Fourth Mediterranean Natura 2000 seminar
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Natura 2000 Biogeographical Process

SPANISH APPROACH TO SETTING FAVORABLE REFERENCE VALUES OF HCI

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Ezousa River (SAC Episkopi Morou Nerou)
Picture ©Marina Xenophontos

Favourable Reference Values (FRVs) are quantifiable indicators established to set what is the favourable conservation status of species and habitats.

They are a tool to deal with the consideration of long-term viability of a species or habitat in their natural range including ecological variations.

FRV are still poorly developed and often inconsistently applied across Member States.
Because:

- Methodologies to determine FRVs are often undocumented.
- FRV were sometimes not explicitly defined.
- Expert opinion was frequently applied for weighting FRV factors.
- The use of operators (>, >>, ≈) was not harmonised.
- Feasibility considerations had often not been used in setting FRV.

Before setting the favourable reference values, it is advisable to collect all the relevant information about a habitat in order to understand their ecological and historical context:

- current situation and assessment of deficiencies, i.e. any pressures, problems
- trends (short-term, long-term, historical, i.e. well before the Directive came into force)
- natural ecological and geographical variation (including variation in species composition, variation in conditions in which habitats occur, variation of ecosystems)
- ecological potential (potential extent of range, taking into account physical and ecological conditions, contemporary potential natural vegetation)
- natural range, historical distribution and causes of change
- connectivity and fragmentation
- dynamics of the habitat type
- requirements of its typical species.

The reference-based approach considers the historical distribution or area of a habitat in a period when the habitat was supposed to be in a (stable) favourable condition. Empirical areas corresponding to a particular historical baseline are used to set FRV. The challenge is to determine how much of the baseline needs to be restored to represent a favourable area.

Model-based approaches use habitat type-specific features, such as habitat suitability or required area for proper functioning

General principles for the process of setting FRVs:

- FRVs should be set on the basis of ecological/biological considerations

- FRVs should be set using the best available knowledge and scientific expertise

- FRVs should be set taking into account the precautionary principle and include a safety margin for uncertainty

- FRVs should not, in principle, be lower than the values when the Habitats Directive came into force, as most habitats have been listed in the Annexes because of their unfavourable status.

- The area (and its distribution) at the date of entry into force of the Directive does not necessarily equal the FRVs

FRVs are not necessarily equal to ‘national targets’: Setting targets would mean the translation of such reference values into operational, practical and feasible short-, mid- and long-term targets/milestones.

FRVs do not automatically correspond to a given ‘historical maximum’, or a specific historical date. Historical information (e.g. a past stable situation before changes occurred due to reversible pressures) should, however, inform judgements on FRVs

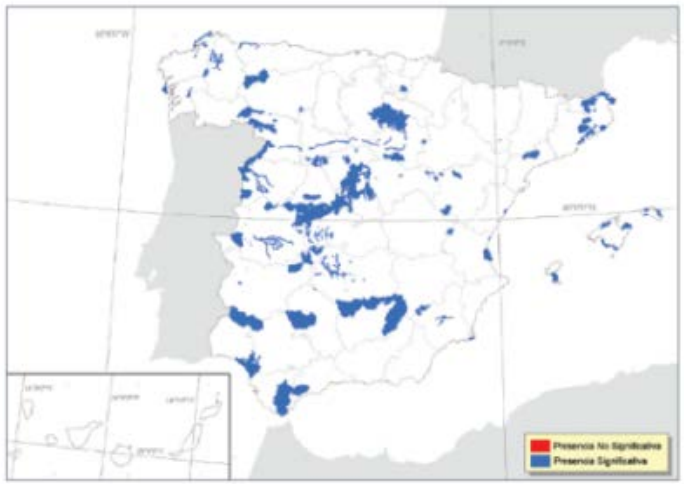
FRVs do not automatically correspond to the ‘potential value’ (maximum possible extent; e.g. overlapping) which, however, should be used to understand restoration possibilities and constraints.

