

The European Union's Instrument for Pre-Accession Assistance (IPA) Programme
For the Republic of Croatia

EuropeAid/129747/D/SER/HR

Natura 2000 Management and Monitoring
NATURA MANMON

GUIDELINES
FOR PREPARATION OF MONITORING
PROGRAMMES

*An auxiliary tool for meeting the
requirements of Art. 11 and 17 of the
Habitats Directive*



This project is funded by
The European Union



A project implemented by
Ramboll Danmark A/S and NatureBureau Ltd

CONTENT

I. Habitats Directive monitoring: why it is needed and how it could be designed	3
II. Terminology used	5
III. Monitoring system instead of ad hoc approach	7
III.1. Monitoring schemes	8
III.2. Monitoring programmes	8
IV. Prerequisite for monitoring programmes: appropriate data	10
IV.1. Data needed for setting the monitoring programmes	10
IV.2. Baseline data	10
IV.3. Status data	11
V. Complete versus provisional monitoring programmes	12
VI. Elements of a monitoring programme	13
VI.1. Monitoring methods	13
VI.2. Sampling design	13
VI.3. Evaluation	13
References	15
ANNEX I: Recommended unified template for monitoring schemes for non-bird species	16
ANNEX II: Recommended unified template for monitoring schemes for habitat types	18
ANNEX III: Framework of daily rates for calculation of funding needs stated in monitoring schemes	20
ANNEX IV: Recommended unified template for monitoring programmes for non-bird species	21
ANNEX V: Recommended unified template for monitoring programmes for habitat types	25
ANNEX VI: Notes on monitoring and reporting under the Birds Directive	28
ANNEX VII: Recommended unified template for monitoring schemes for bird species	29
ANNEX VIII: Recommended unified template for monitoring programmes for bird species	33

I. HABITATS DIRECTIVE MONITORING: WHY IT IS NEEDED AND HOW IT COULD BE DESIGNED

From the day of accession to the EU, every new Member State has to meet obligations arising from the Habitats Directive (92/43/EC). The most obvious of them, establishing the Natura 2000 network, often overshadows the others, apparently less conspicuous – despite the fact they all duties are equally important.

One of such obligations to be in place since the Habitats Directive has become valid for the given MS is that of securing the surveillance pursuant to Art. 11. This Article requires Member States to **“undertake surveillance of the conservation status of the natural habitats and species referred to in Article 2 with particular regard to priority natural habitat types and priority species”**. The term **“surveillance”** used in this Article has never been defined; however, it is generally accepted across the EU that it is a synonym of a widespread term **“monitoring”**.

It is worth noting that Article 11 does not speak on any monitoring (surveillance) but on that of **conservation status of the natural habitats and species** from the Annexes of the Habitats Directive (= phenomena referred to in Art. 2). Conservation status is a term newly introduced by the Habitats Directive to enable to assess the state of its objects - **the natural habitats and species** – in the course of time during implementation of the Directive. Its definitions are given in Art. 1 letters e) and i) of the Directive for habitat types and species, respectively. Thus, conservation status of any habitat type/species is defined as a comprehensive variable reflecting the sum of influences acting on it in the course of time that may affect its long-term natural distribution, then structure and functions as well as the long-term survival of its typical species (as regards habitat types) and abundance of its populations (as regards species). This is a variable which refers to the entire territory of the country - not to any particular location, protected area, or Natura 2000 site; by the decision adopted by the EU Member States in 2006 (by the Habitats Committee established pursuant to Art. 20 and 21 of the Habitats Directive) it is separately displayed for each biogeographical region in the given Member State. Thus, if there is a given habitat type or species occurring in more than one biogeographical regions within a single country their conservation status has to be monitored separately for any of such regions.

Why the conservation status has to be monitored? It follows from the basic provisions of the Habitats Directive requiring, in its Article 2, that all **“measures taken pursuant to this Directive shall be designed to maintain or restore, at favourable conservation status, natural habitats and species...”**.

Article 1 has specified when the conservation status can be considered **“favourable”**; Member States are obliged to check it for every habitat type and every species and report on it to the European Commission within the duty set in Article 17.1: **“Every six years ... Member States shall draw up a report on the implementation of the measures taken under this Directive. This report shall include in particular information concerning the conservation measures referred to in Article 6 (1) as well as evaluation of the impact of those measures on the conservation status of the natural habitat types of Annex I and the species in Annex II and the main results of the surveillance referred to in Article 11.”**

Thus, Member States are obliged to report on conservation status of all concerned phenomena; the vehicle of getting information on that status is just the Art. 11 monitoring (surveillance).

