from 2017 (3 ha were mulched prior to mowing) and on 4 ha three times a year instead of forest grazing (1 ha was mulched prior to mowing). In 2018, the mowing started also on B2 part (area 0.3 ha). Manual removing of expansive plants was aimed on suppression of *Vincetoxicum hirundinaria* (DK1, 140 m<sup>2</sup>), mosses and grasses (DK2, B1, B2, 700m<sup>2</sup>). We also included manual removal of juvenile *Frangula alnus* in Central part on area 12.8 ha, which will be repeated every year. On selected patches we start testing of suppression of *Calamagrostis* sp. using hemiparasitic *Rhinathus alectorolophus*. The removal of humus layer was done on almost 6 000 m<sup>2</sup>. The tree cutting was applied on the area 17.3 ha, while originally planned only on 7 ha project ha. To reduce intensive grazing by wild animals, the 4 most grazed rocks were fenced. To block human access to the B1 sites and stop the dumping of waste, a barrier was placed at a forest path. The first long-term convention was signed with the owner of Hadce u Hrnčír SCI.

Enhancement of natural populations (C2 action) was done by sowing of almost 4 000 seeds and transplantation of 584 juvenile plants. Since the DK1 population is still very small, we will continue with this action until the end of project.

Ex-situ population at the Visitor Centre of Želivka (C3 action) was established by sowing of 2294 seeds and transplantation of 1689 juvenile plants. We collected seeds from plants in this ex-situ population and use them for preparation of juvenile plants for reintroduction of the species at a locality where it went previously extinct. The reintroduced population was established by transplantation of 1 101 juvenile plants.

The Rescue planting in private gardens (C4 action) was initiated by signing of conventions with 14 people and transplantation between 5-150 juvenile plants per garden. We started with preparation of final methodology and instruction leaflet.

All D activities started in 2018. Evaluation of impact of management interventions (D1 action) showed strong positive impact on *M. smejkalii* population size and vegetation composition on B1 and DK3 localities. The target population size in the nature was initially set to 589 individuals (i.e. enhancement of population size by 40%). Recently, the population size in the nature is 837 individuals (without transplanted plants). The project thus reached the planned population size. Enhancement of population size (D2 action) in the nature by sowing was not successful since we observed only 14 seedlings. In contrary, transplanted juvenile plants had high survival rate in a range 64.5% and 79.8%. We thus selected the transplantation of juvenile plants as a suitable method for enhancement of population size. The survival rate in ex-situ population (D3 action) was low, only 13.5% due to instability of the rock. Nevertheless, the plants produced seeds with high germination rate. The planting success in private gardens (D4 action) was garden dependent. While on some gardens all plants went extinct, other gardens had almost 100% survival. The first season, however, showed that the gardeners are not able to fill the evidence list. The list will be thus simplified.

Evaluation of ecosystem services (D5 action) showed that benefit of project on services could be positive or negative depending on the selected method of evaluation. While according to MAES and BVM method the impact will be positive, the EWVM method shows negative impact. Socio-economic impact (D6 action) focused mainly on tourisms, business,

employment, engagement of general public and institution, connection of scientific organization and organizations dealing with nature conservation.

Enhancement of public awareness (E1 action) was based on preparation of promotion items (stickers, posters, postcards, DIY jewels, T-shirts, cups). We regularly updated web sites, social networks and other media. In the Visitor Centre, we prepared two environmental education programs related to the project and placed interactive elements. We installed all notice boards, build tourists information point with information panels and propagate both SCI areas within the geopark Kraj Blanických rytířů. We organized 4 competitions for children and seminar dealing with economic utilization of NATURA 2000 sites. Dissemination of project results (E2 action) was done by contact with other project, discussion with locals in the villages as well as in the field, by many media outputs (papers, TV reports), presentation on international conferences and attendance on many meetings.

## 4. Introduction

The project objective is to rescue priority endemic species *M. smejkalii* whose worldwide distribution is currently limited only into two locations (Hadce u Hrnčír SCI and Želivka SCI). **Background:** Population *M. smejkalii* on both sites had been rapidly decreasing (from 1252 individuals in 2011 to 434 individuals in 2015), and in some parts of the Želivka SCI population was already extinct.

**Problems (solved):** The main reasons for the decline of the population size were human activities associated with forestry leading to formation of dense and shaded pine forests (190,160,162, 990). The forest floor in these forests is covered by high litter and humus layer (990, 420). In these conditions, plants adapted to specific substrates are quickly suppressed and replaced by plants of acid substrates or by competitively stronger plants (971). On one site plants were destroyed by intensive grazing (976) and illegal dump (740, 251). Other problem on both sites were plant collection and vandalism, which lead to direct devastation of individual plants (740, 251)

**Objectives:** The main aim of the project is to enhance population size of the endemic priority species *M. smejkalii* by about 40% by means of suppression of these key negative factors and setting up sustainable and feasible management of the sites by following sub aims:

- 1) Revitalization of natural sites by combination of various management best practices on 17 ha
- 2) Establishment of self-sustainable ex-situ conservation to be used for plant reintroduction on recently extinct site
- 3) Direct enhancement of particular population size in the nature (Želivka SCI) by sowing of seeds and plant transplantation by about 30%
- 4) Prevention of vandalism and plant collection by a) adoption of a Swiss approach, which has never been implemented in the Czech Republic and directly involves local people to plant protection and by elimination of creation of black dump at the locality leading to reduction of loss of plants due to these causes by 90%
- 5) Enhancement of awareness about serpentine phenomenon and NATURA 2000 and dissemination of results on local as well as EU level to 60 000 people by presentation on and organization of seminars, workshops, conference and preparation of an environmental education programme etc.

**Which sites are involved**

1. Želivka SCI - in part with occurrence of serpentine protected on national level as Hadce u Želivky NPA
  2. Hadce u Hrnčír SCI protected on national level as Hadce u Hrnčír PA
- Plus sites of ex-situ sites of conservation, i.e. Visitor Centre Vodní dům and gardeners involved in the Rescue planting in private gardens.

**Which habitat types and/or species are targeted**

Habitat type: Forest habitat mostly pines on slopes with shallow soil and serpentine bed rock with some serpentine outcrops. Serpentine soil is condition sine qua non for *M. smejkalii* progression. Habitat is only targeted for the benefit of *M. smejkalii*.

Targeted species: *M. smejkalii*, (genus: *Minuartia*, commonly known as sandwort), which is Czech endemic species, whose worldwide distribution is currently limited only to two nearby locations: (i) SCI Želivka and (ii) Hadce u Hrnčír SCI. Due to the uniqueness of the species and its limited distribution *M. smejkalii* is protected by law at Czech as well as international level.

The species is an obligate serpentinophyte and thus it occurs only on serpentine sites. *M. smejkalii* prefers rock platforms, crevices and shallow serpentine soils and unconnected grasslands in bright pine forests. The species performs the best at sunny habitats with sporadic vegetation. Once the locality becomes overgrown by competitively-strong plants, *M. smejkalii* ceases to prosper and quite quickly becomes extinct.

**Main conservation issues being targeted (including threats)**

Main conservation issues include standard management techniques such as mowing and manual removal of expansive plants to suppress the high competition. We would like to suppress high competition by implementation of forest grazing after obtaining permission, which is not standard approach. Currently, the high competition is reduced by mowing. The negative effect of forest management is suppressed by removing of juveniles of not-target tree species. The removal of humus layer is done by digger in combination with manual removal. The intensive grazing by wild animals is reduced by fencing. The vandalism and illegal dump is suppressed by building of car barrier and implementation of the new approach – the Rescue planting in private gardens.

Additionally, selected current populations are strengthened by sowing and transplantation of juvenile plants and one population is reintroduced on site, where species already went extinct. Ex-situ conservation of the species has been established.

**Socio-economic context** was considered already at project preparation since both areas lay in marginal areas and suffer from unemployment, lack of public infrastructure and depopulation. Therefore we focused on enhancement of soft tourism and business opportunities, building of regional identity or preventing of negative behaviour. Special attendance is given to supporting social prestige of aging population via Rescue planting in private gardens.

**Expected longer term results (as anticipated at the start of the project)**

The management interventions are very intensive and aimed to restoration of natural ecological processes on the serpentine sites. We thus suppose that habitat conditions on the steep rock will be stabilized and the population will be able to spontaneously disperse. In contrary, the other parts will need additional interventions with minor extent to prevent expansion of grasses and juvenile trees (disruption of natural succession). The strengthened as well as newly created populations are established to be self-reproductive. We thus expect enhancement of population size (from 434 individuals to 589 in situ and 600 ex-situ), improving of species trend (to increase in situ and stable ex-situ) and status (to U1 in situ and FV ex-situ). Concerning habitats,

only the area of Siliceous rocky slopes with chasmophytic vegetation will increase. Habitat conditions will be improved to U1 and trend will be improving for all target habitats.

## 5. Administrative part

### **The project management:**

Hana Pánková from IBOT is the chief project manager and initiates the management meetings and consortium meetings. We organize 3 types of meeting – internal within each beneficiary, top management meetings (Hana Pánková and Karel Kříž) and project consortium meetings (whole project team of all partners and stakeholders). The internal meetings of the IBOT team are held regularly once per month or ad-hoc, the project manager is in contact with particular team members every day in the Institute. We therefore considered the reduction of regular meetings of a whole IBOT team from the foreseen each 2 weeks as reasonable. ČSOP team meetings are held monthly. Meetings of top project management are held regularly every two weeks as foreseen in Průhonice, Vlašim or in the project sites. First project team meeting was held on 25/08/2016 to introduce the project, describe particular position of each employee and introduce the course of project and financial issues. Project consortium meetings are organized twice per year according to availability of particular members. We decided to change the date of consortium meetings on winter and summer to be able to show the impact of project directly in the field. From each consortium meeting the report and presentation of people are prepared. The consortium meetings took place on 10/2/2017 (attendance 12 people, deliverable PR1 Annex F1-1), 29/11/2017 (13 people, deliverable **MtR Annex F1.1a**) and 05/06/2018 (attendance 9 people, only winter dates are considered as deliverable).

To monitor project progress, we created an on-line shared document with specific sections for each action and Deliverable/Milestone. This document is updated weekly so all partners have an opportunity to check actually ongoing works.

The Partnership agreement with ČSOP was signed on 31/08/2016 (PR1 Annex F1-2) and the Partnership agreement with MŽP was signed on 15/09/2017 (**MtR Annex F1.1b**). The delay of signature of partnership agreement was caused by waiting on signature of “*Decision about provision of subsidy*” (PR Annex F1-3).

**The problems encountered:** the only problem was the delay of the signature of partnership agreement with MŽP.

**The partnerships and their added value:** The partnership with ČSOP is very important for project implementation since it allows immediate implementation of scientific results to practice and the rearrangement of management according to species requirements. The cooperation of both institutions is without problems and led to preparation of new project following the LIFE for *Minuartia* currently under evaluation at MŽP – National Program Environment and preparation of other collective projects.

**Communication with the EASME and Monitoring team:** Communication with external monitor is based on month reports of project progress or it is done ad-hoc according to necessity (e.g. preparation of letters for EASME, KPI table, changes caused by delay of forest grazing). External monitor visits every year the project sites, discusses the progress and prepares the report about project for EASME. Concerning EASME we obtained the evaluation of visits of external monitor and evaluation of progress report. We discussed with EASME the eligibility of cost for GPS navigation and goods needed for forest pasture.

## 6. Technical part

### 6.1 Technical progress

#### A1 Administrative issues

Action is in progress

Foreseen start date: 07/07/2016

Actual start date: 07/07/2017

Foreseen end date: 31/12/2017

Actual (or anticipated) end date: 31/05/2019

The shift of end day is caused by the complication with processing of permission from the forest law, see below.