FRV for habitats – Some other possible approaches

- Based on **habitats features (related to area if FRA)**
- **Abiotic & Biotic** features
- **FRA**, is the area covered by the HCI being **enough to ensure long-term conservation of the habitat and its species** (within the biogeographic region?).
- Ideally, the **FRA should not be lower than that allowing all typical species to exist in the habitat type**
- **Additional** considerations can be made, for instance, that the **number of localities** in which the **rarest species** appear would not be lower than a certain number
- **Which typical species?** EUR28 Manual + (or selection)
- **Red list of Ecosystems**
- Minimum dynamic area (**MDA**)

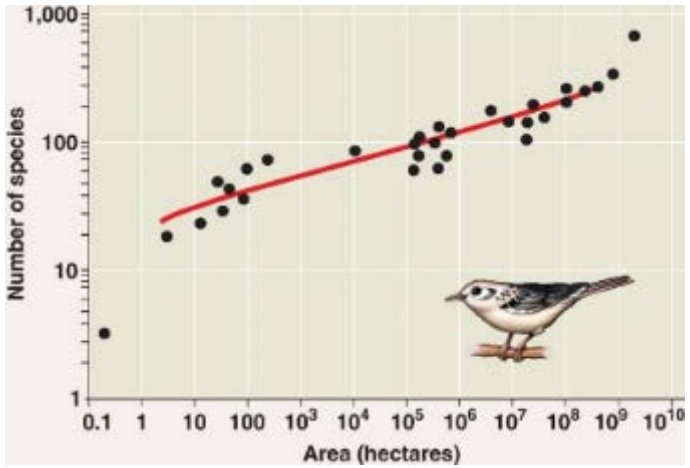
FRA for habitats
Example HCI 3170 Mediterranean temporary ponds

- **HCI 3170** in Spain occupies more than **32000 Ha**, from which nearly 40 % is located in up to 120 Special Areas of Conservation (SAC)
- In **most** of these (106 SAC) this **HIC occupies less than 5 %** of the SCA surface, in 12 SAC it occupies between 5 and 15 %, and only in 2 of them the HCI 3170 spans for up to 15 to 30 % of the SAC area.
- In **Spain**, up to 88 % of the surface of this HCI is located in the Mediterranean biogeographic region, and the remaining is found in the Atlantic region.



FRV for habitats – Community Approach (Camacho et al, 2017)

- The **community approach** is based on the **relative saturation in typical species of the community according to the area** of the HCI occupied within the biogeographic region of each member state.
- This approach uses the relationship between the number of **species and the area** of the habitat considering typical species. A higher area, hypothetically, offers **more niches** to be occupied by more species (species-area relationship) and additionally, according to island biogeography, larger habitat patches are bigger **targets for colonization** (Lomolino et al., 2016). Thus, **the larger the extent of the habitat, the higher the number of (typical) species it can harbor**



FRV for habitats 3170 MTP – Community Approach

- **Typical species (EUR28 Manual) - 41 species:**

- *Agrostis pourretii, Centaurium spicatum, Chaetopogon fasciculatus, Cicendia filiformis, Crypsis aculeata, C. alopecuroides, C. schoenoides, Cyperus flavescens, C. fuscus, C. michelianus, Damasonium alisma, Elatine macropoda, Eryngium corniculatum, E. galioides, Exaculum pusillum, Fimbristylis bisumbellata, Glinus lotoides, Gnaphalium uliginosum, Illecebrum verticillatum, #Isoetes boryana, I. delilei, I. duriei, I. heldreichii, I. histrix, #I. malinverniana, I. velatum, Juncus bufonius, J. capitatus, J. pygmaeus, J. tenageia, Lythrum castellanum (= L. baeticum), *L. flexuosum, L. tribracteatum, #Marsilea batardae, #M. strigosa, Mentha cervina, Ranunculus dichotomiflorus, R. lateriflorus, Serapias lingua, S. neglecta, S. vomeracea*.