The official reason why monitoring has to be operated is, therefore, the EU reporting duty. However, it would be very short-sighted to see only this obligation as a driving force of establishing the monitoring. Monitoring provides a unique opportunity to obtain data on real status of habitat types and species – both listed in the Habitats Directive and of national interest – and update them regularly using standardized, tailor-made methodologies. As a result, decisions in the field of nature protection may be justified, underpinned by proven facts rather than estimates or mere surmises. It can assist when creating national policies including those of developmental sectors, pointing out phenomena

and/or locations prone to endangerment. Last but not least, it can show the concerned public how the nature really stands and what are the trends shaping it. Thus, good monitoring can serve as additional opportunity for the given country rather than a difficult burden or unwished obligation.

Neither Habitats Directive nor any other official Commission´s paper provides any instruction how to design monitoring. Therefore, following the subsidiarity principle it is up to every Member State how it approaches this task. There are hundreds of ways how to do it; nevertheless, the existing experience from current Member States shows that to be effective, monitoring should be organized in a systematic manner, to be institutionalized, regularly funded and carried out in a standardized, repeatable way.

The presented guidelines are a result of long-term discussions held with the State Institute for Nature Protection already during the project No: 2007-0404-010901 IPA 2007 "Identification and setting-up of the marine part of Natura 2000 network in Croatia - Marine NATURA 2000" (2010 – 2011) followed by preparatory works for the current project and represent recommendation how to approach the monitoring duty under particular Croatian conditions.

Two issues have to be pointed out. There has been a lot of confusion even among many current EU Member States as to the monitoring of conservation status and so-called site-based monitoring (mostly of Natura 2000 sites but also of other protected area of national or international importance). While the monitoring of conservation status, carried out regardless of particular (protected or conserved) sites is an obligation ensuing from the Habitats Directive, there is no comparable duty to perform any site-based monitoring in this piece of EU law. Therefore, it is up to every Member State if it decides to establish any kind of site-based monitoring. If this is the case, the purpose of such monitoring will be substantially different from that of conservation status: its main justification is to obtain information about the effectiveness of site management, which logically leads to use of different methods as well as different evaluation of the data gathered. It is more than logical that the site-based monitoring should be part of management plans for the given site and must be tailored to the particular needs at the site. For all these reasons, this kind of monitoring has not been a subject of these guidelines.

II. TERMINOLOGY USED

Area: one of four components of conservation status for habitat types. It is assessed based on the surface area and distribution pattern within the range. Favourable reference area is defined as total surface area considered the minimum necessary to ensure the long-term viability of given habitat type.

Conservation status: defined in the Habitats Directive as characteristics reflecting either:

- the sum of the influences acting on a species that may affect the long-term (natural) distribution and abundance of species' population or structure, or
- the sum of the influences acting on a natural habitat and its typical species that may affect the long-term (natural) distribution, structure and functions of a habitat type as well as the long-term survival of its typical species,

within the territory of the biogeographical region within the given Member State.

Future prospects: one of four components of conservation status. It depends on impacts of pressures and threats acting towards a given species/habitat type.

Habitat for the species: one of four components of conservation status for species. It is assessed based on the area and quality of habitat.

Mapping: gathering of data over a wide area in a relatively short time. Detail of data collected is usually low. It mainly provides information on the presence/absence of the habitat type or species at a particular site and an account of their distribution. Mapping is not a method of monitoring but a way to get a baseline data and data serving for other (e.g. scientific) purposes

Monitoring programme: description of the monitoring process for particular (group of) species or habitat type(s) within a biogeographical region including methodologies for all levels of data collection.

Monitoring scheme: description of logistics, roles and financing of monitoring of particular (group of) species or habitat type(s) with similar or identical characteristics. Particular methods and sampling design may differ but the overall logistics for the whole scheme is the same.

Monitoring *sensu stricto*: long-term gathering of data at standardized sites. The results must be statistically evaluable. It allows in particular a description of trends of the given habitat types or species.

Monitoring system: a framework including all elements associated with monitoring (management, financing, logistics, data gathering & analysis, IT tools etc.).