#### **A1.1 Processing of permissions from the Law on Conservation of Nature and Landscape (Regulation Nb. 114/1992 Code.) and from the Forest law (Regulations no. 289/1995 Code)**

##### The Law on Conservation of Nature and Landscape

Permissions for IBOT were issued by the Agency of the Nature Protection (AOPK) for activities on the Želivka SCI on 10/11/2016 (PR1 Annex A1-1a) and by the Regional Office Středočeský kraj for Hadce u Hrnčír SCI on 15/03/2017 (PR1 Annex A1-1b). ČSOP permission for management activities on SCI Hadce u Želivky was issued on 26/06/2017 (PR1 Annex A1-1c). The Regional Office Středočeský kraj for Hadce u Hrnčír SCI asked for the statement of the state organ of nature protection about project impact on NATURA 2000 network according to §45 Regulation Nb. 114/1992 Code, which was issued on 12/04/2018 (**MtR Annex A1.1a**). On the basis of this statement, the permission for management activities on Hadce u Hrnčír SCI was issued on 04/06/2018 (**MtR Annex A1.1b**).

##### Forest law permission for grazing

The preparation of materials necessary for the permission started already in September 2016. However, during the processing of the permission, a new legislative barrier - the Water law (Regulations no. 254/2001 Code) was identified. Forest pasture is not very common approach in the Czech Republic and neither us, nor Povodí Vltavy, a.s., manager and operator of the drinking water source, were clear about how would drinking source protected zone rules be applied. We applied for an official permission with unrestricted time validity according to the Water Code 254/2011 Coll. to the Central Bohemia regional authority. Consent of the operator Povodí Vltavy is a necessary condition in this process. Finally, Povodí Vltavy and us came to an agreement on the way how to allow sheep pasture at the site during a meeting. We therefore asked again for official agreement with forest pasture to Povodí Vltavy. The permission will be, however, issued namely for particular managers. Therefore the pasture could not be implemented as a subcontract, but it must be done by the staff of CSOP. We thus asked for additional shift in project budgeted in the case that the permission will be issued. This change was approved by Mrs. Donato on 26/10/2018. Since even processing of such permission is innovative for the Czech conditions, we decided to wait for decision and postpone the deadline for this action until the end of 05/2019 to guaranty implementation of pasture twice per year for the following years. If the permission will not be issued until the first grazing period, the shift in budgeted will not be done and the site will be mown as up to now.

#### **A1.2 Public tenders/selection of providers based on methodology of green procurement**

All actions were done by each partner separately. The selection of providers and orders were made on the basis of green procurement rules and the lowest price comparing minimally 3



offers. All tenders were realized prior the Progress report: 1) genetic analysis, 2) evaluation of ecosystem services, 3) evaluation of socio-economic impact, 4) graphical and printing services, 5) building of touristic point.

Public tender for forest pasture will not be realized since one of the conditions of the permission will be that all personnel responsible for the pasture entering the protected zone is registered and listed in the permission document. Therefore this action will be implemented by employees of ČSOP.

The all equipment was already bought: IBOT bought the efficient laptop, camera with fish-eye and other additional equipment for measurement of canopy openness. Further, we bought after the approval of Mrs. Donato (21/8/2017) GPS navigation Garmin.

ČSOP bought all the equipment except goods needed for forest pasture: brush cutter, chainsaw, photo traps.

### **A1.3 Tenders for the newly created position**

IBOT

1. We created one new half time job for technician since the preparation of new plants for transplanting was more time consuming then we supposed.
2. We opened new student thesis, recently we have 2 bachelor students from Department of Botany, Faculty of Sciences of the Charles University in Prague, 1 bachelor student from Faculty of Environmental Sciences of Czech University of Life Sciences Prague and 2 students from Institute for Environmental studies, Faculty of Sciences of the Charles University in Prague contributing to the project.

### **A2 Revitalization of habitats**

Action is in progress

Foreseen start date: 07/07/2016

Actual start date: 7/07/2017

Foreseen end date: 31/12/2017

Actual (or anticipated) end date: 31/12/2019

The management interventions on Central part and B2 are based only on evaluation of habitat quality, while the interventions on other sites combine the data on plant life cycle as well as on habitat quality. The data for evaluation of life cycle of *Minuartia smejkalii* were collected in 2016-2017 on each site except germination from seed bank, which is necessary to test for more years. A2.1 and A2.2 action will finished in December 2018, but we will continue with marking of management plots in the field prior each intervention to be sure that the marking is not lost and the plots can be reliably identified even later.

#### **A2.1 Evaluation of fitness of \**M. smejkalii* on particular parts of SCI areas**

The distribution of individuals was localized by GPS in autumn 2016 for Želivka SCI (PR1 Annex A2-1a and PR1 Annex A2-1b) and in summer 2017 for Hadce u Hrnčír SCI (PR1 Annex A2-1c). Concerning plant fitness, we measured plant size, number of infertile and fertile stems, number of flowers per stem and capacity to reproduce generatively and vegetatively in July and June 2017 on each site and combine these data with data from regular monitoring of AOPK. We also collected ripe capsules to evaluate seed production and seed germination rate. The results showed that the seeds have high germination rate exceeding 80%. The dispersal ability of *M. smejkalii* was evaluated in 2017 by using of Petri dished in the field and by simulations of different dispersal modes in the laboratory. The preliminary results from these experiments

suggest that the species is able to disperse only on short distance and the majority of seeds fall out near the mother plants.

For purpose of evaluation of the life cycle we divided the Hrnčíře SCI into two parts – with former occurrence of plants (H1) and plants established on forest roads in 2011 (H2) even it is not possible to recognize them as separate populations. The evaluation of plant life cycle showed that populations B1, DK2, DK4, H1 and H2 produce a large amount of seedling, but they have high mortality in the first year. In contrary, juvenile plants in populations DK1, DK3 and DK5 are able to grow for many years when established. There is a thus problem with seedling survival on populations B1, DK2, DK4, H1 and H2 caused probably by habitat conditions. In contrary, on each population, plants are able to survive for a long time when already established. Populations with high seedling mortality produce high amount of seedling while populations with low seedling mortality produce also low amount of seedling. The one exception is DK3 population, which produces high amount of seedlings with high survival.

As part of our population dynamics modelling, we conducted a survey of available climatic data from various previous projects. The following projects were potentially relevant:

<http://www.cctame.eu/>

[https://cordis.europa.eu/project/rcn/92067\\_en.html](https://cordis.europa.eu/project/rcn/92067_en.html)

<http://climate-adapt.eea.europa.eu/>

<http://www.copernicus.eu/>

We obtained climatic data from the websites of these projects and evaluated their usability for our project. Most of these projects provide different versions of climate projection maps based on different types of models. Although these models are interesting, they are only different versions of the same – i.e. some version of the estimate of the long-term development of the climate. Although different models differ, it is not easy to grasp, which prediction is more appropriate than another.

For our purposes, we need a simple prediction of the future changes of temperature and precipitation in the Czech Republic for several decades. This information is easily identifiable, for example, from the International Panel on Climate Change (<https://www.ipcc.ch/>). This is the information commonly used, and hence the most logical type of information for our purposes. Although it would be nice to compare the outputs of many different climate models, we think it would not be appropriate or meaningful.

The main reason for not using a wider range of models for our project is the fact that our population data are only 10 years long and such data do not allow us to study correlations with too many climatic variables. We will therefore have to limit our modelling to a maximum of 2 climatic variables (e.g. average temperature and precipitation in the growing season).

Another limit of wider use of all possible models is the question of the usability of each variant. Our knowledge of plant ecologists does not allow us to assess, which of the models is the most correct. In addition, a wide range of emerging models suggests that even their creators do not agree on which model is the right one. That's why we will stick to a conservative approach of using generally accepted models as the most suitable for practical use in our project. Even one data source offers different variants of future developments and gives us the possibility of estimating the uncertainty associated with choosing one particular projection, which we consider to be absolutely sufficient for a specific conservation recommendation based on our results.

## **A2.2 Habitat quality on particular parts of SCI area**

To evaluate habitat quality, we marked at least 10 permanent plots 1x1 m per site and evaluated phytocoenological relevés, depth of soil horizon, slope, aspect and canopy openness. Close to the permanent plots we collected soil samples to evaluate chemical and physical properties (e.g. nutrients and heavy metal content, water capacity), evaluate amount of biomass litter (needles

etc.) and aboveground biomass and placed microclimatic sensor. The autumn and spring aspect of vegetation was evaluated only in 2017. We decided to evaluate the vegetation only in summer since the species composition was the same in each part of year. We supposed that we would put 3 microclimatic sensors (except DK2) on each site, nevertheless because of different types of management interventions, it is necessary to use minimally 2 sensors per intervention per site. We thus bought in the first year 70 pcs of sensors (60 pcs were proposed). Further sensors will be bought in 2019 since some of them were destroyed by animal. To avoid other destruction of them, they will be fenced.

### **A 2.3 Set up of plots for interventions**

According to evaluation of plant fitness and habitat quality of particular parts, we rearrange the plots for management interventions (The report about the specification of management interventions, **MtR Annex A2.3a**). We decided to decrease the intensity of tree cutting (the area will be nevertheless the same as proposed). All plots are set up in the field prior the management implementation to be sure that the marks will be visible.

We thus marked following plots:

#### Želivka SCI

Central part: mowing, tree cutting, removing of humus layer by digger and for manual removing, manual lifting of *Frangula alnus*, sowing of *Rhinanthus alopecurus*

DK1: tree cutting, manual removing of humus layer, manual lifting of *Vincetoxicum hirundinaria*,

DK2: manual removing of humus layer, fencing of selected rocks,

DK3: tree cutting, removing of humus layer by digger and for manual removing

B1: tree cutting, removing of humus layer by digger and for manual removing

B2: tree cutting, manual removing of humus layer, manual lifting of *Frangula alnus*

Hadce u Hrnčír SCI: tree cutting, removing of juvenile tress, manual removing of humus layer

Proposed management interventions were reported as deliverable in Progress report (PR1 Annex A2-2a, PR1 Annex A2-2b, PR1 Annex A2-2c). Actualized maps of management interventions are attached as a **MtR Annex A2-3b** for DK1, **MtR Annex A2-3c** for DK2, **MtR Annex A2-3d** for Central part, DK3 and DK4, **MtR Annex A2-3e** for B1 and B2 and **MtR Annex A2-3f** for H.

### **A3 Enhancement of population size**

Action is in progress

Foreseen start date: 07/07/2016

Actual start date: 07/07/2017

Foreseen end date: 30/06/2018

Actual (or anticipated) end date: 31/10/2020

The population DK1 produces very low amount of seeds because of limited number of individuals. This limitation caused that we had only limited number of individuals/seeds for enhancement of population size. On the basis of genetic analysis and hybridization experiment we planned that we will establish mixed population on this site and thus finish this action in autumn 2018. Nevertheless, after the discussion with AOPK we decided to follow principle of preliminary awareness and did not established mixed populations on currently occupied sites. This action will thus continue by preparation of juvenile plants from DK1 population. The elongation of this action will not increase total budgeted. The personnel costs will be covered by moving of appropriate working capacity of researcher from E1 and E2 activities to technicians. Other costs (e.g. growing services) will be covered by moving of budgeted from A1 action.

### A3.1 Sowing

The sowing was made only in 2016-2017. The seeds were sown into sowing square plots 0.5m x 0.5m divided into 25 small square 10x10 cm. The seeds were counted to small bags per 30 seeds. We totally prepared 1944 seeds from DK1, 1432 seeds from B1 and 315 seeds from DK3. To be able to evaluate success of sowing, we sowed also 5320 seeds on DK2. Prior sowing, we marked sowing plots in the field and removed vegetation from the plots (PR1 Annex A3-1).

