

**RAPPORT 2013/2**  
**METHOD FOR EVALUATING**  
**GRASSLAND MANAGEMENT**  
**AND BIODIVERSITY**

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# Method for evaluating grassland management and biodiversity – Status and trends 1997-2012 in the Uppland coastal region

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*Land use changes  
Restoration, late grazing*



*Ecological habitat changes  
Sun exposure, shelter*



*Potential for butterflies  
Abundance and trend  
of host plant*



*Abundance and trend of butterfly*

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## **Grassland management and biodiversity – status and trends 1997-2012 in the Uppland coastal region**

### **Background**

During 1996-1997 a number of semi-natural grasslands in Eastern Uppland were surveyed by Upplandsstiftelsen, primarily with respect to butterflies and their host-plants, but also management status and general grassland structure were noted. The grasslands are situated in the limestone-rich archipelago and coastal area of Northern Roslagen, known for its rich flora. The butterfly fauna was investigated through active search on host-plants and in other suitable habitats, and through manual light-trapping.

Several species-rich grasslands were discovered, and the work showed a much richer butterfly fauna than earlier known.

For some of the grasslands, restoration and improved management was applied, e.g. through advice to land-owners, financial support to active measures, facilitation of contacts between land-owners and external owners of cattle etc. All grasslands subject to such measures were also eligible for agri-environment payment, which has been the main economic incentive for continuation of grassland use during the period.

Since the sampling effort regarding species of butterflies and plants varied between sites, the data can not be used quantitatively. On the other hand, the data provide qualitative information about relationships between butterfly occurrence (not abundance), host-plant occurrence, and management. The qualitative data on grassland status and biodiversity, together with information about subsequent conservation measures can be used to evaluate how species-rich grasslands of conservation concern have developed during 15 years in Sweden.

- By re-visiting the grasslands 2011-2013, it is possible to contribute to the evaluation of the ecological effects of both the national RDP, and the conservation efforts done by Upplandsstiftelsen and other actors.
- Analyses of the data from the two surveys can further contribute to finding methods for identification of value-areas for biodiversity, and to focussing on indispensable management components which need to be maintained or re-introduced. The analyses can thus be regarded as an applied example of knowledge-based conservation, in turn a base for a revision of the NRDP and of European CAP in general.

### **Method**

For the second inventory 2011-13, a stepwise approach for data collection is used. For each site, information is collected according to the following:

1. Step one: Changes of habitat management since the first survey.

2. Step two: Ecological changes of the habitat as result of the management changes in step one.
3. Step three: Changes of the potentials for favourable conservation status of the butterfly fauna, as result of the ecological habitat changes in step two.
4. Step four: Actual changes of the butterfly fauna since the first survey, as a result of the habitat changes in step three.

Information in step one and two can always be collected. Information in step three can usually be collected, although some types of data may be uncertain because of unsuitable weather conditions or large between-year variation. Observations of actual changes of butterfly populations, step four, can only be made with certainty under favourable conditions and may therefore be missing at some sites.

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## *Field manual*

### **1) Changes of habitat management and other land use**

#### *a) Restoration measures*

- i) Clearing of the shrub layer in order to favour the grass sward (note the type and intensity of clearing, i.e., what has been cleared and to what extent)
- ii) Clearing of the tree layer in order to favour the grass sward (note the type and intensity of clearing, i.e., what has been cleared and to what extent)
- iii) Clearing of the tree layer in order to favour veteran trees, shrubs or other structures in the tree- or shrub layers (note the type and intensity of clearing, i.e., what has been cleared and to what extent. Note also which structures that seem to have been the target for the measure)
- iv) Fencing in order to expand or control the grazing (note what seems to have been the target for the measure)
- v) Other restoration measures (describe)

#### *b) Changed management*

- i) Resumed management (note the type of management, e.g., mowing, grazing, late grazing, lawn mowing)
- ii) Changes of management type (note the type of change, e.g., new type of grazing animal, mowing instead of grazing, late grazing instead of continuous, considerably increased or decreased intensity of grazing)
- iii) Ceased management (if possible, note when cessation took place)

- iv) Other management changes (describe)
- c) ***Other habitat changes related to land-use***  
(note the type of change, e.g., tree plantation, fertilisation, new buildings, roads, forestry logging, drainage, cultivation)

## **2) Ecological changes of the habitat as result of the management changes**

### **a) *Sun exposition and wind***

- i) Change of tree layer (note the canopy projection [Categories: 0-25%, 26-50%, 51-75%, 76-100%, mosaic of gaps and groves] and describe how it has changed since last survey)
- ii) Change of shrub layer (note the ground cover [Categories: 0-25%, 26-50%, 51-75%, 76-100%, mosaic of gaps and groves] and describe how it has changed since last survey)
- iii) Estimated sun and wind conditions as result of the tree and shrub layers
  - (1) Sun exposure (on a three-category scale: Exposed [sun exposed most of the day and most of the site]; Intermediate exposure [approx. half of the day or half of the site]; Shadow [most of the day or most of the site].)
  - (2) Wind exposure (on a three-category scale: Shelter, Intermediate shelter, Wind-exposed)

