MUSÉUM
NATIONAL D'HISTOIRE NATURELLE

ASSESSING THE CONSERVATION STATUS OF HABITATS IN FRENCH NATURA 2000 SITES: METHOD FOR CALCAREOUS GRASSLANDS AND HAY MEADOWS

Lise Maciejewski (MNHN-SPN), May 2012 – revised June 2015

The aim of the Natura 2000 network is to reconcile the preservation of nature and socio-economic concerns, through the concerted and contractual management of a group of sites dedicated to maintaining or restoring species and natural habitats listed in the annexes of the Habitats-Fauna-Flora directive (Habitats Directive) at a favourable conservation status. Favourable conservation status is not considered an absolute scientific reference but rather a co-construction between ecological principles and socio-economic requirements compatible with preservation of nature. Natural and semi-natural grassland formations are the perfect example of this balance, where human activities play a key role in maintaining and conserving those habitats.

CONTEXT

Building by the French Natural Heritage Service (a unit of the French Museum of Natural History) this method meets the following four objectives:

1. Establish a scientific basis to determine and discuss the conservation objectives within the Natura 2000 steering committees (concerted management), as well as provide operators with a management support tool.
2. Assess the conservation status of the habitats which have led to the designation of the sites according to French law, as part of the management documents (DOCOB - objectives document).
3. Indicate the degree of conservation in the standard data forms.
4. Locally define the favourable conservation statuses and relevant indicators to measure, in order to help to set up surveillance at a large scale (article 11 of the Habitats Directive).

This study focuses on the most common grassland formations among the French Natura 2000 sites: semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (EU 6210), lowland hay meadows (EU 6510), and mountain hay meadows (EU 6520).

METHODOLOGICAL CHOICES

Assessment of the conservation status on a local scale is based on three major parameters: (i) composition, structure and functions of the habitat, (ii) deteriorations it undergoes and (iii) evolutions of its area within the site. These parameters are themselves composed of criteria to which one or more indicators are associated.

Unlike community evaluation, a digressive gradual final grading approach for conservation status has been chosen. For each indicator, the observed value is compared to threshold values. Based on the difference with these threshold values, a grade is attributed to each criterion. A final grade is obtained by subtracting all of these grades from 100. Lastly, the conservation status is obtained by transferring that

grade onto an axis representing the conservation status gradient, which can be later divided into different levels of conservation status (Figure 1).

Criterion (*cf* tables 1 and 2)	Observed values	Threshold values	Grade
A	2	0 < A < 3	0
		3 < A < 6	-5
		6 < A < 9	-10
B	10%	100 % > B > 80 %	0
		80 % >B >20 %	-10
		20 % > B > 0 %	-20
C	7	C > 10	0
		C < 10	-15
		Final grade	**100** - 0 -20 -15 = 65

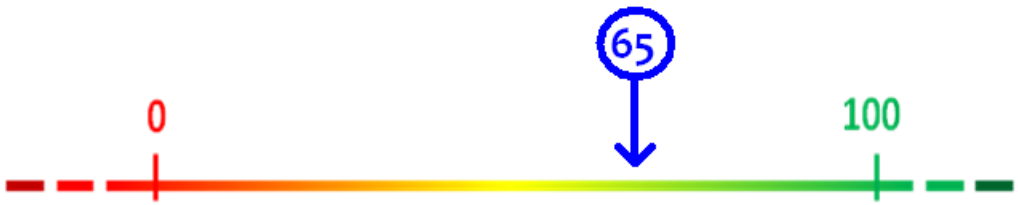

Figure 1: axis representing the conservation status gradient

This approach helps independently highlight criteria whose evaluation is good or bad, and rank them according to their importance. It helps to situate the habitat more precisely within a conservation status category. This sharp evaluation is used to better adapt the efforts that need to be made for the habitat and should highlight the management efforts carried out.

MATERIALS AND METHODS

This study was carried out in three major stages. A first group of criteria and indicators was selected from the bibliography, to which new indicators developed in consultation with different partner structures were added. This list has been confirmed by a group of experts and site managers. The existing tools were used when relevant and several indicators were suggested for a given criteria whenever possible.