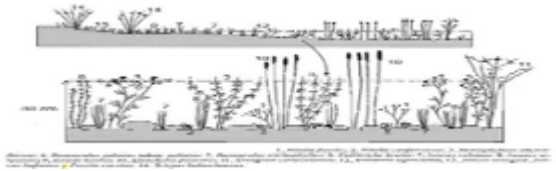
- **But only 18 species in Spain**

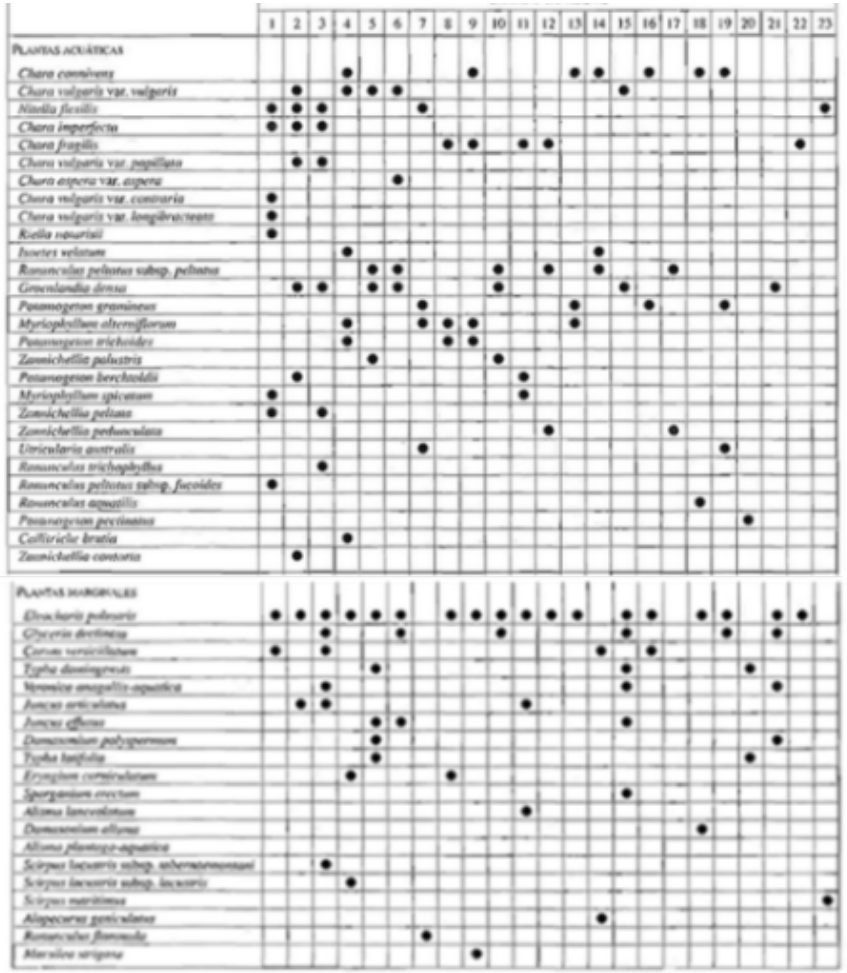
- *Agrostis pourretii, Cicendia filiformis, Eryngium corniculatum, Illecebrum verticillatum, Isoetes durieui, I. histrix, I. velatum, Juncus bufonius, J. capitatus, J. pygmaeus, J. tenageia, Lythrum castellanum (= L. baeticum), *L. flexuosum, L. tribracteatum, #Marsilea batardae, #M. strigosa, Mentha (Preslia) cervina, Ranunculus lateriflorus,*

- **Plus other typical species (national level)** (Spanish Society for Plant Conservation) **+ 26 spp**:

- *Antinoria agrostidea* subsp. *annua, Baldellia ranunculoides, Blackstonia perfoliata, Briza minor, Centaurium pulchellum, Crassula vaillantii, Damasonium polyspermum, Gnaphalium luteo-album, Hypericum humifusum, Illecebrum verticillatum, Isoetes setaceum, Isolepis setacea, Lotus subbiflorus, Lythrum acutangulum, L. borysthenicum, L. hyssopifolia, L. thymifolia, Mentha pulegium, Myosurus minimus, Polypogon maritimus, Ranunculus batrachioides* subsp. *brachypodus, R. longipes, Sedum lagascae, Silene laeta, Solenopsis laurentia, Verbena supina*.