### A3.2 Planting

The plant transplanting was done each year. The seeds were germinated on Petri dishes (to maximize the germination rate) as well as directly on the serpentine soil (to select suitable genotypes). The seedlings were transplanted to the pots with the mixture of serpentine substrate from the Bernartice mine and substrate obtained directly in the field after removing of humus layer. In 2017 we transplanted plants also on DK2 population to distinguish if the potential low survival is caused by methodology or by particular populations. Since we obtained only one individual from DK3 population, but the seedlings are present in the field, we decided not to continue with enhancement of this population. Transplantation of these additional plants did not increased the budged for this action.

Population	2017			2018		
	Nb. of sown seeds		Total Nb. of juvenile plants	Nb. of sown seeds		Total Nb. of juvenile plants
	Petri dishes	Soil		Petri dishes	Soil	
B1	1349	0	150	250	0	97
DK1	1504	0	153	123	98	14
DK2	2537	700	811	x	x	x
DK3	459	0	1	x	x	x

Table 1. Number of sown seeds and obtained juvenile plants in 2017 and 2018.

### A4 Ex-situ conservation and reintroduction

Action is finished

Foreseen start date: 07/07/2016

Actual start date: 07/07/2017

Foreseen end date: 30/09/2018

Actual (or anticipated) end date: 30/11/2018

The delay was caused by change in methods for genetic analysis and low number of juvenile plants suitable for hybridization.

#### A4.1 Optimization of design of ex-situ population establishment

In 2016 and 2017 we collected leaf samples from at least 20 individuals per population, dried them on silicagel and isolated DNA. Because of unexpected specific sequences in the DNA, we had to change the methodology from microsatellite analysis to NextRAD sequencing. Prepared samples of DNA were sent to SnpSaurus company for sequencing. The results showed that plants from both SCI areas are genetically different and therefore it is not possible to mix them together. In contrary, population within each SCI area are genetically similar. Concerning these results, ex-situ population must be established for each SCI area separately, but it is possible to combine seeds from particular populations within each site.

#### **A4.2 Reproduction ability of inter-population hybrids**

Hybridization experiment was based on removing of the anthers of *M. smejkalii* and manipulative crossing with pollen from the same individual, same population or other population. Because of low availability of juvenile plants for crossing, we divided this experiment into two years. The results showed that self-crossing as well as out-crossing led to similar production of seeds, which were able to germinate. We therefore decided after discussion with state organs of nature protection, that ex-situ population will be established from juvenile plants/seeds from different populations in Želivka SCI. Seeds from these plants will be used for reintroduction. Reintroduced population will be thus established also from plants with different origin within a single region.

#### **A4.3 Building a rock outcrop**

The rock outcrop was built by the employees of ČSOP in 2016-2017 (deliverable building diary PR1 Annex A4-1). Serpentine rock from Bernartice mine and substrate obtained by management interventions in the field were used. Since we used native soil, many of serpentine species (e.g. *Potentilla cranzii*) started to grow from the seed bank. Since the rock was not completely stabilize, we added additional mixture of serpentine mine soil and native soil in 2018.

#### **A5 Rescue planting in private garden**

Action is in progress

Foreseen start date: 07/07/2016

Actual start date: 07/07/2017

Foreseen end date: 31/12/2017

Actual (or anticipated) end date: 30/9/2019

The delay is caused by the low interest of people at the beginning of project. Currently, the interests is high and the supposed number of involved gardeners will be achieved.

##### **A5.1 Legislative issues**

We discussed several possibilities of legal regime to permit the gardeners to keep the *M. smejkalii* plants in their gardens. ČSOP asked for the permission from the Law about Conservation of Nature and Landscape 114/1992 to hold and manipulate with the plants to AOPK for Želivka SCI (MtR Annex A5.1a). It was not necessary to ask separately for Hadce u Hrnčír SCI since this action was allowed already in permission MtR Annex A1.1a. Currently, the legislative process is based on two agreements: 1) gardeners signed an agreement with the ČSOP to place the serpentine rocks on their gardens 2) gardeners sign the convention with the ČSOP about borrowing of plants (PR1 Annex C4-1, MtR Annex A5.1b). This concept will be further developed by discussion of the Working group (see action E2).

##### **A5.2 Draft of The methodology of rescue planting of *M. smejkalii* and Instruction leaflets for gardeners**

To familiarize with the methodology we visited the Swiss company TOPOS (Dr. Karin Marti) and the state authority Amt für Landschaft und Natur, kanton Zurych (Kaspar Spörri) from 12 to 15/6/2017, discussed the methodology of planting, concept of program and work with locals. We also visited the “sampling points” – local gardens, from which plants are distributed to the gardeners and revitalized sites. On the basis of the new information we prepared the draft of the Instructional leaflet for gardeners (MtR Annex A5.2a) and draft of the methodology of rescue planting of *M. smejkalii* (MtR Annex A5.2b).

##### **A5.3 Addressing of local people**

We first addressed local people on seminars about the project (see E2 action) in Bernartice on 27/11/2016 (attendance 43 people, deliverable attendance sheet PR1 Annex E2-1) and in Kamberk on 18/02/2017 (attendance 34 people deliverable attendance sheet PR1 Annex E2-2). Since many people from other organizations dealing with the rare plant species asked us on information about Rescue planting in private gardens, we decided to enhance the number of printout of leaflet to 500 pcs. and distribute it to people interested in this program on particular actions (PR1 Annex A5-3). The seminars focusing on Rescue planting were organized as a training course for local gardeners on 19/04/2017 in Kamberk (deliverable attendance sheet PR1 Annex A5-2). The training was realized continuously prior transplanting of individuals for gardeners planting individuals from Želivka SCI (deliverable attendance sheet **MtR Annex A5.3a**). We also organize two discussion seminars in the Basic and kindergarten Christian School Archa Petroupim for children on 25/09/2017 and for general public on 19/10/2017 (attendance appr. 40 people and 40 children).

Currently, we have 8 interested persons or organizations for Želivka SCI populations and 10 interested persons for Hadce u Hrnčír SCI (Nb. of interested people/organization is presented as PR Annex A5-1 and **MtR Annex A5.3b**).

#### **A5.4 Creation of suitable conditions in the private gardens**

The serpentine rock outcrops were finished in 11 private gardens, in the Botanical garden of Faculty of Science of Charles University in Prague and in the village square of Kamberk, Pravonín, Libouň, in the garden of Administration of Blaník PA, in the visitor centre Včelí svět and in the Basic and kindergarten Cristian school Archa Petroupim (see PR1 Annex A5-4, **MtR Annex A5.4**). Juvenile plants for transplantations are prepared in A3 activity. For Želivka SCI gardens we use only plants from population DK2.

#### **C1 Revitalization of habitats**

Action is in progress

Foreseen start date: 30/11/2016

Actual start date: 01/11/2016

Foreseen end date: 30/06/2020

Actual (or anticipated) end date: 30/06/2020

Management interventions started already in 1/11/2016 and were rearranged on the basis of evaluation of plant fitness and habitat quality. The deliverable Photo documentation was attached as PR1 Annex C1-1 and **MtR Annex C1.1**.

##### **C1.1 Suppression of competitively strong plants**

- a) Mowing: 6 ha of the Želivka SCI Central part were mown in spring (May and June) and in summer (August and September) every year. In 2018 we start mowing also 0.3 ha on B2. We introduced mulching on 3 ha as a new method as some of the bunches of *Calamagrostis arundinacea* could not be sufficiently suppressed by mowing. The mulching has been done only once before mowing. Apart from the regular mowing, 4 ha of CP (Želivka SCI) is mown three times per year as a substitution for forest grazing. One ha of this area has been mulched. The biomass was raked out and transported to compost.
- b) Manual removal of expansive plants: The mosses and *Vincetoxicum hirundinaria* was removed from the part DK1 on total area 140 m<sup>2</sup>. The removing of *Vincetoxicum* will be repeated twice since it is able to regenerate very quickly. We will continue with removing on mosses on the surrounding rocks. The mosses were removed on the DK2 part on 4 small patches, total area 150 m<sup>2</sup>. In the following years we will continue in the parts, where the trees will be removed. The bunches of grasses and mosses were

manually removed on small patches on DK4 part in total area 60 m<sup>2</sup>. Part B1 (850 m<sup>2</sup>) was completely revitalized by combination of manual removing of mosses and plants and by using digger since the humus layer was very high. The humus layer with bunches of *Sarothamus scoparius* and grasses on the bottom and the surrounding area were firstly removed by digger and consequently manually flattened. The mosses and vegetation on the rocks were removed only manually. The mosses and vegetation were removed on the steep rocks of part B2 on the area 260m<sup>2</sup>. The mosses and vegetation will be in following seasons removed on the surrounding rocks in parts DK4, B1 and DK2. Removing of expansive plants start on DK5 in the autumn 2019. In addition, we decided to include to the management interventions removing of juvenile trees of *Frangula alnus* with root system in Central part. Juvenile trees were removed on the whole area 10 ha. This action will be done regularly each year on the parts, where the *Frangula alnus* will grow again.

- c) Grazing: Since the permission for forest grazing was not yet issued, we decided to suppress grasses in this part by combination of mowing and mulching for now. Appropriate part of the budget was thus shifted to personnel. This change did not increase the total project budget.
- d) Experimental suppression of *Calamagrostis* using *Rhinanthus alectorolophus*: Since the *Rhinanthus alectorolophus* is a hemi-parasitic species, it reduces the cover of *Calamagrostis*. Nevertheless, it is not able to parasite on other species occurring on serpentine sites than on grasses from the family Poaceae. This approach was firstly tested on the 3 plots on the periphery of the protected area. The plots with *Rhinanthus* were fenced to prevent grazing by wild animals. Since the results showed that the *Calamagrostis* was reduced, we decided to establish other 3 plots in the Central part of Želivka SCI.

### **C1.2 Removal of humus layer (990, 420)**

The humus layer was removed by using digger on parts B1 in the bottom of mine and its surrounding on the area 850 m<sup>2</sup>, on 6 patches in DK3 (totally 1540 m<sup>2</sup>), on two places in CP of Želivka SCI (2000 m<sup>2</sup>), deliverable PR1 Annex C1-2. The humus layer was manually removed on upper part of B2 (area 500m<sup>2</sup>) and in Hadce u Hrnčír SCI manually instead of using digger not to disturb the roots of trees. We thus remove humus layer with mosses and vegetation on 13 patches, total area 350m<sup>2</sup>. Next years we will continue with removal of humus layer on parts between mine and asphalt road on B1, Central part and DK3.

### **C1.3 Suppression of negative effect of forest management (190,160,162, 990)**

On the basis of evaluation of life cycle of *M. smejkalii*, we decided that the intensive thinning as well as complete removal of trees will be replaced by gradual thinning to keep part of each area partly shaded. In contrary, the total area of tree removal is larger than planned since the development of juvenile non-target trees was very intensive.

The thinning of dense parts of forest and removing of self-seeded trees was done on the almost whole Central part (95%, 13 ha) instead of previously selected parts on 4 ha.

Trees on the part DK1 were removed from the rocks with occurrence of *M. smejkalii* and on parts with planned population enhancement on total area 0.3 ha.

We started tree removing on part DK2 near the places where the vegetation was manually removed, total area 0.1 ha.

We focused on the part DK3 on removing of expansive non target trees and juvenile pines. The trees were removed on the half of the total area, i.e. 0.4 ha.



On the part B1 the juvenile trees were removed on the area 0.1 ha and on the part B2 on the area 0.7 ha.

Forest thinning on Hadce u Hrnčír SCI will be done in to two consequent actions to open the forest gradually. Currently the forest was thinned on the area 0.5 ha.

The wood biomass was removed from the locality and handed to the owner who transported it outside of the locality. Smaller trees were chipped by the machine and transported to the compost. Some of the felled trees were left in place for the development of insects.