These indicators were then tested based on data collected on different French sites. Statistical analyses have helped find out precisely what information each indicator bears and highlight any redundancies. This has helped simplify the method and make it more efficient, as well as more adaptive by suggesting alternatives for a given criteria. Lastly, the threshold values and associated grades have been calibrated using these same statistical analyses.

RESULTS

This method based on a set of indicators which are easy to calculate and practical to collect in the field, can be used by the majority of site managers. Following the analyses, some of the indicators selected in the first stage were not chosen, because their relevance was not proven, or because they were redundant with other more simple indicators: for example, the presence of orchids was not kept as an indicator of the good conservation status of calcareous grasslands. Also, ruderal species were not

chosen, because their definition can be ambiguous, and they are partially redundant with eutrophic species. Two grids of parameters, divided into criteria and indicators, have been implemented for grasslands and meadows (Tables 1 and 2).

Composition and structure of vegetation constitute the principal information used to determine the type of habitat; however faunistic indicators form a part of this method. Indeed, fauna is a part of the habitat and contributes to how it functions. Like flora, it is an integrator of ecological conditions of the environment, and its higher level in the trophic chain helps to obtain overall information on functional aspects.

The principal indicators chosen concern:

- **Trophic dynamics of the habitat**. For example, it has been established that an inventory of eutrophic species based on a precise list, helps to find out if the trophic level of a parcel is high. The use of a presence/absence check-list helps limit the number of species to recognise and limit the "observer effect". Among the existing tools tested, one called "Prairies Fleuries" method ("*Flowering Meadows*") and the list of species implemented for the 2011 national contest in the French regional natural parks were included in the evaluation (when crossing a parcel, observation of a list of species indicators of a good agro-ecological balance, which are easy to recognise). It has been demonstrated that the decrease in the observed number of species on this list is strongly related to the increase in the trophic level of the parcel. The result is a choice of two indicators for trophic dynamics: either the presence of eutrophic species or the "Prairies Fleuries" (*"Flowering Meadows"*) indicator.
- **Spatial dynamics of the habitat,** highlighted in particular thanks to the area evolution trend of the habitat within the site, or with the assessment of the cover of shrubs and trees.
- **Stability of the habitat maintenance conditions, and the balance with the practices.** Bunch grass cover for calcareous grasslands and presence of species which are characteristic of mowing practices for hay meadows help highlight the balance between anthropogenic impact and ecological factors that govern the establishment of these habitats.
- **Connectivity and functioning of the eco-complex.** Indeed, at a site level, fragmentation evolution trend, as well as for example dynamic of shrubs and trees, provide information on fragmentation of the habitats. On a local scale, the Diurnal Lepidoptera, thanks to their pollination function, their sensitivity to fragmentation and the link with their host plants, provide indirect indications on the trophic level of parcels, and in particular, provide integrated information on how the entire eco-complex functions. A proposal of two indicators has been given.
- **Functioning of the cycle of matter.** The presence and activity of dung beetles provide information on the correct functioning of the degradation cycle of organic matter on the ground.

DISCUSSION

Each habitat type described in the interpretation manual of European Union habitats (EUR 28) cans have a large ecological variability. That is why certain fine dynamic aspects of the habitat cannot be detected by the method, such as a beginning of eutrophication of xerophilous grassland. It is also one of the

consequences of the assumed compromise between simplicity and efficiency. Ongoing studies will help highlight these limits.
Sampling must adapt itself to the question being asked, but also to the site's history and means available. According to the indicators (Tables 1 and 2), data can be collected on different units of sampling.
New grids for other grassland formations of community interest have been included in the method [tall herbs fringe communities (6430-A) and Molinia meadows (6410)], to eventually cover the entire diversity of natural and semi-natural grassland formations.

CONCLUSION

The method's strongest points are its simple application, the use of both floristic and faunistic indicators, alternatives suggested for certain criteria, and the statistical origin of threshold values and grades.
One of the most important limits is that this method, set up for the entire metropolitan France territory, is not adapted to some local particularities.

OTHER HABITATS TYPES

So far, the French Museum of Natural History has created method to assess conservation status at a site level of: forest habitats, unwooded Atlantic coastal dunes, lagoons, alpines and Mediterranean Rivers, natural and semi-natural grasslands.