Methodology: detailed instructions prepared by a specialist (methodist) for the field work including sampling design, forms and exact description of the evaluation of the data for particular species or habitat type.

Phenomenon: any habitat type of Annex I or species of Annex II, IV or V of the Habitats Directive (and, in case that the competent authority decides so, any other habitat type/species of national importance) to which monitoring duty applies. The phenomena are named as natural habitat types of Community importance and species of Community interest in the Habitats Directives.

Population: one of four components of conservation status for species. It is assessed based on population size and population structure (reproduction, mortality and age structure). Favourable reference population is defined as population considered the minimum necessary to ensure the long-term viability of the species (including room for metapopulations).

Range: one of four components of conservation status. It represents spatial limits within which the species/habitat occurs, including permanent occurrences and adjacent suitable areas (e.g., migration routes) but not vagrant/occasional occurrences. Range is dynamic, it can decrease or expand (naturally, or due to reintroduction/restoration). Favourable reference range is defined as range within which all significant ecological variations of the habitat/species are included.

Research: intensive short-term gathering of data in a limited area (e.g. a single site), usually focused on particular interest groups of species and/or habitats (synonymous with “species/habitat survey”, “inventory”). It allows a detailed quantitative description of the status of the given feature within the site.

Sampling design: detailed description of the selection of sites for monitoring (monitoring sensu stricto, mapping and research), including and distribution in time (respecting the six-year official periods of reporting – six years according to the Habitats Directive, three years for the Birds Directive) and a shape file in GIS.

Sampling plot: a site at which particular monitoring data are gathered. Sampling plots should be distributed following the sampling design for particular phenomenon.

Scientific research: very intensive standardized research. It allows to obtain scientific results for technical publications and influences actual level of knowledge of biology, ecology or genetics of targeted phenomena. Scientific activities are aimed at gathering either descriptive or response data of particular objects usually without any conservation objectives. Their outcomes mostly serve as a material for scientific publications and may shift forward the current level of knowledge about such objects. The results of the scientific research usually cannot be directly used for practical conservation purposes.

Site based monitoring: a part of a management plan implementation. It focuses on results of effectiveness of conservation measures applied on site level taking into account the conservation objectives and influencing pressures.

Structures and functions: one of four components of conservation status for habitat types. It depends on conditions of given habitat type and its typical species.

Typical species: species characterizing given habitat type which should be selected to reflect favourable structure and functions of that habitat type, even though it will not be possible to associate species with all aspects of structure and function. The sum of sites and occurrences of each habitat type should support viable populations of the typical species on a long term basis to be in favourable conservation status. This should be either species found exclusively in that habitat or those which are **present over a large part of the habitat’s range. They should** be sensitive to changes in the conditions of the habitat. Different species may be needed in different parts of the range of a habitat type or for different subtypes of such habitat type to fully reflect habitat’s qualities.

III. MONITORING SYSTEM INSTEAD OF AD HOC APPROACH

The EU requirements for surveillance of habitat types and species according to Art. 11 of the Habitats Directive commit all Member States to establish a comprehensive national monitoring system at the level of biogeographical regions. Detailed data for conservation status assessment of all phenomena are needed to feed the obligatory reporting (Art. 17). Single phenomenon might have 1, 2 or 3 monitoring programmes (for Continental, Alpine and Mediterranean biogeographical regions, respectively). The establishment of the monitoring system fits also the National Biodiversity Strategy and Action Plan from 2008 (OG 143/08) whereby all kinds of monitoring together should build up the „National Monitoring Framework“.

The reasons for the need of **continuous and standardized monitoring** are mainly following:

- **financial** – ad hoc projects are expensive because of need for large datasets collected in short term. All experts have to learn a lot, there is a lot of expenses related with the system calibration.
- **logistic** – it is possible to cooperate with the stable team of experts well experienced in related issues. It makes a continuous coordination team work possible.

According to the new Croatian nature protection act “the surveillance of the status of nature conservation encompasses surveillance and assessment of biological species, their habitats, habitat types, ecologically important sites, ecosystems, ecological network as well as landscape types“.

The monitoring means a systematic, long-term and well-organized gathering of specific, parameterized field data on habitat types and species. These data do not represent only simple finding records but parameterized data with information on quantity, quality, information on surrounding environment, trends and threats. These data must be stored, processed and managed in a safe way; they should also be made public under specific rules.