The forest thinning will continue in following period on DK1 (near rocks and on the edges of the site), DK2 (around the edges of the site), DK3 (the rest of trees and juvenile trees of *Frangula alnus*). We will start with removal of trees on the part DK5 in the autumn 2019.

#### **C1.4 Reduction of intensive grazing (976)**

At the beginning of project we put 3 photo traps at the part DK2. The additional two were bought in 2018. The photo traps showed the occurrence of roe deer, fox, hare and wild boar (PR1 Annex C1-3, **MtR Annex C1.4a**). On the basis of occurrence of these animals the three most grazed rocks were fenced (**MtR Annex C1.4b**).

#### **C1.5 Building of barrier for cars entry in a part B1 for vandalism removal (740, 251)**

After discussion with the owners who refused to place the barrier in the originally planned site, the barrier was placed at a secondary forest path leading to the site B1 from south-west (**MtR Annex C1.5**). Entry of cars to B1 from the asphalted road will be blocked by large stone blocks and a ditch after the removing of hummus layer by digger will be finished.

#### **C1.6 Convention with owners**

The convention with the owner Hadce u Hrnčír SCI – Kamberk municipal - was signed on 24/09/2018 (**MtR Annex C1.6**). Also other owners are informed about management interventions and their importance for plant protection due to project consortium meetings as well as meetings directly in the field.

### **C2 Enhancement of population size**

Action is in progress

Foreseen start date: 30/09/2016

Actual start date: 01/03/2017

Foreseen end date: 30/06/2018

Actual (or anticipated) end date: 31/10/2020

Since the plant population DK1 is too small, it produces low amount of seeds and we were not able thus to prepare sufficient amount of juvenile plants for its enhancement. Plants transplanted in 2017 started to produce seeds already in the first vegetation season. We thus decided to use also these seeds for preparation of juvenile plants and extend this action until 31/10/2020.. The evaluation of success will be based on the data 2017-2019, but the evaluation will continue in the frame of regular species monitoring after the end of project.

#### **C2.1 Sowing**

Sowing was done only in 2017. We totally prepared 1944 seeds from DK1, 1432 seeds from B1 and 315 seeds from DK3. To be able to evaluate success of sowing, we sown 5320 seeds from DK2 (PR1 Annex A3-1). Since the seed germination was very low, we decided to enhance population only by plant transplantations.



## **C2.2 Transplanting of juvenile plants**

This action will be implemented at the end of August 2017 and 2018.

Transplantation of juvenile plants was done in 2017 on 4 parts: B1 150 individuals, DK1 152 individuals, DK2 170 individuals and DK3 1 individual.

In 2018 we transplanted 97 individuals from B1 and 14 individuals from DK1.

Since the population B1 is stabilized and individuals spread there alone, the population enhancement will continue only on DK1 population.

The photo documentation of plots with transplanted individuals is attached as deliverable **MtR Annex C2.2**.

## **C3 Ex-situ conservation and reintroduction**

Action is in progress

Foreseen start date: 31/11/2016

Actual start date: 01/04/2017

Foreseen end date: 30/09/2019

Actual (or anticipated) end date: 30/09/2019

The delay of action start was caused by delay of A4 action – genetic analysis and hybridization experiment.

### **C3.1 Initiation of ex-situ protection**

Ex-situ protection was initiated by sowing of 2294 seeds (**MtR Annex C3.1a**) and by transplantation of 400 juvenile plants on both serpentine rocks (**MtR Annex C3.1b**). Firstly, we used seeds only from DK2 populations. Since the results of genetic analysis and hybridization experiments showed that it is possible to combine all populations from Želivka SCI, we decided to transplant also juvenile plants from other populations: 138 individuals from DK5 and 72 individuals from DK4. Plants from other populations were not used because we prefer using them for enhancement of local population size. Juvenile plants from DK2 had high mortality caused by low stability of rock, we thus transplanted additional 1079 juvenile plants from DK2.

### **C3.2 Reintroduction of the site B2**

The majority of juvenile plants for reintroduction were obtained from the seeds collected at the ex-situ population. The seeds were grown in the Petri dishes as well as at the serpentine soil. The seedlings were transplanted to the small pots and in autumn 2018 transplanted to the field. Totally, 896 individuals from DK2 population, 67 individuals from DK4 and 138 individuals from DK5 (**MtR Annex C3.2**). The rest of the plants will be transplanted in autumn 2019.

## **C4 Rescue planting of \**Minuartia smejkalii* in private gardens**

Action is in progress

Foreseen start date: 01/07/2019

Actual start date: 01/06/2017

Foreseen end date: 31/12/2019

Actual (or anticipated) end date: 31/12/2019

We were able to start with this project action earlier since the juvenile plants from Želivka SCI as well as some serpentine rocks in the gardens were prepared already in 2017.

### **C4.1 Establishment of rescue plants in the private gardens**

The convention about the placement of the rock outcrop for planting of *M.smejkalii* were signed with 7 people for Hadce u Hrnčír SCI population and 7 people for Želivka SCI populations. We transplanted between 5-150 individuals for each garden (see the list of gardeners – PR1 Annex C4-1, **MtR Annex A5.4** and gardens with transplanted rocks - **MtR**

**Annex C4.1a).** Since plants in some gardens were not able to grow (totally 3), we re-built these rocks. Plants will be transplanted there in autumn 2019.

#### **C4.2 Development of final methodology and Instruction leaflet**

On the basis of comments of Working group discussions on meetings with specialists in plant conservation we started with preparation of final methodology and instruction leaflet.

#### **D1 Revitalization of habitats**

Action is in progress

Foreseen start date: 01/06/2018

Actual start date: 01/04/2017

Foreseen end date: 30/09/2020

Actual (or anticipated) end date: 30/09/2020

The evaluation of habitats started immediately after the management intervention. We used the same plots established in the A2 action and evaluate the same parameters.

##### **D1.1 Evaluation of fitness of \**M. smejkalii* on particular parts of SCI areas**

The data on impact of management interventions on the fitness on *M. smejkalii* were evaluated on the parts DK1, DK2, DK3 and B1 (the year of start of management intervention is marked by green colour). This action will start in 2019 on site DK4 and DK5. The results showed that the revitalization had strong impact on especially DK3 and B1 plant populations. The results are based only on naturally occurring individuals. The transplanted individuals will be included into the total population size in 2020, when they will be stabilized.

The population B1 seems to become stable since there is a lot of new seedling and plants which started to spontaneously spread to the surroundings. Currently, there are 129 individuals. The population DK3 currently contains 141 individuals, but they occur still only on small part of the site. Therefore the future management will focus on creation of suitable habitat in the proximity of current species occurrence. Management interventions on DK2 focused on reduction of intensive grazing. The fencing led to enhancement of proportion of flowering stems, but it had not impact on population size and the population is still decreasing probably due to low survival of seedlings. Number of individuals on DK1 is still the same. We nevertheless suppose that these plants will start to reproduce since there is now sufficient amount of pollination partners due to C2 action. The population in Hadce u Hrnčír SCI has a high fluctuation in population size and therefore it is not clear if the population enhancement was caused by management intervention or if it is just the fluctuation. All plants produced seeds with high germination rate. The highest germination rate 95.6% was observed for population DK4, while the lowest 68.6% in Hadce u Hrnčír SCI.

Site	Population	2011	2014	2015	2016	2017	2018
Hadce u Želivky	DK1	22	11	5	7	5	5
	DK2	432	294	222	251	183	155
	DK3	67	1	2	89	102	141
	DK4	198	34	40	79	36	29
	DK5	51	19	14	39	39	33
	B1	203	54	40	42	90	129
	B2	1	0	0	0	0	0
Hadce u Hrnčír	H	279	198	98	338	284	345
Total number of individuals		1253	611	421	845	739	837

Table 2. Number of naturally occurring individuals on particular parts of both sites. Green colour shows beginning of management interventions.

### **D1.2 Habitat quality on particular parts of SCI area**

Habitat quality was evaluated on permanent plots in each site (including Central Part) where management interventions were implemented. To evaluate the impact of mowing/forest grazing we put 13 cadges to the Central part as a control plots. The vegetation composition was evaluated in the spring, summer and autumn only in 2017. The results showed no differences in species composition, we thus decided to evaluate the data only in summer. The data about impact of management interventions on vegetation were analysed for B1 and DK3 in details. The results showed that the strongest impact on recovery of serpentine vegetation had intensive interventions such as removing of humus layer, nevertheless the recovery is long-term process since the serpentine plants are spreading slowly. The first serpentine species found on these sites is *Potentilla cranzii*. If the humus substrate is removed only partly, competitive stronger grasses (e.g. *Agrostis gigantea*) start to spread on such sites. Therefore we decided to continue in removing of humus layer using digger to be sure that the serpentine bedrock is uncovered. We will continue in evaluation of changes in all sites to be able to distinguish the fluctuation between years and predict further development of the vegetation.

### **D2 Enhancement of population size**

Action is in progress

Foreseen start date: 01/07/2018

Actual start date: 20/03/2017

Foreseen end date: 30/09/2020

Actual (or anticipated) end date: 30/09/2020

#### **D2.1 Sowing**

Germination of *M. smejkalii* seeds in the field was not successful even we tried several different approaches for working with seeds: sowing immediately after collection, winter stratification, storage in cold/normal temperature etc. The sowing plots were checked every two weeks, but we observed only 14 seedlings in one plot in B1. Nevertheless, the plants spread on this site spontaneously, we are not able thus distinguish if these seedlings are really from the sown seeds. Because of these results we decided to stop this sub-action and enhance the population size only by transplanting.

#### **D2.2 Transplantation of juvenile plants**

Evaluation of transplantation success will be based on plant survival and comparison of fitness of transplanted and naturally occurring plants. The results after the first year showed that on B1 site 98 individuals survived (65.3 %), on DK1 98 individuals (64.5%) and on DK2 113 individuals (66.5%). The one individual transplanted to DK3 also survived. Further, transplanted plants in B1 had germination rate 79.8% and started to reproduce in the field already after first vegetation season (**MtR Annex D2.2**). Surprisingly, we did not observe any seedlings on DK1 and DK2 populations. Nevertheless, seeds of these populations can germinate later since the soil layer is higher on these sites and the seeds had high germination rate: 91.3% for DK1 and 94.2% for DK2.

The comparison of plant fitness will be done in 2020, when the data from more years will be available.

#### **D2.3 Selection of appropriate method**

Since the sowing was unsuccessful, we will suggest transplantation of juvenile plants as suitable approach for population enhancement in the Methodology of care about *M. smejkalii*.

### **D3 Ex-situ conservation and reintroduction**

Action is in progress

Foreseen start date: 01/07/2018

Actual start date: 20/03/2017

Foreseen end date: 30/09/2020

Actual (or anticipated) end date: 30/09/2020

#### **D3.2 Plant fitness**

##### Ex-situ population

We observed no seedlings germinated from sown seeds. Therefore the population was established only by transplantation of juvenile plants. The survival rate was, however, very low, only 13.5%. This low survival was caused by instability of rock and soil movements to the inner parts of rocks. Therefore we added the soil to the rock to stabilize the rock. In spite of such high plant mortality, plants produced seeds with high germination rate 78.6%.

##### Reintroduced population

Since the plant transplantation was finished in autumn 2018, the evaluation will start next vegetation season.

### **D4: Rescue planting of \*Minuartia smejkalii in private gardens**

Action is in progress

Foreseen start date: 1/6/2019

Actual start date: 01/04/2018

Foreseen end date: 30/11/2020

Actual (or anticipated) end date: 30/11/2020

The action started earlier since the plants were transplanted already in 2017.

#### **D4.1 Impact on the population in the area**

We started to collect data for the evaluation of impact in the frame of action D1.