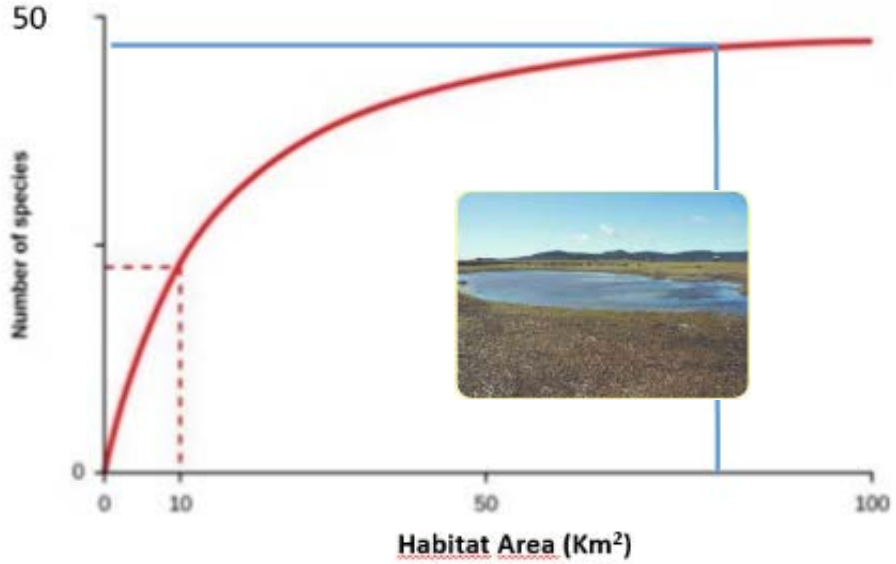
- **Up to 44 typical plant species** can be expected to appear in the whole set of localities where HCI 3170 appears.
- **Inventories of typical species (plants?)** for a representative set of localities are needed





Other taxocoenoses (e.g. amphibians).