There are four main ways of **systematic data collection** (for definitions see chapter II):

- monitoring (general status and trend)
- mapping (distribution data)
- research (site status, occurrence on localities level, i.e., inventories)
- scientific research (new facts, rarely utilizable for nature conservation)

To collect the above data, good organization is needed on a systematic and cost-effective manner. Such system has to be based on a dedicated technical body. The **State Institute for Nature Protection** is *inter alia* responsible for implementation of monitoring system in Croatia. There should be dedicated group of experts exclusively in charge of monitoring; then a system of guarantors for each group of species and habitat types have to be established. The main tasks for the technical body are following:

- to develop monitoring schemes and programmes (see below);
- to prepare (in time) agreements for all paid contractors;
- to prepare agreements with cooperating institutions;
- to establish and nominate members of the individual Working Groups for groups of phenomena;
- to organize all needful meetings;
- to instruct/check the field workers;
- to take over the data including the input of data into the database;
- to coordinate processing and correct interpretation;
- to inform the public;
- to institutionalize the task;
- to ensure long-term continuity.

Such technical body must be formed by **trained dedicated staff**. All responsibilities have to be clear in a long-term by declarations in strategic documents and by contracts. Also good public relations have to be established between the system and scientific and nature conservation community as well as directed towards public and its representatives (politicians). The main cooperation should be based

on continuous sharing of data, capacities and experiences with public institutions, universities, museums, contracted experts, private companies and expert NGOs. It is possible to increase capacities for volunteers work in Croatia. Special importance should be given to the relations with site managers (foresters, farmers, hunters, fishermen etc.). For some rarities also foreign experts could be invited. All specific programmes should be managed by **Working Groups** formed by public servants and selected external experts (universities, museums etc.). A network of experts and trained staff should provide data collection for each taxonomic group using regional and departmental coordinators.

It is proposed to realize a **pilot project** if no (reliable) methodology exists and needs to be verified. Pilot project starts with gathering of existing data; the field work using the necessary technical equipment could start after finalization of the first version of methodologies. It could be funded by separate project if needed.

III.1. Monitoring schemes

Monitoring schemes represent a **framework** for preparation of monitoring programmes and **logistic aspects**. It is prepared for one or more phenomena together depending on correspondence of their basic characteristics important for monitoring programmes.

Only fundamental information on ecology and biology as well as on distribution with special focus on situation in Croatia should be described in schemes. It is concerned on current (i.e. before the EU accession) surveillance in Croatia and on existing data. Also the data structure and ownership are mentioned.

Scheme of surveillance, as a part of monitoring scheme is based on combination of mapping, monitoring, research on localities and/or scientific research. Details of different levels of surveillance in relation to assessment of four components of the conservation status have to be described briefly.

Roles of technical body (SINP) and other participants is described in the chapter on logistics together with the (possible) need for a pilot project. Schemes contain also a general estimation of costs for monitoring programmes giving a framework for planning of capacities and preparation of monitoring programmes. Monitoring is the obligation of any Member State, therefore it should be funded on a regular and permanent basis from the **state budget**. Only some special (one-off) activities which are not essential for the proper monitoring programme could be funded from other sources, e.g. research programmes, international projects, etc.

Schemes have to be updated if necessary, mainly after finalization of specific monitoring programmes when more precise data are available.

Recommended unified template for monitoring schemes for non-bird species is included in Annex I, for habitat types in Annex II and a framework for daily rates for calculation of funding needs in monitoring schemes in Annex III.

III.2. Monitoring programmes

Monitoring programmes are prepared for all phenomena separately even if they could be very similar for related species or habitat types. Special monitoring programme has to be prepared for each biogeographical region where the given phenomenon occurs.

Detailed information about a species or a habitat type is included into the programmes. All the global, European and Croatian range of every phenomenon and its distribution pattern are described with a note about historical development of distribution. Also habitat of the species, its life cycle, important

influences and conservation measures are recorded for any species and information on typical species, important influences and conservation measures for any habitat type.

The recommended unified template for monitoring programmes is in detail described in the chapter VI.

It is expected that the monitoring programmes will be updated following the improvement of knowledge. All changes have to be prepared with the respect to the possibility to build upon the data coming even from the period prior to such updating.