#### **D4.2 Planting success**

##### Plant growth

The planting success was garden depended. Three population went almost extinct (two from Hrnčíře SCI area and one from Želivka SCI). Therefore, we decided to improve these small rocks and transplant new plants there. Further, the survival rate was dependent on the rigorous observation of rules. The traditional gardeners decided to water plants in the summer (despite being asked not to do so) and therefore had the survival rate higher (almost 100%) than botanical garden (60.7%) or school Archa (41.4%).

##### Plant evidence

The plant evidence was too hard for the gardeners and we thus have only two sheets (one in paper version and one in electronic). On the basis of this we decided to prepare new evidence sheets, where people will monitor only number of surviving plants and flowering of population in 3 categories (full flowering, only one or two stems and non-flowering).

### **D5. Evaluation of ecosystem services**

Action in progress

Foreseen start date: 07/07/2016

Actual start date: 07/07/2017

Foreseen end date: 30/11/2020

Actual (or anticipated) end date: 30/11/2020

D5 and D6 action were subcontracted by the same organization (with a different responsible person for each). The evaluation of ecosystem services was based on more approaches: 1) Mapping and Assessment of Ecosystem Services; 2) The value of particular biotopes (BVM); 3) Energy-water-vegetation method (EWVM)

The report describing the state at the beginning of project was composed by Doc. Ing. Josef Seják, CsC (**MtR Annex D5**)

According to MAES, the project enhance the value of cultural and maintenance services. Calculated to economic value, the total amount of ecosystem services is 61 000 CZK per ha per year. The majority of ecosystem services (61.5%) respond cultural and habitat services, the maintenance and provisioning services respond to 38.5%. The willingness to pay for non-economical services as a protection of one plant species of people in USA is 5-100 Dollars per year. The benefit transfer to Czech conditions thus suggests that the rescue of *M. smejkalii* produce the economic value 437 million per year.

BVM method is based on transfer of the particular biotopes on reference point and consequently to the economic value. The current value of biotopes in Želivka SCI is 447 011 856 CZK, Hadce u Hrnčír SCI 15 448 062 CZK, while the expected value in 2020 is 491 713 042 CZK in Hadce u Želivky NPA and 16 244 200 CZK.

Energy-water-vegetation method (EWVM) is based on efficiency of solar energy utilization by different habitats. The value of the Hadce u Želivky NPA is 714 679 442 CZK and Hadce u Hrnčír SCI 69 419 900 CZK. Since one of project action is aimed on thinning of the forest the expected efficiency after the project realization is decreasing.

## **D6. Evaluation of socio-economic impact**

Action in progress

Foreseen start date: 07/07/2016

Actual start date: 07/07/2017

Foreseen end date: 30/11/2020

Actual (or anticipated) end date: 30/11/2020

The report describing the state at the beginning of project was composed by Ing. Jakub Vosátka, Ph.D. (**MtR Annex D6**).

The study evaluated the current socio-economic situation on both areas and estimate the potential impact on particular areas. The project will have impact on tourism, business, employment, engagement of general public and institution, connection of scientific organization and organizations dealing with nature conservation. Socio-economic impact of Minuartia alone is very low, nevertheless the protection of sites and enhancement of knowledge about its importance and rarity between local people let to enhancement of attractiveness of the regions. Similarly, the impact of rescue planting in private gardens is important aspect not only on local level, but also on national level.

## **E1 Enhancement of public awareness**

Action is in progress

Foreseen start date: 07/07/2016

Actual start date: 07/07/2017

Foreseen end date: 31/12/2020

Actual (or anticipated) end date: 31/12/2020

We decided to use for preparation of promotion issues local natural sources, such as serpentine, pictures of landscape or plants Therefore we rearranged the particular items (approved in Progress report) and produce them continuously.

### E1.1 Preparation of promotion items

The project logo was selected and the milestone fulfilled on 16/11/2016. Promotional items continue to be produced. Photo documentation of posters, postcards, DIY jewel and the information leaflet about *M. smejkalii*, its localities and the project is attached as **MtR Annex E1.1**. Currently we are contracting a producer able to produce representative jewels from serpentine. First set will be produced by 31/1/2019. The stickers will be produce by 31/1/2019 at the latest.

T-shirts (PR1 Annex E1-1a), and cups (PR1 Annex E1-1b, produced by sheltered workshop), postcards and posters are distributed personally by project team to cooperating institutions, partners and at public events. Postcards and posters are distributed to education programmes and public events participants as well as to cooperating institutions and other partners. Sets with DIY serpentine jewels and postcards are distributed to visitors of the SCI Information Centre Vodní dům by the staff.

	Original project			Produced up to 30/11/2018			Total promotion items planned per project			Date of production	Pieces distributed
	nr. of pieces	price per piece CZK	price per item CZK	nr. of pieces	price per piece CZK	price per item CZK	nr. of pieces	price per piece CZK	price per item CZK		
Pens	1000	6	6000							-	0
T-shirts	250	200	50000	450	200	90000	250	244	61000	05/05/2017	300
Colouring books	500	50	25000							-	0
Pairs game	500	50	25000							-	0
Stickers	2000	27	54000	200	10	2000	200	10	2000	31/1/2019	15
Cups	0			150	100	15000	150	100	15000	30/06/2017	88
Serpentin jewels	0						80	400	32000	31/1/2019	0
Posters	0			300	10	3000	300	10	3000	1/11/2018	5
Postcards	0			500	2	1000	500	2	1000	1/11/2018	25
Serpentit DIY jewels	0			2500			5000	10	50000	1/9/2018	480

### E 1.2 Website, social media

The domains [www.kuricka.cz](http://www.kuricka.cz) (2192 unique visitors so far) and [www.sandwort.eu](http://www.sandwort.eu) (201 unique visitors so far) were registered and the milestone thus fulfilled on 20/09/2016 (PR Annex E1-3a and b). Websites were adjusted according to the findings of the last monitoring visit and both Botanical Institute and ČSOP Vlašim continued to update it regularly. Ministry of Environment assisted with translations for the English website.

On social media at [facebook.com/kuricka](https://www.facebook.com/kuricka), engagement has increased, in six month (April - September 2018), total daily reach of the site activities reached 8092 users.

Virtual photogallery of the project was set up at <https://www.zonerama.com/Kuricka> with total 593 visits so far.

Linked-in profile was created at <https://www.linkedin.com/company/life-for-minuartia>. We use it to attract students to work on the issues linked to the LIFE for Minuartia project in their thesis.

### **E 1.3 Environmental education programs for schools**

In March 2018, first educational programme "Get to know SCI Želivka" started to be offered to pupils of 3rd - 5th grade of basic schools, first run took place in May. The programme takes 60 minutes, it presents the species of European interest in SCI Želivka and includes a commented excursion to the Švihov dam as well as a show of feeding a bat. The programme ran 6 times with 156 pupils so far (**MtR Annex E1.3a**).

In November 2018, first run of the second educational programme "Natura 2000 and nature protection" took place. It is aimed at pupils of 7th - 9th grade of basic school and takes 120 minutes. It presents wider nature protection perspectives and methods illustrated at the example of *Minuartia* and presents also other protected species. New information is tested in a game called *Risk!*. Three runs of the programme took place with 69 pupils so far (**MtR Annex E1.3b**).

### **E1.4 Enhancement of tourist activities on particular sites**

#### **a) Notice boards:**

Installed notice boards (PR1 Annex E1-4) were updated according to the EASME requirements. Fourth notice board was placed at the public part of the Průhonice park operated by the Botanical Institute. The notice board was placed nearby a serpentine rock with the ex-situ population (**MtR Annex E1.4a**).

b) Tourist information point was built in proximity to the DK3 and information panels were placed on the walls. The wooden structure is used regularly by cyclists. We are using the information panels to explain the project and *Minuartia* protection during site trips (**MtR Annex E1.4b**).

In the proximity of notice boards, selected project sites as well as tourist information point, the geocaches were placed. They create a series, which guide the visitors across both project sites as well as selected rocks with *Minuartia*

d) Interactive panels in Visitor Centre of Želivka SCI - Vodní dům One interactive element was placed in the external exposition of the SCI Visitor Centre - Vodní dům. It is a collection of 3 serpentine stones with grinded surface and images of *Minuartia smejkalii* and other serpentine bound species cut into the grinded surface (**MtR Annex E1.4c**). Children can use paper and pencil to make a "frottage" - copy the plants from the stones to paper. This interactive element is used during the excursions and education programmes.

Concept of the second interactive element has been agreed between project partners, it will be a metal sculpture of *Minuartia* flower. Currently we are looking for a provider.

#### **e) Propagation of both SCI areas**

Both sites were included to the program of soft tourism Kraj Blanických rytířů (milestone PR1 Annex E1-5). We plan to further improve the propagation of the SCI areas by short movies planned to be shot in 2019. These will be placed at social media and at information and tourist promotion sites (kudyznudy.cz etc.).

#### **f) Competitions**

The first competition run in 2017 as a part **A-fest – Scientific track**. The participants evaluate the life cycle on model sites and estimate the most critical stage. At the end of competition the winners obtained the promotion materials. The total attendance was 200 people.



29/09/2018 we organized competition within the workshop “**Drátkování s hadcem**”. The competition was based on a quiz focusing on the relationship of presented serpentine jewellery, natural rock serpentine rock and Minuartia smejkalii. The winners obtained small pieces of natural rock and promotion materials (cup, T-shirt). The attendance was 160 people. More info: [https://benesovsky.denik.cz/zpravy\\_region/obrazem-ve-vodnim-dome-v-hulicich-dratovali-s-hadcem-20181001.html?fbclid=IwAR09qIl30Kb0Yb7FAzdw78A52xm0c6yeuGgc4oc6tNf-kPLWEi3RV0-enQ](https://benesovsky.denik.cz/zpravy_region/obrazem-ve-vodnim-dome-v-hulicich-dratovali-s-hadcem-20181001.html?fbclid=IwAR09qIl30Kb0Yb7FAzdw78A52xm0c6yeuGgc4oc6tNf-kPLWEi3RV0-enQ)

In February 2018 two competitions for pupils of basic and middle schools were launched: **Fine Arts Competition** and **Creative Writing Competition**. The topic of competition was: Natura 2000 and nature in the Czech Republic. About 41 participants sent their pictures to the Fine Arts Competition and 20 pupils participated in the Creative Writing Competition. Winners were awarded project T-shirts, cups and free tickets to visit the SCI Visitor Center and Průhonice Park. More details at: <http://www.kuricka.cz/aktuality/detail/2026>

### **E1.5 Seminar Economic utilization of NATURA 2000 sites**

Seminar took place on 9.11.2018 in the environmental education centre Sluňákov at Olomouc. During the preparatory discussion, we decided to focus the seminar especially at the questions of use of Natura 2000 for promotion of sustainable tourism.

Nature protection professionals, especially from visitor centres, who can promote Natura 2000 species and sites participated. Experience of ČSOP Vlašim promoting SCI Želivka and Minuartia smejkalii as well as experience of the central office of the Agency for Nature protection with promotion of nature-oriented tourism were presented.

Several topics linking sustainable management of Natura 2000 and economic utilisation were discussed:

- How to regulate exceed of visitors at the SCIs endangering the target species
- How to promote SCIs and species which are not accessible to public
- How to improve the public image of nature protection
- How to link existence of SCIs with local business activities

26 participants took part in the seminar (**MtR Annex E1.5**). Representatives of Ministries of Industry and Trade and Regional Development as well as agencies promoting economic development (CzechTourism, CzechInvest) were invited but unfortunately turned the invitation down despite prior expressions of interest.

### **E2 Active dissemination of project results**

Action is in progress

Foreseen start date: 01/01/2017

Actual start date: 05/09/2016

Foreseen end date: 30/09/2020

Actual (or anticipated) end date: 30/09/2020

The action started earlier because of Kick-off meeting (E2.2).