FRV for habitats
Community Approach

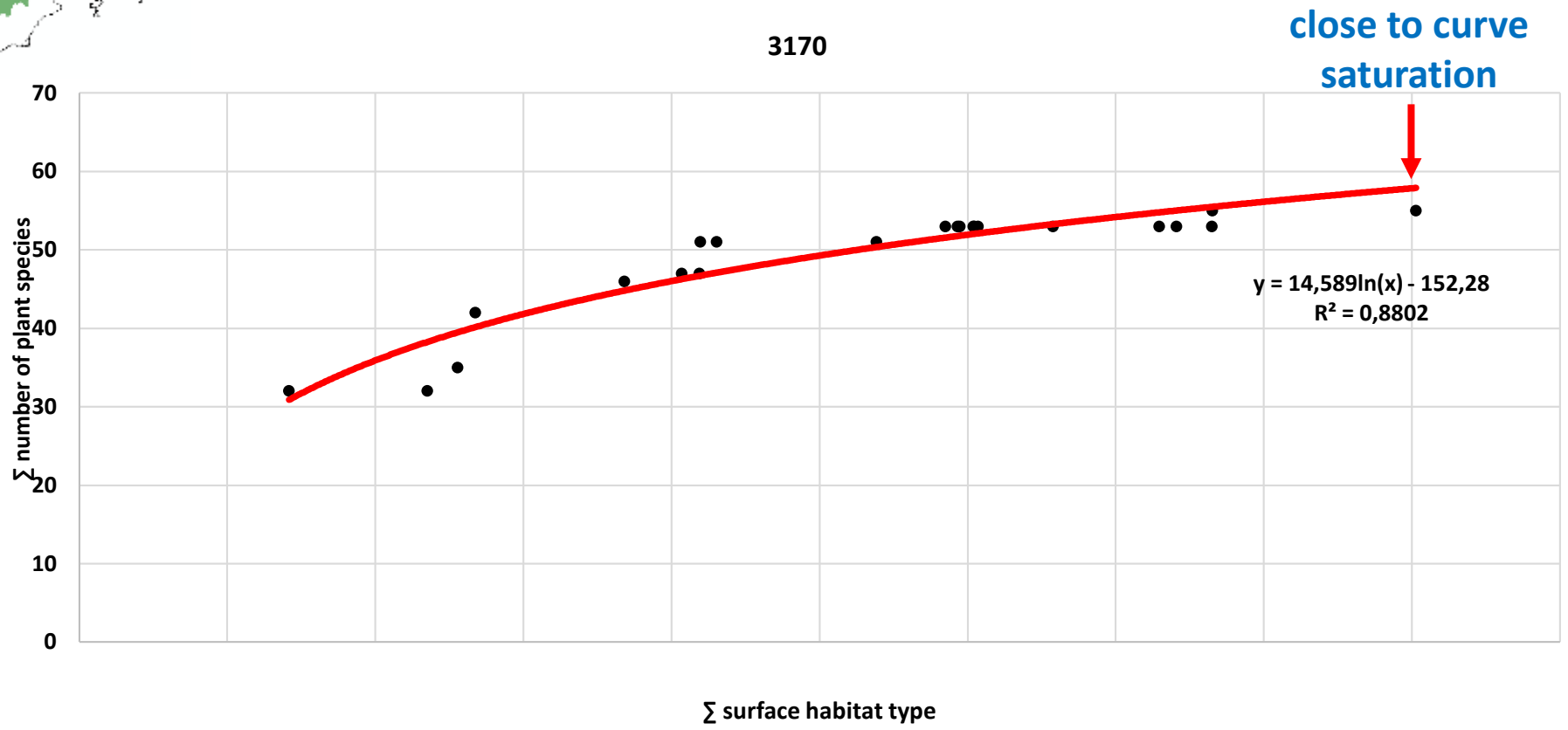


e.g. current areas > Minimum FRA

Alytes cisternasii, Bufo calamita, Bufo viridis, Discoglossus jeanneae, Discoglossus galganoi, Discoglossus pictus, Hyla arborea, Hyla meridionalis, Lissotriton boscai, Pelobates cultripes, Pelodytes ibericus, Pelodytes punctatus, Pleurodeles waltl, Rana perezi, Salamandra salamandra, Triturus marmoratus, Triturus pygmaeus

FRV for habitats – Community Approach

Inventoried **3170*** **habitats** with a catalogue of aquatic and marginal plant species



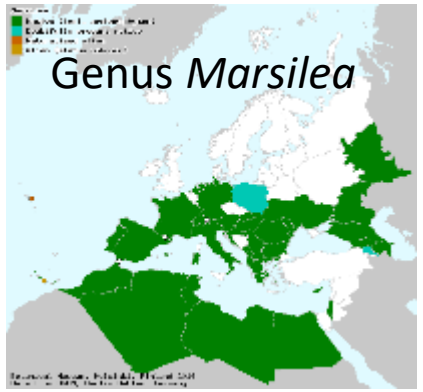
FRV for habitats – Species+ Approach (Camacho et al, 2017)

- This approach is exemplified by the **evaluation of the conservation status of a typical species**, but for a proper evaluation it needs to be complemented by the simultaneous assessment with other species also typical from the habitat.
- In this case **these typical species are also diagnostic**, this is, they are able to evaluate the conservation status of the HCI by themselves because of their ecological (including habitat area) requirements. As such, **this approach does not only consider areal requirements, but also combines it with the status of the structure and function**, since the ecological requirements of the targeted species must be fitted both in terms of enough area but also of enough ecological quality.
- This approach basically consists in **comparison of the number of localities (and its extension) where the HCI appears and the number where a typical and diagnostic species is found.**

3 main diagnostic plant species for the HCI 3170 in Spain (+ 5 spp) Spanish Society for Plant Conservation

- ***Marsilea strigosa*** Willd. This is a specialist species for the ecological conditions of the HCI 3170, with a circum-Mediterranean potential distribution, though more restricted current distribution.
- ***Juncus pygmaeus*** Rich. – This is an almost exclusive species for the HCI 3170, distributed in Western and southern Europe, Anatolia and the north of Africa.
- ***Mentha cervina*** L. This species, almost exclusive for the HCI 3170, has an important structural role in the habitat, being distributed in the Iberian Peninsula, south of France, and the north of Africa.

FRV for habitats – Species+ Approach



- Example with *Marsilea strigosa*

Most of the **occurrences of *Marsiliea strigosa* are associated to temporary ponds.** Thus**, a certain area** of the habitat is likely **needed** to ensure the **conservation of this typical species** of HCI3170.

This analysis shows that ***Marsilea strigosa* is present in 87 from 137 Mediterranean temporary ponds larger than 1 Ha**, this is, a 63.5 % of occurrence.