IV. PREREQUISITE FOR MONITORING PROGRAMMES: APPROPRIATE DATA

A meaningful monitoring should be based on good, operational monitoring programmes. These should not be theoretical exercises but realistic, feasible documents enabling daily use in practice. If such good MP is to be drafted, three conditions have to be met:

- good knowledge (data) of the given phenomenon;
- human capacity for execution of the programme available;
- funding provided for.

There is no doubt that funding plays a crucial role. Nevertheless, human capacity may be often even more restrictive factor: some phenomena are difficult to determine or the methods used for their surveillance require special education or knowledge, and the number of appropriately trained persons in a given country may be highly limited; the particular programmes have to reflect these circumstances. However, even if funding and human capacity are available the very basis for every monitoring programme is the availability of appropriate data. These three conditions therefore limit the design and extent of any MP and are inseparable from each other. However, there is some kind of hierarchy among them: the availability of data predetermines the other two.

IV.1. Data needed for setting the monitoring programmes

For the reporting pursuant to the Habitats Directive, four components of the “conservation status” have to be known for every habitat type and every species for each biogeographical region in which they occur. These components listed in Art. 1 of the Habitats Directive are the following:

For species :	For habitat types :
range	range
population	area
habitat for the species	structure & function
future prospects	future prospects

Particular components of conservation status have to be described by data which can be divided into two groups: “baseline data” and “status data”.

IV.2. Baseline data

Baseline data are those of mostly descriptive character collected before the monitoring & reporting duty starts. They are needed for *setting the basic (reference) values used subsequently during the future reporting rounds* without any need for substantial amendments or verification in the field: once they have been gathered they should be valid “forever” (with some limitation due to e.g. changes in range caused by natural or artificial influences like climate change, extinction of some populations, etc.). Following parameters can be marked as baseline ones (in square brackets those which may be both baseline and status data):

Range (occurrence)
[Area of habitat]
[Population]
[Main pressures and risks]

Range

Range is a critical factor for

- setting the volume of monitoring works,
- setting the sampling design, and
- evaluation methods used.

For the purpose of MPs it would perhaps be more suitable to operate with the term "occurrence" instead of "range". The difference lies in the fact that "range" encompasses the entire area (e.g., in a given country) where the phenomenon is distributed but does not take into account e.g. gaps in its distribution due to the altitudinal aspect or landuse changes – the area of "occurrence" may therefore be (substantially) smaller than the total area of range. This is specifically important for setting the sampling design: it would make no sense to locate sampling plots into those parts of range where the phenomenon does not occur.

More extensive range does not necessarily mean direct proportion e.g. with the volume of monitoring works (i.e., number of sampling plots). Naturally, phenomena with extensive range will generally require more sampling plots than those with very restricted range. However, sampling design should not only reflect the occurrence of given habitat type/species as a whole but also encompass the main ecological variations or other aspects which are worth noting. Therefore, one phenomenon which does not show any geographical or ecological variation may manage with less sampling plots than the other which is highly variable even if their ranges were identical.

Area of habitat

This parameter may be considered either baseline or status data depending on particular habitat type. Some habitat types are stable (e.g., many forest habitat types) and once their area is ascertained before the proper monitoring starts it can be considered for invariable during the time course – the impacts from outside are mostly reflected by changes in "structure and functions". Investing in precise inventorying of these parameters at the beginning therefore decreases the volume of work needed during the proper monitoring.

Population

Like in the previous case, this parameter can be considered either baseline or status data depending on particular species or species group. In some species (especially animal) it must be estimated in advance (=no link to the proper monitoring); in others (e.g. by widespread plants) it can be derived from range based on abundance assessed at sampling plots (=can be acquired from the proper monitoring). Decision must be done on the case-by-case basis.

Main pressures and risks

Main pressures and risks may either be planar (like abandonment of pastures in the whole regions) and should be recorded before setting the MP or have a point character or be site-linked (like e.g. catching of animal species in a particular pool/stream, spatial plans involving development in the neighbourhood of a particular site with major occurrence of the given phenomenon, etc.).

This "categorization" of the pressures is important for setting the sampling design: planar risks do not need to be reflected during the field monitoring (and, therefore, can be considered "baseline") while those which are unique can only be captured during the proper monitoring.