#### **E2.1 Networking with other LIFE**

We are in close contact with all Czech LIFE projects focusing on similar habitats (e.g LIFE09 NAT/CZ/000363, LIFE12 NAT/CZ/000629, LIFE16 NAT/CZ/000639 especially LIFE Corcontica LIFE11 NAT/CZ/000490 in the Giant Mountains (Krkonoše) and LIFE Orchids (LIFE17 NAT/IT/000596). From 28/08/2018 to 30/08/2018 we made a field trip to the LIFE Corcontica LIFE11 NAT/CZ/000490 in the Giant mountains (Krkonoše). We visited sites of Minuartia concortica as well as managed sites of Gentianella praecox subsp. bohémica. We visited project sites with grazing management and interviewed 5 farmers. Meeting took place



in Děčínská bouda farm participating in the project. With the project employees, we shared experiences with inclusion of local residents into nature protection projects, ex-situ and in-situ flora protection and we discussed future cooperation in preparation of LIFE and other projects. Robin Bohnish, the Krkonoše National Park director as well as Ing. Václav Jansa, vicedirector and LIFE project leader were present. (**MtR Annex E2.1**) Further we are in contact with foreign LIFE projects (e.g. LIFE Herbages – LIFE11 NAT/BE/001060, LIFE European Red Lists LIFE14 PRE/BE/001, FRESHABIT LIFE14 IPE/FI/000023, Hydrology LIFE LIFE16 NAT/FI/000583, LIFE Saimaa Seal LIFE12 NAT/FI/000367) and HORIZON projects dealing with climatic change e.g. ERC Formica (ERC Starting Grant 757833). As a result of networking, a COST project OC-2018-2-23140, An integrated approach to conservation of threatened plants for the 21th Century was prepared (main beneficiary Dr. Živa Pečnikar, Slovenia)

## E 2.2 Kick-off meeting

was held on 06/10/2016 in Bruxelles

## E 2.4 Dissemination of project results to the general public

### a) Discussion with locals:

One seminar was organized on 27/11/2016 in Bernartice, attendance 43 people (PR1 Annex E2-1) and on 18/02/2017 in Kamberk with 34 people (PR1 Annex E2-2).

On 18/05/2018 a site excursion to the SCI Želivka took place for gardeners, members and partners of ČSOP Vlašim (see **MtR Annex E2.4a**).

### b) Media outputs:

Since project outputs fulfilment (4 articles) was already reported in in the Progress report (deliverables: journal Botanika PR1 Annex E2-3a, Benešovský deník PR1 Annex E2-3b, PR1 Annex E2-3c, press release PR1 Annex E2-3d)), only outputs since 09/2017 are reported now:

- <http://www.jiskra-benesov.cz/clanek/u-vodniho-domu-v-hulicich-bylo-vysazeno-ctyrista-vzacnych-kuricek-hadcovych-9702>
- <https://21stoleti.cz/2018/08/14/podari-se-zachranit-drobnou-krasku/>
- The article was published in the journal Pod Bláníkem (**MtR Annex E2.4b**)
- Lady in trouble article in AΩ Věda pro každého:  
<http://www.kuricka.cz/userfiles/files/LIFE/Alfa%20omega%20V%C4%9Bda%20pro%20ka%C5%BEd%C3%A9ho.pdf>
- Participation of pupils of MŠ a ZŠ Archa Petroupim in the project was covered by the Czech Television: <http://www.ceskatelevize.cz/ivysilani/10265744641-zpravicky/218411000160110>
- Academy of Science prepared a promotion spot:  
<https://www.facebook.com/ceskaveda/videos/1533204230134694/>
- The Czech Radio Junior covered LIFE for Minuartia event - part of Science Fair of the Academy of Science: <https://youtu.be/jzWTaHGfKNo>
- The TV-report in magazine The Czech Science was prepared:  
<https://www.youtube.com/watch?v=UqIQrnL6Z74> The report was further published in these media: TV Kinosvět, TV Noe and Aktuálně.cz

Extra activities:

Thematic weekend for general public was organised on 10 - 11/11/2017 in the Vodní dům as part of the 2018 Science fair (<http://www.veletrhvedy.cz/cz/>). Visitors learned and experimented botanical research methods in protection of Natura 2000 sites and Minuartia in games, short lectures and assisted workshops. More than 100 visitors visited the weekend.

LIFE for Minuartia was presented at the Veletrh vědy (<http://www.veletrhvedy.cz/cz/>) held on 8.-10.6.2017 (17 000 visitors) and 07-09/06/2018 in PVA EXPO Praha – Letňany (24 000 visitors).

## **E 2.5 Dissemination of project results to specialists**

- a) *Management plan for Hadce u Hrnčír SCI* will be prepared in the winter 2018/2019
- b) *Workshop “Working with the public in ex-situ plant conservation* will be organized in 2019.
- c) *Scientific Publications*: we started with preparation of scientific paper focusing on genetic differences between populations of *M. smejkalii*
- d) *Presentation of project results on scientific conference*: The project results were presented on the 5th European Congress of Conservation Biology in Jyväskylä both as a poster and talk in 2018 (deliverable **MtR Annex E2.5a**) and 46th Annual Meeting of the Ecological Society of Germany, Austria and Switzerland, "150 years of ecology – lessons for the future as a poster in 2017(deliverable PR1 Annex E2-4).
- e) *Final international 3 day conference* will be organized in 2020, nevertheless, we will start with organization already one year in advance.
- f) *Instruction leaflet* will be prepared in 2020
- g) *Seminars about ex-situ conservation*: *The first seminar was organized in the Kindergarden and Basic school Archa Petroupim on 25/09/2017 and 19/10/2018.*

Additional actions:

Presentations:

- Presentation of project results to botanists of AOPK (01/06/2017, Svatý Jan pod Skalou)
- on which base the species should be selected. These main Meeting of people dealing with rescuing of rare plant species (11-13/09/2017, Krásná Lípa)
- Conference of Botanical gardens, Prague (10/04/2018)

Field excursions:

- 23/05/2018: forest managers of the forest direction Světlá nad Sázavou
- 20/10/2018: organization Zvonečník and Platform for Landscape, attendance appr. 50 people

Publications:

- Chapter in the book Restoration ecology II (<http://www.ochranaprirody.cz/res/archive/404/065971.pdf?seek=1537948770>)
- The journal Fórum ochrany přírody (<http://www.casopis.forumochranyprirody.cz/magazin/analyzy-komentare/zachranne-pestovani-ohrozenych-rostlin-v-soukromych-zahradach>)

## **E2.6. Expert participation in ex-situ conservation in private gardens**

The meetings were organized on 24/06/2017 (milestone PR1 Annex E2-5) and 28/02/2018. Next meeting is planned in January 2019. Between meetings, the program of rescue planting in private gardens was solved by email. We identified some juridical questions, which are now solved by the lawyers of AOPK and MŽP (deliverable Draft of the Recommendations for

Regulatory changes **MtR Annex E2.6**). The first question is connected with the protection of the second generation of the plants. Since these plants are not protected by the law, it is necessary to prohibit the trade or their donation in the convention with the gardeners. Second question is about ownership of plants since there is discordance between civil law (the owner of the garden is normally also the owner of the plant) and Law on Conservation of Nature and Landscape (owner of the plant is the holder of permission, in this case different from the owner of the garden). The official statement of lawyers is that the civil law is obligatory and superior to the Law on Conservation of Nature and Landscape. This means that such form of conventions with gardeners is not suitable for plant species. We will thus initiate meeting with the lawyers in January 2019 to find other possible solutions for the concept of convention. One possible alternative is to physically divided the garden and rock by a physical barrier or keep the plants in large pots.

Concerning selection of other plant species, we started with discussion about the main points, standards are the species rarity, knowledge about species biology, possibilities of planting, availability of seeds and attractiveness for gardeners. Additional standards are existence (or planning) of the rescue program or action plan, existence of regional coordinator, reasonability (species reintroduction, need of ex-situ population). We selected these species (**project deliverable**) *Jurinea cyanoides*, *Adenophora liliifolia*, *Tephroseris aurantiaca*, *Tephroseris longifolia* subsp. *Moravica*, *Sedum hirsutum*, *Tofieldia calyculata*, *Littorella uniflora*, *Schoenus* sp., *Equisetum variegatum*, but the discussion will continue in 2019.

## 6.2 Main deviations, problems and corrective actions implemented

### Forest grazing

During the processing of the permission, from the Forest law, a new legislative barrier - the Water law (Regulations no. 254/2001 Code) was identified. Forest pasture is not very common approach in the Czech Republic and neither us, nor Povodi Vltavy, a.s., manager and operator of the drinking water source, were clear about how would drinking source protection zone rules be applied. We applied for an official permission with unrestricted time validity according to the Water Code 254/2011 Coll. to the Central Bohemia regional authority. Consent of the operator Povodi Vltavy is a necessary condition in this process. Finally, Povodi Vltavy and us came to an agreement on the way how to allow sheep pasture at the site in a meeting. We therefore asked again for official agreement with forest pasture to Povodi Vltavy. One of the conditions of the permission will be that all personnel responsible for the pasture entering the protected zone is registered and listed in the permission document itself.

Therefore, it is not possible to implement the pasture as a service, but undertake it by ČSOP employees and appropriate amount of badged move to personal cost, travel cost and equipment. This change was approved by Mrs. Donato on 26/10/2018. Since even processing of such permission is innovative for the Czech conditions, we decided to wait for decision and postpone the deadline for this action until the end of 05/2019 to guaranty implementation of pasture twice per year for the following years. If the permission will not be issued until the first grazing period, the shift in budged will not be done and the site will be mown as up to now.

### Enhancement of population size

The population DK1 produces very few seeds because of limited number of individuals in the field. This limitation caused that we had only limited number of individuals/seeds for enhancement of population size. Therefore we decided to continue with transplantation of juvenile plants to this site until the end of the project.

## 6.3 Evaluation of Project Implementation

### Methodology applied

Management interventions are based on a combination of traditional and innovative approaches. The first project results indicate that for restoration of serpentine sites, very intensive interventions such as removing of humus layer by digger are needed. Further, the planning of management interventions according to evaluation of critical phase of life cycle let to their particular rearrangement.

Sowing of seeds/ plant transplantation of *Minuartia* in the field and in the garden showed that although seeds have very high germination rate, they are not able to germinate in the field. Therefore we left the enhancement of population size by sowing and continue only by transplantation of juvenile plants. Planting of juvenile plants in the garden is successful, plant are able to grow in normal as well as in serpentine soil. For plant transplantation is, however, better to grow the juvenile plants in the serpentine soil to keep the species adaptations, even the costs are higher. The success of plant transplantation to the ex-situ sites as well as to the field will be done in the following years.

Local people involved to the Rescue planting in private garden were not able to fill the evidence sheet of plants. Therefore, we decided to prepare new list, which will be simpler and the evaluation will not be time-consuming.

**The results achieved**, the objectives and expected results are presented in a table as attachment **MtR Annex 6.3**

Majority of project impact is visible immediately after their implementation (e.g. removal of humus layer, tree thinning, mowing, plant transplanting). Nevertheless the real impact on composition of vegetation or stabilization of populations in the nature will be achieved after appr. two years. The only exception is situation on B1 site, where the removing of humus layer by digger and plant transplantation let to complete change in the site character and stabilization of population already in 2018. Further, the plants started naturally disperse to other parts of site.

The main part of **replication** is based on the Rescue planting in private gardens. We therefore take a part on many seminars or discussion dealing with ex-situ cultivation and explain the concept of this program. Within the working group we will select other suitable species and suggest implementation of this approach to their rescue program. Additionally, we are partner of COST action (applied in 2018), which focuses on ex-situ conservation.

Concerning of **dissemination activities**, the strongest impact on general public have actions organized in the Visitor Centre Vodní dům, the Facebook, publications in regional journals and excursions. In contrary, for specialists are more important presentation on conferences, organization of discussions. Both categories were interested in TV shots. Surprisingly, we observed very low interest in Linked-in profile. Therefore we will try to improve it to attract more people.