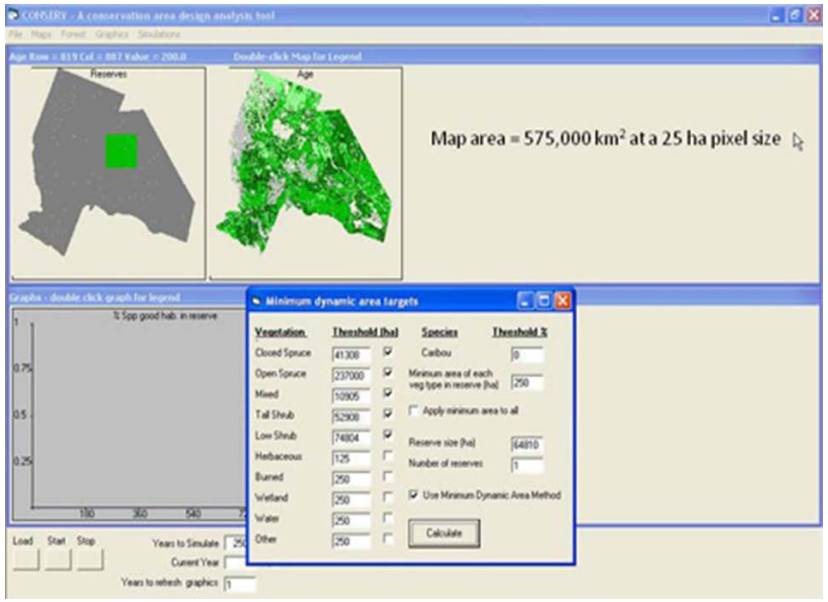
Weighted use of 3 + 5 typical & diagnostic species

Weighting criteria (e.g. species from annexes II and IV could have higher load on the index. (*Marsilea strigosa*, *M. batardae*, and *Lythrum flexosum)*

Minimum Dynamic Area

Pickett and Thompson (1978) defined a minimum dynamic area (MDA) as "the smallest area with a natural disturbance regime, which maintains internal recolonization sources, and hence minimizes extinction".

- While the MDA concept posits general design principles for self-sufficient reserves, no explicit or quantitative criteria on how to construct a MDA have been established,
- Dynamic simulation models (Peters *et al*. 1997) and temporal reconstruction of patch mosaics using forest history data (Baker 1989) have been proposed.
- By relaxing the restrictive conditions of the MDA and making criteria more explicit, it may be possible to identify practical approaches for the design of large reserves to incorporate natural disturbance and maintain ecological processes.



So far, “relaxed” approach used for reserve design

WORKSHOP: FORMALISATION OF CRITERIA AND APPROACHES TO SET THE FAVOURABLE REFERENCE VALUES OF HABITAT TYPES OF COMMUNITY INTEREST

Procedures to establish the Favourable Reference Area

CY	- Area resulted from **mapping** - **Distribution** (area of occurrence of species communities) **of HCIs** (initially mapped/re mapped) - **Other existing informations** e.g. water bodies maps, vegetation maps - FRA was resulted after assessing the parameters and use of the operators in Access CDR tool (according to guidelines and experts opinion).
ES	**- Operators instead** of absolute values because of the high degree of uncertainty - Mostly the same value as when the HD came into force. **- Expert judgement** with the help of limited GIS analyses.
FR	**Unknown**
GR	- the **potential natural** distribution of HCI - the relation of the **potential natural distribution of HCI to the current area of HCI** - the consideration of **recent and historical changes and trends** of HCI area - the best **expert judgement**
IT	
MT	By the current situation of the habitat (with respect to pressures, ecological potential, habitat dynamics and typical species and their requirements) and comparing it with the **historical situation**, focusing on distribution and abundance. This is most of the time supported by **expert opinion**
PT	Any defined procedure to establish this value. References from "**Expert opinion**" to answer this question in the last Monitoring Report.

5 MS
4 MS
3 MS
2 MS
1 MS

Workshop Formalisation of criteria and approaches to set the FRV of HCI
Madrid, November 2019

3170 typical species*	CY	ES	FR	GR	MT	PT	IT
Agrostis castellana		■					
Agrostis pourretii		■					
Alopecurus aequalis		■					
Anagallis minima		■					
Antinoria agrostidea		■					
Antinoria insularis				■			
Artemisia molinieri			■				
Asteriscus aquaticus				■			
Baldellia ranunculoides		■	■				
Baldellia repens		■					
Callitriche brutia	■			■			
Callitriche pulchra				■			
Callitriche truncata					■		
Centaurium maritimum		■					
Centaurium pulchellum	■			■			
Chaetonychia cymosa		■					
Chaetopogon fasciculatus						■	
Chara spp.	■				■		
Cicendia filiformis		■		■		■	
Coronopus navasii		■					
Coronopus squamatus	■	■					
Corrigiola litoralis				■			
Corrigiola spp.		■					
Crassula alata	■						
Crassula tillaea				■			
Crassula vaillantii	■	■	■	■	■		
Crepis pusilla				■			
Crypsis aculeata			■				
Crypsis schoenoides			■				
Crypsis spp.		■					
Damasonium alisma	■						