IV.3. Status data

Status data are those *reflecting changes of some parameters which have occurred during the preceding monitoring or reporting period*. Those data have to be monitored repeatedly with a frequency set by respective monitoring programmes and depending on the ecological characteristics of given feature (i.e., some forest habitats will require field check once in a 12-years-period while some species prone to rapid changes will need to be monitored annually).

Typical status data are those on the habitat of the species, on population (by species where particular populations are separated and subject to different impacts) or structure and functions of the habitat types, as well as area of habitat of some habitat types. Site-specific pressures and risks also belong to this category.

V. COMPLETE *VERSUS* PROVISIONAL MONITORING PROGRAMMES

Before starting to draft the monitoring programmes it is optimal to have both baseline and status data as complete and recent as possible. However, key are the baseline data: based on their availability, **extent and quality a decision has to be taken if the MP is to be considered “full” (definitive), provisional (temporary), or if it is impossible to draft it unless the necessary baseline data will have been gathered and evaluated.**

How to decide if the MP should be considered “definitive” or provisional?

If all data needed for setting the MP are available the conclusion is easy. However, such situation almost never occurs – not only because of known gaps in knowledge about particular phenomenon but also due to new data acquired through the inventories, scientific research, due to the effect of climate change, etc. It is highly probable that even the monitoring programmes of widespread and stable phenomena will require a review and sometimes a re-design after several reporting rounds will have passed.

Anyway, even if the data are not **fully complete it is possible to set the “full” monitoring programme.** It may happen under following circumstances:

- full range can be set with at least ± 75 % certainty (into the limits of uncertainty fall particularly the peripheral areas of the range, small disjunctive occurrences as well as historical occurrences not confirmed recently [during last 20 – 50 years depending on particular species] due to an absence of appropriate research);
- exact setting of area of the habitat is impossible due to an absence of recently verified field data but range is known and the character of given habitat enables to estimate the area based on the good knowledge of the range;
- recent data on the population size of species are missing but range is well known and population size can be derived (estimated) from that (e.g. by large carnivores with known range and population density).

In such phenomena, “definitive” MPs may be prepared but it is recommended to carry out supplementary research to fill in the data gaps and, if appropriate, to amend the MPs accordingly.

In many cases, however, good and usable data will either be unavailable at all, or only for some parts of the range (i.e., for one of two or three biogeographical areas where the given phenomenon occurs). Then, decision has to be made if:

- to try to draft a provisional MP (with clearly defined aims, e.g., to get a provisional picture on structure and functions or on population size, which would enable to estimate situation in the unexplored parts of the range or populations), or
- to postpone drafting the MP until sufficient data will have been gathered and evaluated and, in order to report on the conservation status, to rely on best expert estimate only – this is the fairest solution at least for the first reporting period.

Definitive and provisional MPs should be clearly distinguished: the aim should be to have as little provisional MPs as possible and if they are unavoidable, to focus on replenishment of the missing data enabling to replace the provisional MPs by the definitive one as soon as possible.

VI. ELEMENTS OF A MONITORING PROGRAMME

VI.1. Monitoring methods

The work on monitoring methods preparation should start by detailed literature **review** taking into account relevant international (European) experience. Some consultations with experts in EU Member States, mainly from neighbouring countries, are welcome. Different methodologies can be combined to create an optimal vision useful for Croatian conditions.

The aim is to establish permanent methodologies for every phenomenon as a part of monitoring programme for all biogeographical regions occupied by a given species or habitat type. Each methodology must contain all obligatory chapters (see Annexes IV and V). If a pilot project is realized according to the working version of methodology, a revision is needed based on experience with such project. All versions of methodologies need to be **reviewed** by experts experienced both in **biology** and **nature conservation**.

For the basic informative common chapters the limit of characters has been set by unified template (see Annexes IV and V) because of standardisation of programmes for different species. It is **necessary to point out the fact that monitoring programme could not be written "continuously" from the introduction to the end but has to be considered as one complex formed by interconnected sections**. It is necessary to describe objectives of each of chosen ways of systematic data collection.

The authors of methodologies have to have in mind that they will be **peer reviewed** and then **tested in the field**. For this reason not only detailed instructions for the field work have to be ready but also comprehensive and **standardised data forms** for the field work should form a part of methodologies. Results of surveillance will gradually be verified and analysed, which can cause a need for modifications. **Pilot project** represents a specific tool for process verification.