### Policy impact

#### Legislation

The project deals with the species protected on national as well as EU level. It thus fulfils the programs focusing on enhancement of biodiversity.

The project thus required the permissions from The Law on Conservation of Nature and Landscape (Regulation Nb. 114/1992 Code) and from the Forest law (Regulations no. 289/1995 Code). We thus asked for permission to appropriate state organs of nature conservation (AOPK and Regional Office Středočeský kraj). Concerning the permission from Forest Law, new

legislative barrier - The Water Code 254/2011 Coll appeared. The correct form for permission is now solved with appropriate state organs. If the permission will be issued, it will be important novelty for nature protection.

Other legislative questions emerged from the Rescue planting in private garden. We solved the legislative protection of F2 generation, ownership of species (the conflict between the Civil Law and The Law on Conservation of Nature and Landscape). The solution of these question will be included in the methodology of the program Rescue planting in private gardens.

The EU added value is based on the implementation of Directives 92/43/EEC, (i) activities aimed at improving of the conservation status of species of EU interest since it focuses on priority European species *\*Minuartia smejkalii*. Further, it fulfils aims of A Priorized Action Framework (PAF) (F1, thematic priority 2) since it establishes new management plan for Hadce u Hrnčič SCI and updated Methodology of Care based on management realization and its evaluation and The priority C (Article 12) by suppression of species illegal collecting and working with the most important stakeholders. Project leads to implementation of MAWP, mainly strategy area SA1.7 Biodiversity, ecosystems, agriculture and forests as they deal with evaluation of *\*M.smejkalii* conservation status, predicting their future behaviour and lead to halting loss of biodiversity and the degradation of ecosystem services. Further, the project evaluated the data about climatic change from projects focusing on climate change (<http://www.cctame.eu/>; [https://cordis.europa.eu/project/rcn/92067\\_en.html](https://cordis.europa.eu/project/rcn/92067_en.html); <http://climate-adapt.eea.europa.eu/>; <http://www.copernicus.eu/>) and includes the model of global change to the modelling of species population dynamic. The project led to submission of the large COST action, which creates network of 49 organizations from 32 countries.

The project is climate related since the management interventions are based on scientific research modelling the most critical phase of species life cycle on the basis of prediction of climatic change. The populations on the most open sites were considered for the long time as the most perspective. Nevertheless, the evaluation of life cycle showed that there may be a huge problem with survival of seedlings when the climate will be warmer and dryer. On the basis of these data, we decided to rearrange the management interventions and keep the sites as a mosaic of open and shaded patches.

## 6.4 Analysis of benefits

### 1. Environmental benefits

#### a. Direct / quantitative environmental benefits:

The project has direct impact on improving of conservation status of *Minuartia smejkalii*, species of priority interest, in two European important areas with total area of 46.73 ha. Since the total area of species is limited by the occurrence of serpentine, it is not possible to enhance it. In contrary, the population size of rare species bounded to this specific substrate will increase. Concerning population size of *Minuartia smejkalii*, it is evaluated on two levels: populations in-situ and ex-situ. Prior the project start, population size in the nature was 434 individuals, ex-situ population was not established. The target population size in the nature is 589 individuals and 600 individuals in ex-situ population. Recently, the population size in the nature is 837 individuals (without transplanted plants). The project thus reached the planned population size. The ex-situ populations were established in 2017/2018 and therefore it is too early for evaluation of their population size.

#### b. Qualitative environmental benefits

To evaluate changes in species trend or status is too early. Although the total number of individuals is increasing, the increase was observed only on revitalized sites. Population size of other populations is still decreasing. We thus focused on detection of major problems on these

sites It seems that the critical phase of plant life cycle on these sites is survival of seedlings, which is negatively affected by high temperature and extremely dry conditions. We thus decided to change planned management interventions and abandoned the tree cutting on selected rocks. Project is in progress and therefore the elimination of the threats has been done only partly. The only actions, which were finished are fencing of the most grazed rocks and building of car barrier. Other actions are done continuously to change the habitat conditions in particular steps.

On the basis of further evaluation of plant life cycle and impact of management interventions, we will suggest appropriate management for particular sites. Management interventions implemented in the LIFE project are very intensive (e.g. removal of humus layer by digger) and let to regeneration of natural processes on these sites. Therefore the management interventions after the project end will have lower intensity. The only action, which will be done every year will be mowing and grazing. Removal of juvenile trees will be done appr. every 3 years. All action will be ensured by Management plan.

## **2. Economic benefits**

The economic benefits are connected mainly with out-sourcing of particular actions (e.g. graphical and printing services, genetic analysis, evaluation of ecosystem services...) and order of equipment or consumables. Concerning services (digger and other machine, catering), we prefer regional producers, and thus support local economics. Other economic benefit is connected with enhancement of soft tourism near both SCI areas due to organization of actions or by geocaching. The project recently creates 5.35 FTE and involves work of 4 bachelor students and 4 student internships (one student from France, one from Mexico). We also employ many student helpers.

## **3. Social benefits**

The most important social benefit has the action Rescue planting in private gardens, which is focused on the involvement of local gardeners, to species protection. Gardening is very popular mostly in pensioners, who faces risk of marginalization. The project will offer new opportunity for this group to raise its social status and network with other similar people through sharing of the results. Awareness raising in the local community shows the negative impacts of vandalism on the population of this species and related natural and socioeconomic values in the region. Vandalism becomes thus a non-tolerated behaviour. Other social benefits are aimed to nature conservationists since we demonstrate the new approaches in conservation or also increase the employment in the region.

## **4. Replicability, transferability, cooperation**

The replicability and transferability of the project is based on enhancement of awareness as well as active dissemination of the results. The project shows that the most important opportunity for transfer and replication of results could be based on two aspect: the Rescue planting in private gardens and management interventions on specific substrate. The most important target audience are conservationist and state organs of nature protection. Therefore we decided to take a part in more actions (conferences, meeting, seminars), where we discuss these results. Rescue planting in private gardens is slowly spreading into the awareness of conservationists also due to our working group. We discuss the implementation of this approach into standard method of care about selected rare species. Since one of activity of submitted COST action is establishment of trans-national methods of care, the Rescue planting in private gardens should be easily spread to other countries. Even if the planned COST action will not be supported, the idea of international method of care will be further developed. We thus consider that the

replicability of this action as very high, but it will be policy dependant since the laws about nature conservation are different in each country.

The management interventions on B1 were already published as a model site in the book Restoration ecology II and should be thus very easily transferable to other sites with different geology (e.g. sandy areas). Such replication is highly probable and will be market-driven. Concerning ex-situ conservation, we are in contact with the Union of Botanical gardens as a potential target audience. Nevertheless, the evaluation of methodology for establishment ex-situ populations will be finished in 2020. The methodology will be thus prepared in the last year of the project, but the transfer to other species is also probable and will be affected by availability of gardeners interested in the project and legislative.

## **5. Best Practice lessons**

Management interventions such as mowing, forest thinning or removal of humus layer are based on standard approaches. Nevertheless, their application is usually based on the current habitat quality. In our LIFE project, we, however, included in planning of these interventions evaluation of plant life cycle, identification of its critical phases and model of climate change. On the basis of these data we rearranged the interventions planned in proposal to be effective also in the future. On the other hand, aiming of management interventions on particular stage of plant life cycle or focusing on conditions in future place high demands on field managers, who must be more educated then when they apply only common approach.

Concerning enhancement of population size, we used standard approaches of sowing and transplantation of juvenile plants. Surprisingly, the sowing was unsuccessful even the seeds had high germination ability. This finding shows that even the approach is common, it cannot be automatically considered as suitable for similar rare species and should be tested prior usage.

Other best practices approaches will be tested in the next years.

## **6. Innovation and demonstration value**

The demonstrative aspect of project is the Rescue planting in private gardens. The primary motivation of transfer of this Swiss approach to the Czech condition was reduction of vandalism and plant collection in the nature. During the implementation of this action we found, that this is also great opportunity for creation of network of ex-situ populations, which are on one side in local climatic conditions, but on the other site, their slightly differ in environmental conditions. Therefore they are ideal for keeping of maximal genetic diversity. The success of planting, reduction of vandalism as well as preserved genetic diversity will be evaluated in 2020 and presented in the program Rescue planting in private gardens. Consequently, we applied for new project focusing on using of such obtained seeds for establishment of populations of *Minuartia smejkalii* in the nature, what is important for evaluation of reasonability of ex-situ conservation.

## **7. Policy implications**

The most important national legislative barrier is connected with forest grazing, which need permission from Forest law and Water law. Since the Water law cannot allow such action, we found the alternative solution with the Regional office Středočeský kraj. If the permission will be issued, it will be novelty in the Czech legislative.

The most important contribution to legislative is the Rescue planting in private garden, which is new approach for species conservation. We thus have to solve many questions connected with the correct interpretation of laws. Concerning EU level, we found that each country has different approaches in particular laws dealing with protection of rare species (seed collection in the nature, species planting, reintroduction). Therefore this must be consider in the



conventions when the Rescue planting in the private garden will be transferred to foreign conditions.

## 7. Key Project-level Indicators

KPI contain three specific contexts: Rescue of *Minuartia smejkalii* in situ and Rescue of *Minuartia smejkalii* ex-situ and Dissemination of information on *M. smejkalii*.

**Humans influenced by the project** include people involved in the Rescue planting in private gardens (ex-situ context). We supposed that totally 10 gardeners will be involved, but we found that it is necessary to create rocks separately for each SCI area. We thus suppose that at the end of project, totally 20 people will be involved. Currently, we have 14 gardeners directly involved.

### **Wildlife species**

Prior the project start, population size in the nature was 434 individuals, ex-situ population was not established. The target population size in the nature is 589 individuals and 600 individuals in ex-situ population. Recently, the population size in the nature is 837 individuals (without transplanted plants). The project thus reached the planned population size. The ex-situ populations were established in 2017/2018 and therefore it is too early for evaluation of their population size. For evaluation of species trends and status long term monitoring of plant growth is necessary.

### **Information and awareness**

*Website:* the domain [www.kuricka.cz](http://www.kuricka.cz) has 2192 unique visitors so far and [www.sandwort.eu](http://www.sandwort.eu) has 201 unique visitors so far, what is more then we planned (400 visits at the end and 1100 after 5 years). Concerning social networks, the [facebook.com/kuricka](https://www.facebook.com/kuricka), engagement has increased and total daily reach of the site activities reached 8092 users (6510 was expected at the project end and 6815 after 5 years).

### **Other tools**

The dissemination of information is in the progress. We reached the expected number of print media (2) and prepared video/broadcast, which was not planned.

### **Capacity building**

*Networking:* we planned to be in contact with 30 professionals, what was already reached due to organization of excursions, visits of projects, attendance on seminars or by preparation of other projects. We contacted appr. hundreds of people.

*Professional training:* We have recently 4 bachelor students involved in the project and 4 students absolved their internship (planned attendance was 5).

**Jobs:** the final FTE for Dissemination of information is 1.1, for Rescue of *M. smejkalii* in-situ 4.4 and for Rescue ex-situ 1.7. The proposed FTE values will not be reached since the total project FTE is currently 5.35 and it is not expected to be higher. The values are lower since we decided to employ more student helpers.

## 8. Comments on the financial report

The financial report captures the costs, respectively expenditures incurred since the beginning of the project implementation by 30<sup>th</sup> September 2018. Almost 45 % of the total project budget has been spent. The highest item, which has been spent, is the budget capture **Personnel costs**. It means expenditures of staffing of project work incl. management. For Institute of Botany of the CAS work five permanent members of the project team with various percentage of their working time allocated to the project. Students are involved by physical work in the locations of the occurrence of *Minuartia smejkalii*. In ZO ČSOP Vlašim seven permanent members are



involved in the project, and the Ministry of Environment has one representative. The representative of the ministry acts as a consultant, resp. advisor in the project.