### **b) *Field layer, grass sward***

- i) Change of cover of grass sward
  - (1) Change of grass sward cover since last survey (if possible by estimating approx. percentage change, otherwise note only increase or decrease)
  - (2) Causes (if the grass sward cover has changed, note the most plausible causes for the change, e.g., denser tree cover, too intense grazing, clearing of shrubs)
- ii) Changes of vegetation properties
  - (1) Change of vegetation height and litter depth (note whether the vegetation height seems to have increased or decreased, and the same for the litter depth, i.e., the layer of old plant material)
  - (2) Change of vegetation composition (note estimated changes of the vegetation composition, e.g., increased or decreased dominance of grasses or rushes on the cost of herbs, increased dominance of certain species, or decreased abundance)

of certain species which earlier were conspicuous in the vegetation. For increase/decrease of more rare species, e.g. host-plants for butterflies, see step 3, below.)

(3) Change of vegetation disturbance (note whether the vegetation the intensity of disturbance by grazing, mowing or other, has increased or decreased since last survey)

iii) Other vegetation changes (describe, e.g., changed soil moisture, more bare soil)

**c) *Other habitat structures which have been affected by changed management***

i) Veteran trees and similar (note if possible the approximate number of trees that are either overgrown, dead, or rescued by clearing measures; otherwise note if the number of trees in the different categories has increased or decreased)

ii) Biologically important shrubs (note the change of status, e.g., regarding exposure)

iii) Other (describe, e.g., changed exposure of wetland, rocks, certain types of wood)

**d) *Landscape (optional)***

Describe important changes of the site's neighbouring areas.

### **3) Changes of potentials for butterflies as result of the ecological changes**

**a) *Local butterfly-climate***

Describe briefly the microclimatic status of the site regarding climate variables being important for butterflies (wind-exposure, sun-exposure), either in general or for specific species occurring at the site. If possible summarise the description in terms of very suitable, suitable, unsuitable for butterflies.

**b) *Important host-plants for butterfly species present at the site***

i) Abundance of host-plants (note for each host-plant species: abundant, medium abundant, scarce, and if possible large increase, increase, stable, decrease, large decrease).

ii) The host-plants' function for butterflies (describe the suitability for butterflies: suitable, less suitable because of... e.g. too intensely grazed, too little sun exposure etc).

iii) Concluding host-plant potential (summarise for each of the most important butterfly-species the site's potential regarding host-plants, in terms of very suitable, suitable, unsuitable).



**c) *Nectar resources, flower richness***

- i) Abundance of nectar plants (note nectar-plant abundance: abundant, medium abundant, scarce, and if possible large increase, increase, stable, decrease, large decrease. Note also if the resource differs between early-season-flying and late-flying species).
- ii) The nectar-plants' function for butterflies (describe the suitability for butterflies: suitable, less suitable because of... e.g. too intensely grazed, too little sun exposure etc).
- iii) Concluding nectar-plant potential (summarise the site's potential regarding nectar-plants, in terms of very suitable, suitable, unsuitable).

**d) *Other habitat conditions important for butterflies***

Describe other conditions, e.g. for species dependent on other food sources than host-plants, on specific hibernation conditions etc.

**e) *Landscape (Optional)***

Describe major changes of the potential for butterflies, e.g. broken dispersal routes, increase or decrease of neighbouring populations (which may serve as dispersal cores), increase or decrease of suitable habitat close to the site etc.

## **4) Changes of the butterfly fauna as result of the changed habitat potential**

**a) *Species specific for patches of host-plants or other substrate, microhabitats etc (can be found by directed search on the specific resource)***

- i) Quantitative changes (note if possible for each species the total number of suitable resource patches at the site, and the number of patches on which the species was found. Note if possible coordinates for the visited patches, or show on a map where they are situated)
- ii) Qualitative summary of the changes. Describe for each species its conservation status in terms of:
  - (1) Abundance (abundant, medium abundant, scarce)
  - (2) Trend (large increase, increase, stable, decrease, large decrease since previous inventory)
  - (3) Causes (Likely explanations for the status and trend)

**b) *Species specific for the site but less obviously connected to certain patches of resources (can be found by site-scale netting or light-trapping)***

i) Qualitative summary of the changes. Describe for each species its conservation status in terms of:

- (1) Abundance (abundant, medium abundant, scarce)
- (2) Trend (large increase, increase, stable, decrease, large decrease since previous inventory)
- (3) Causes (Likely explanations for the status and trend)



This report describes a Method to follow up status and trends of grassland management and biodiversity with a focus on butterflies. A stepwise approach for data collection is used. The method has been developed as a tool for data collection to be able to analyse status and trends in the Uppland coastal region.



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