CONTACTS

Lise Maciejewski: maciejewski@mnhn.fr
Farid Bensettiti: bensettiti@mnhn.fr
Julien Touroult: touroult@mnhn.fr

REFERENCE

Maciejewski, L., Seytre, L., Van Es, J. & Dupont, P. 2015. *État de conservation des habitats agropastoraux d'intérêt communautaire, Méthode d'évaluation à l'échelle du site. Guide d'application. Version 3*. English Summary, June 2015. Service du patrimoine naturel, Muséum national d'Histoire naturelle, Paris.

DOWNLOADS

- *Implementation guide (in French)*: http://inpn.mnhn.fr/docs/N2000_EC/Eval_EC_habitats_agropastoraux_version3_MNHN-SPN_2015.zip
- *Learn more and find guides for others habitats types*: http://inpn.mnhn.fr/telechargement/documentation/natura2000/evaluation?lg=en

Inventaire National du Patrimoine Naturel

Table 1: Criteria and indicators chosen for assessing of the conservation status of hay meadows (EU 6510 and EU 6520). For the thresholds and grades associated to each indicator, please refer to the implementation guide.

PARAMETER	CRITERION			INDICATOR		Information highlighted
				Options	Description of indicators	
Area covered	Area of the habitat			Area evolution trend (indicate the causes of the evolution)		General functioning and prospects, reservoir of biodiversity and connectivity, dynamics of the habitat
	Parcelling and fragmentation			Fragmentation evolution trend		Connectivity
Composition, Structure and Functions	Ground cover			Cover of trees and shrubs (in %)		Dynamics of the habitat: risk of habitat loss, fragmentation and reduction of seed reservoir
	Specific composition	Floristic composition		A	List of floristic species (national list 2011) "Prairies Fleuries" (*"Flowering meadows"*)	Dynamic trajectory regarding the trophic level
				B	Presence of eutrophic species	
				Presence of characteristic species of mowing practices		Stability of the habitat maintenance conditions, balance with the practices
				Presence of alien invasive species		General functioning, conservation of the habitat
		Faunistic composition	Composition in Diurnal Lepidoptera (A or B)	A	'colour' indicator	Trophic level, fragmentation and functioning of the eco-complex
				B	'species determination' indicator	
			Composition or activity of dung beetles (A, or A+B)	A	'dung beetles activity observation' indicator	Functioning and space-time continuity of the cycle of matter (herbivore-ground connection)
				B	'K strategy dung beetles' indicator	
Deterioration	"Diffuse" damage to the site			Damage whose impact is difficult to quantify on the surface		Large-scale damage
	Damage to the polygon			Localized damage and its recovery		Remainder of disruptions not taken into account indirectly by the other indicators

Table 2: Criteria and indicators chosen for assessing the conservation status of calcareous grasslands (EU 6210). For the thresholds and grades associated to each indicator, please refer to the implementation guide.

PARAMETER	CRITERION			INDICATOR		Information highlighted
				Options	Description of indicators	
Area covered	Area of the habitat			Area evolution trend (indicate the causes of the evolution)		General functioning and prospects, reservoir of biodiversity and connectivity, dynamics of the habitat
	Parcelling and fragmentation			Fragmentation evolution trend		Connectivity
Composition, Structure and Functions	Ground cover			Cover of trees and shrubs (in %)		Dynamics of the habitat: risk of habitat loss, fragmentation and reduction of seed reservoir
	Specific composition	Floristic composition		Presence of eutrophic species		Dynamic trajectory regarding the trophic level
				Tor-grass cover		Stability of the habitat maintenance conditions, balance with the practices
				Cover of species of scrubland facies		Stability of the habitat maintenance conditions, balance with the practices
				Presence of alien invasive species		General functioning, conservation of the habitat
		Faunistic composition	Composition in Diurnal Lepidoptera (A or B)	A	'colour' indicator	Trophic level, fragmentation and functioning of the eco-complex
				B	'species determination' indicator	
			Composition or activity of dung beetles (A, or A+B)	A	'dung beetles activity observation' indicator	Functioning and space-time continuity of the cycle of matter (herbivore-ground connection)
				B	'K strategy dung beetles' indicator	
Deterioration	"Diffuse" damage to the site			Damage whose impact is difficult to quantify on the surface		Large-scale damage
	Damage to the polygon			Localized damage and its recovery		Remainder of disruptions not taken into account indirectly by the other indicators