3170 typical species*	CY	ES	FR	GR	MT	PT	IT
Damasonium bourgaei					■		
Damasonium polyspermum		■					
Elatine alsinastrum				■			
Elatine gussonei					■		
Elatine macropoda	■		■	■			
Elatine spp.		■					
Eleocharis acicularis		■					
Eleocharis multicaulis		■					
Eleocharis palustris	■						
Erophila praecox				■			
Eryngium corniculatum		■				■	
Eryngium galioides		■				■	
Eryngium viviparum		■					
Exacullum pusillum		■					
Exaculum pusillum			■				
Fimbristylis bisumbellata				■			
Gypsophila muralis				■			
Heliotropium supinum		■	■				
Illecebrum verticillatum		■				■	
Isoetes duriaei		■	■			■	
Isoetes histrix		■		■			
Isoetes setaceum		■				■	
Isoetes spp.		■					
Isoetes velata			■				
Isoetes velatum		■				■	
Isoeto-Nanojuncetea	■						
Isolepis cernua	■			■			
Isolepis setacea	■						
Isolepis pseudosetacea						■	
Isolepis spp.		■					
Juncus bufonius	■	■		■		■	
Juncus capitatus		■				■	

5 MS
4 MS
3 MS
2 MS
1 MS

3170* typical species	CY	ES	FR	GR	MT	PT	IT
Juncus hybridus	■	■		■			
Juncus pygmaeus		■		■		■	
Juncus spp.						■	
Juncus tenageia		■					
Lepidium spinosum				■			
Limosella aquatica	■						
Lotus angustissimus	■						
Lotus hispidus						■	
Lotus parviflorus						■	
Lotus spp.						■	
Lythrum baeticum		■					
Lythrum borysthenicum		■	■	■		■	
Lythrum flexuosum		■					
Lythrum hyssopifolia	■	■		■	■	■	
Lythrum portula		■					
Lythrum spp.		■					
Lythrum thymifolia		■					
Lythrum tribracteatum	■	■	■	■			
Marsilea batardae		■				■	
Marsilea strigosa		■					
Mentha cervina		■	■			■	
Mentha pulegium		■			■		
Montia arvensis				■			
Myosotis sicula		■	■				
Myosurus heldreichii				■			
Myosurus minimus	■	■		■			
Ophioglossum azoricum		■					
Ophioglossum lusitanicum	■	■		■			
Pilularia minuta			■				
Plantago cretica	■						
Plantago weldenii				■			
Poa infirma				■			

3170* typical species	CY	ES	FR	GR	MT	PT	IT
Polypogon maritimus				■			
Pulicaria paludosa		■				■	
Pycreus flavescens				■			
Radiola linoides		■				■	
Ranunculus batrachiodes		■					
Ranunculus lateriflorus		■		■			
Ranunculus longipes		■					
Ranunculus marginatus				■			
Ranunculus nodiflorus		■					
Ranunculus peltatus	■				■		
Ranunculus revellierii			■				
Riella notarisii			■				
Schoenoplectus supinus		■					
Sedum eriocarpum subsp. porphyreum	■						
Sedum caeruleum					■		
Sedum maireanum		■					
Sedum microcarpum	■						
Sedum nevadense		■					
Sisymbrella aspera		■				■	
Solenopsis laurentia		■					
Spergula purpurea		■					
Spergularia bocconei				■			
Spergularia capillacea						■	
Trifolium cernuum		■					
Trifolium micranthum		■					
Trifolium ornithopodiodes		■					
Trifolium retusum		■					
Trifolium suffocatum				■			
Verbena supina	■	■					
Veronica anagalloides		■				■	
Zannichellia melitensis					■		
Zannichellia palustris	■			■			

Workshop Formalisation of criteria and approaches to set the FRV of HCI Madrid, November 2019

Promising approaches to establish the Favourable Reference Values at the Member State scale

REFERENCE VALUES AT MEMBER STATE LEVEL	POINTS
Species-area curve	11
Potential distribution (modelling)	6
Historical references	2
Randomisation with spatial aspects	2
Viability analysis for (some) typical spp.	1
Ecological variability	1
Remote sensing	1

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Ezousa River (SAC Episkopi Morou Nerou)
Picture ©Marina Xenophontos