Fairly large part of the costs is spent on **travelling** to the destinations where rescue operations are taking place. These are localities at the dam Švihov (Želivka), Bernartice, Vlašim, Benešov, Kamberk, Borovsko etc. Foreign business travels were realised to Brussels, Helsinki and Zurich.

In general, the budget is being used appropriately and the costs are in accordance with the financial plan.

The standard statement of expenditure FINANCIAL STATEMENT of the INDIVIDUAL Beneficiary is attached as **MtR Annex 8a** (for MŽP), **MtR Annex 8b** (for IBOT) and **MtR Annex 8c** (for ČSOP). Subscribed copies of pdf versions are attached as **MtR Annex 8e** (for MŽP), **MtR Annex 8f** (for IBOT) and **MtR Annex 8g** (for ČSOP). Each partner fulfils the Financial statement separately.

An overall view of the project's management is given in to CONSOLIDATED FINANCIAL STATEMENT. This statement summarizes the total costs and receipts of the project for the period from 7<sup>th</sup> July 2016 to 30<sup>th</sup> September 2018 and is attached to the Report as **MtR Annex 8d**, subscribed copy of pdf version is attached as **MtR Annex 8h**. The summary of costs is mentioned in part 1.1 of this report, as well money spent in particular budget categories.

## 8.1. Summary of Costs Incurred

Summary of Cost Incurred is based on individual statements which have been filled separately by each partner. All relevant data is available in attached .xls files (mentioned above).

PROJECT COSTS INCURRED			
Cost category	Budget according to the grant agreement in €*	Costs incurred within the reporting period in €	%**
1. Personnel	493,186.00	233,586.95	47.36 %
2. Travel and subsistence	38,268.00	16,924.15	44.23 %
3. External assistance	89,111.00	23,138.54	25.97 %
4. Durables goods: total <u>non-depreciated</u> cost	12,972.00	8,166.67	62.96 %
- <i>Infrastructure sub-tot.</i>	<i>4,169.00</i>	<i>4,706.13</i>	<i>112.88 %</i>
- <i>Equipment sub-tot.</i>	<i>8,803.00</i>	<i>3,460.54</i>	<i>39.31 %</i>
- <i>Prototype sub-tot.</i>	<i>0.00</i>	<i>0.00</i>	<i>0.00 %</i>
5. Consumables	17,900.00	8,548.00	47.75 %
6. Other costs	36,711.00	9,298.60	25.33 %
7. Overheads	47,792.00	16,967.00	35.50 %
<b>TOTAL ELIGIBLE costs</b>	<b>735,940.00</b>	<b>316,629.92</b>	<b>43.02 %</b>
<b>TOTAL COSTS</b>	<b>735,940.00</b>	<b>322,001.65</b>	<b>43.75 %</b>

## 8.2. Accounting system

On general level all Partners shall follow principles of Act on Budgetary Rules No. 218/2000 Coll. and its associated Decrees. There is, of course, operational standard double-entry bookkeeping system.

The Departments of Budget or Economics manage all book entries. This is the standard procedure for all Beneficiaries. All the documents, on the basis of which the costs are charged, are archived in accordance with the terms of the project and the beneficiary's internal rules.

All internal accounting is kept in CZK (in accordance with the Accounting Act No. 563/1991 Coll.) – conversion to EUR is made only for formal Life Financial Report (“FINANCIAL STATEMENT of the INDIVIDUAL Beneficiary”). It is used daily rate conversion method.

Each project partner (i.e. Beneficiary) uses specific identification code for the purpose of separately costs recording in his accountancy system.

- Institute of Botany of the CAS      LIFE for Minuartia = Project No. 200901EU
- Ministry of Environment      LIFE for Minuartia = Project No. PDD470001
- ZO ČSOP Vlašim      LIFE for Minuartia = Project No. 405

The accounting system in Czech Republic is standardized by the Ministry of Finance in the form of accounting standards. The system is based on the unequivocal determination of the types of cost items so that it is immediately recognizable what type of expenditure is involved. Cumulatively, synthetic accounts are used, analytical evidence can be used to specify cost item. The costs are listed by default as the first sign 5, the proceeds are charged with the sign 6. Special accounts are used to record the acquisition of fixed assets with depreciation.

Each partner is responsible for the costs he/she charges as eligible project costs. In accordance to Financial control Act No. 320/2001, Coll., is obliged to undertake preliminary, continuous and follow-up control. Prior to the creation of an accounting case, the Operation Commander, Budget Administrator and Chief Accountant are involved in the process. The Operation Commander is responsible for substantive accuracy, the Budget Administrator approves the financial criteria and the Chief Accountant is responsible for the correctness of the accountancy. Each of these three people confirms the correctness with his/her signature. Internal Time and Performed Work Statement checked and signed by Head of Unit is on daily basis. Brief description of daily work is given in the personnel file as well a part of the work assignment that is allocated to the project.

Costs are attributed to the project through an internal code that provides separate accounting (above mentioned). The contractor is asked to provide the registration number on the document (invoice). However, if this is not technically feasible for him, then the document is addressed only to the consumer. For this purpose a project designed stamp is used.

### **8.3.Partnership arrangements**

The partnership is based on a contractual relationship. The Partner Agreement between IBOT and MŽP was based on the signature of Decision about provision of subsidy of MŽP (PR Annex F1-3) and was signed on 15<sup>th</sup> September 2017 (**MtR Annex F1.1b**) and the Partner Agreement between IBOT and ČSOP Vlašim dated on 31<sup>st</sup> August 2016 (PR1 Annex F1-2). Rights and obligations as a condition of financial transfers are enshrined in above mentioned agreements. Partners agreed on quarterly reporting period. Agreed deadlines are respected without delay.

### **8.4.Certificate on the financial statement**

Irrelevant

## 8.5. Estimation of person-days used per action

Action type	Budgeted person-days	Estimated % of person-days spent
All projects when applicable Action A: Preparatory actions	931	53.45 %
NAT and CLIMA projects Action B: Purchase/lease of land and/or compensation payment for payment rights	0	0.00 %
NAT projects Action C – Concrete conservation actions	1472	57.55 %
NAT and CLIMA projects Action D: Monitoring and impact assessment	484	52.54 %
NAT and CLIMA projects Action E: Communication and Dissemination of results	856	51.09 %
NAT and CLIMA projects Action F: Project management (and progress)	1148	44.61 %
<b>TOTAL</b>	4976	51.22%

## 9. Envisaged progress until next report

The A4 action is already finished. Until the next report (Progress in 2Q 2020) following actions will be finished: A1, A2, A5, C3, C4. The rest of action, i.e. A3, C1, C2, D1, D2, D3, D4, D5, D6, E1, E2, F1 and F2 will continue to the end of project according the plan.

We expect that the permission from the forest law (**A1 action**) will be issued in a short time. We decided, however, that if it will not be issued until the beginning of the next vegetation season (June 2019), we will continue by mowing and stop this activity.

Concerning **A2 activity**, we finished the collection of data about species life cycle and habitat quality. We will continue with set-up of management plots since it is better to mark them immediately prior management implementation.

Enhancement of population size (**A3, C2 activity**) will continue for DK1 population since it produced low amount of seeds. To ensure that the population will be stable, we decided to postpone all these actions for the whole time of project. The evaluation of results will be, however, based only on individuals transplanted in 2017-2019.

Rescue planting in private garden (**A5**) will continue since we are solving the legislative issues. The rest of rock will be built in 2019.

Since the plants were transplanted to garden already in 2017, the evaluation of planting success (**action D4**) started in 2018.

The changes in project timetable are attached as a PR1 Annex F1-4 and **MtR Annex 9a** as xlsx file (Gantt chart, Figure 1), the progress in particular project deliverables and milestones is attached as PR1 Annex F1-5 and **MtR Annex 9b**. Table of key project indicator was attached as PR1 Annex F2-1

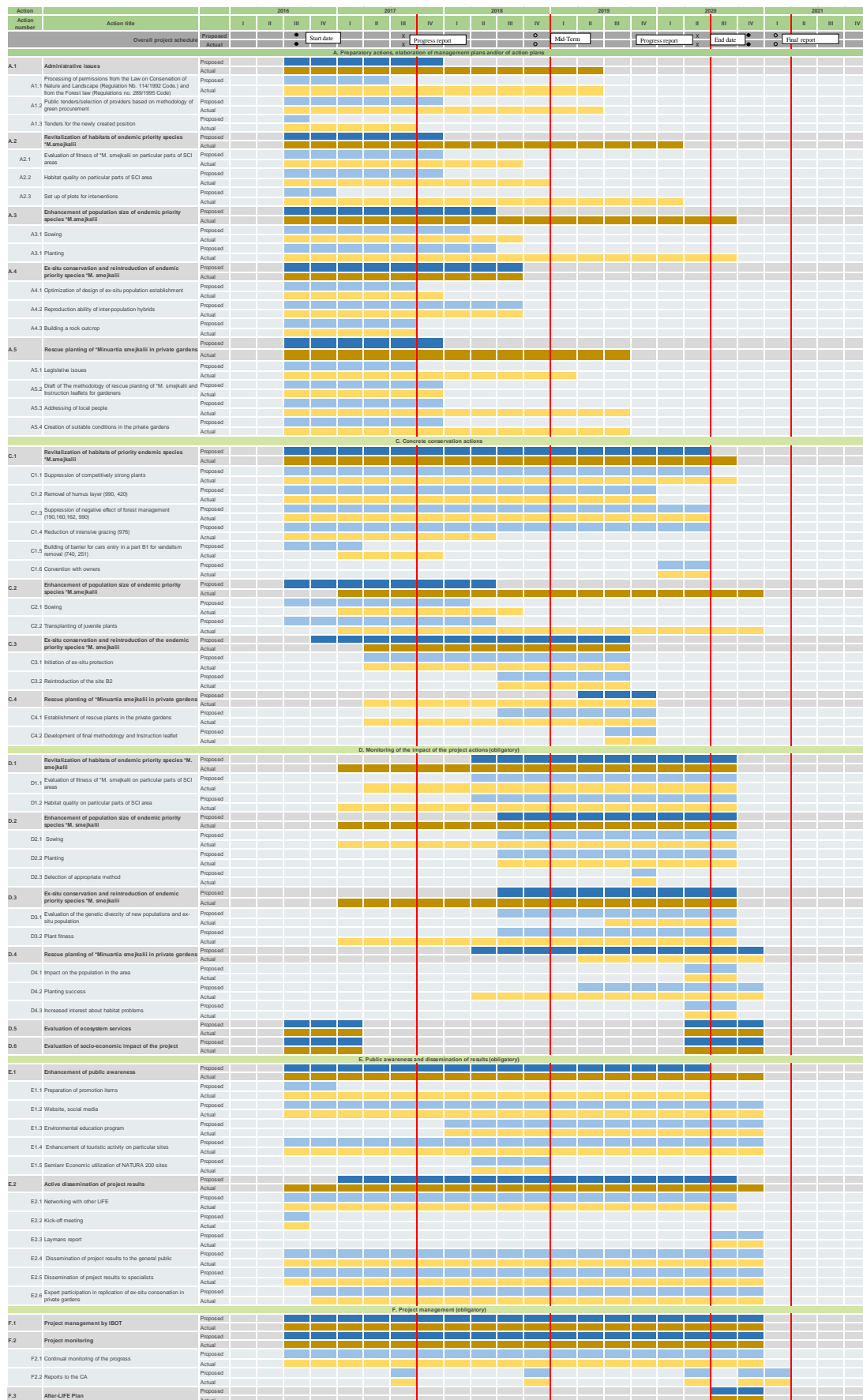


Figure 1. Gaant chart.