VI.2. Sampling design

Sampling design is determined by number of monitored plots, their geographical distribution and frequency of monitoring as well as distribution in time. At the same time, it must enable the evaluation of all the data to be analyzed.

The aim of sampling for **mapping** is to cover most localities of occurrence or maximize the area where the species or habitat types can potentially occur.

A method of **classification** is proposed for **monitoring** of majority of widespread species. It is based on choosing combinations of the most important factors (parameters) influencing variability of populations and their intervals. Maximum of 3 most important parameters are selected (e.g., altitude and abundance of population) and for each of them intervals are defined at maximum of 3 degrees (e.g. altitude below 350m; from 350 to 750 m; above 750 m). According to the representation of populations in individual classes the number of sites per class is set. Selection of localities within a class can be random or directed (taking account e.g. of grouping more monitored species together, accessibility, etc.). Only so many sites are monitored which provide results enabling to analyze the trends (e.g. population size); the aim is not to cover as much sites as possible but a number sufficient for deriving reliable conclusions on the conservation status.

VI.3. Evaluation

Monitoring programme does not focus on the field work only; it must also include an **evaluation system of gathered data** for the **purpose of reporting**. The evaluation of the conservation status components is based on validated data from all levels of monitoring as well as additional data sources.

It is not only a statistical issue; implementation of an evaluation system of the conservation status can help fix the conservation priorities, it stimulates further development of knowledge (research), legislation amendments, funding support and in particular basic elements of nature conservation (especially for planning, decision-making and policy-making).

To enable data analyses, clear data structure avoiding misinterpretation is needed. Also the reduction of monitored parameters up to the necessary minimum only increases the information value of the datasets. The structure of data could be modified only because of unification with monitoring programmes for other species or habitat types where sharing of data is useful. In some cases values of parameters are weighted according to their importance. These weights may change based on the improving knowledge but the parameters should stay constant.

All the data should be stored in a **central database(s)** using analytic and GIS tools. There is a need for interconnection with evaluation applications.

To make a comprehensive monitoring programme it is also necessary to know from what period the data for evaluation will be used. The evaluation system needs an expert review as well as monitoring methodologies. It is recommended to **review the monitoring programmes as a whole**.

REFERENCES

European Commission, 2011: Assessment and reporting under Article 17 of the Habitats Directive. Reporting Formats for the period 2007-2012, 19 pp.

Evans D., Arvela, M., 2011: Assessment and reporting under Article 17 of the Habitats Directive. Explanatory Notes & Guidelines for the period 2007-2012. European Topic Centre on Biological Diversity, 123 pp.

Project EU IPA 2007 – TAIB/TAF: Identification and setting-up of the marine part of Natura 2000 network in Croatia – marine NATURA 2000. Final Report of the Project No: 2007-0404-010901 IPA 2007.

<http://bd.eionet.europa.eu/>

<http://eumon.ckff.si/>

<http://eunis.eea.europa.eu/>

ANNEX I: RECOMMENDED UNIFIED TEMPLATE FOR MONITORING SCHEMES FOR NON-BIRD SPECIES

- **ENGLISH NAME(S)**
- *Author(s)*
-
- **Group of species**
- List of similar species that can be grouped together taking into account the potentially involved staff and logistics with stating of a link to Annex II, IV or/and V.
- Ecology & biology
- Very brief description of basic characteristics
- Current surveillance
- Description of activities undertaken in Croatia after the year ~ 2000
- Existing data
- Listing of Croatian datasets including description of their structure with a special attention to data available at SINP. Notes on potential application should be added.
- Distribution
- Basic information on both world and European distribution pattern and natural conditions preferred by the species

- **Scheme of surveillance**
- Monitoring scheme is framed by the data filled in the table below:

Component of the conservation status	Way of surveillance	Complementary notes
Range	mapping - monitoring - research on localities - scientific research ¹	
population	mapping - monitoring - research on localities - scientific research ¹	
habitat for the species	mapping - monitoring - research on localities - scientific research ¹	
future prospects	mapping - monitoring - research on localities - scientific research ¹	

¹ Delete what inappropriate

- **Logistics**
- Description of the affiliation to the specific Working Group and the role of SINP coordinator(s)

- Roles of participants
- Current overview of both available and needed capacities is summarized in the table below:

Kind of work	Current specialists & institutions	Specialisation needed
preparation of methodologies		
Expert examination		
expert coordination (membership in WG)		
communication with IT experts		
regional coordination of the field work		

field work		
data evaluation		

- Pilot project
- Clarification if a pilot project is or is not needed.
-
-

Funding

General estimation of costs for monitoring programmes of the species providing a framework for planning of capacities and preparation of monitoring programmes:

	costs per 6 year period	trend in following periods
Preparation of methodologies & examination		
Theoretical coordination (Working Group)		
Coordination of the field work		
Pilot project		
Collection of existing data		
Monitoring on plots		
Scientific research		
Data evaluation		
TOTAL		

-
- **References**
- Only those with relevance to monitoring should be mentioned.
-

ANNEX II: RECOMMENDED UNIFIED TEMPLATE FOR MONITORING SCHEMES FOR HABITAT TYPES

- **ENGLISH NAME(S) + CODE(S)**
- *Author(s)*
-
- **Group of habitat types**
- List of similar habitat types that can be grouped together taking into account the potentially involved staff and logistics.
- Description and ecology
- Very brief description of basic characteristics
- Current surveillance
- Description of activities undertaken in Croatia after the year ~ 2000
- Existing data
- Listing of Croatian datasets including description of their structure with a special attention to data available at SINP. Notes on potential application should be added.
- Distribution
- Basic information on world and European distribution pattern and natural conditions
-
- **Scheme of surveillance**
- Monitoring scheme is framed by the data filled in the table below:

Component of the conservation status	Way of surveillance	Complementary notes
Range	mapping - monitoring - research on localities - scientific research ¹	
Area	mapping - monitoring - research on localities - scientific research ¹	
structure and functions	mapping - monitoring - research on localities - scientific research ¹	
future prospects	mapping - monitoring - research on localities - scientific research ¹	

¹ Delete what inappropriate

- **Logistics**
- Description of the affiliation to the specific Working Group and the role of SINP coordinator(s)
-
- Roles of participants
- Current overview of both available and needed capacities is summarized in the table below:

Kind of work	Current specialists & institutions	Specialisation needed
preparation of methodologies		
Expert examination		
expert coordination (membership in WG)		
communication with IT experts		
regional coordination of the field work		
field work		

data evaluation

- Pilot project
- Clarification if a pilot project is needed.

-
-

Funding

General estimation of costs for monitoring programmes of the habitat type(s) giving a framework for planning of capacities and preparation of monitoring programmes in the table below:

	costs per 6 year period	trend in following periods
Preparation of methodologies & examination		
Theoretical coordination (Working Group)		
Coordination of the field work		
Pilot project		
Collection of existing data		
Monitoring on plots		
Scientific research		
Data evaluation		
TOTAL		

-
-

References

-

ANNEX III: FRAMEWORK OF DAILY RATES FOR CALCULATION OF FUNDING NEEDS STATED IN MONITORING SCHEMES

The basic estimation of mean daily rates for planning of capacities and preparation of monitoring programmes was calculated in accordance with regard on actual Croatian situation and experiences from other EU countries.

The rates include expert fee, insurance, taxes, material, overheads (expenses for communication, energy, lease etc.), and travel expenses (see remarks).

Activity	Mean daily rate	Remarks
Preparation of methodologies & their examination	1 000 Kn	Responsible and highly professional work. It is also necessary to take into account how many similar methodologies the expert prepare/examine at once.
Theoretical coordination (Working Group)	1 000 Kn	Potential travel expenses for WG meetings included. It is also necessary to take into account how many phenomena are of WG interest.
Coordination of the field work	750 Kn	Travel and communication expenses included.
Pilot project	750 Kn	Expert work, travel expenses included.
Collection of existing data	500 Kn	Mostly office work for specialists (not necessary best experts)
Mapping of the species	500 Kn	Field work, travel expenses included.
Mapping of the habitat	500 Kn	Field work, travel expenses included.
Field mapping	500 Kn	Field work, travel expenses included.
Monitoring on plots	750 Kn	Best expert field work, travel expenses included.

ANNEX IV: RECOMMENDED UNIFIED TEMPLATE FOR MONITORING PROGRAMMES FOR NON-BIRD SPECIES

Common chapters

ENGLISH NAME (*LATIN NAME*)

Range

- Total world and European range of the species with description of its **distribution pattern**
- Remarks on subspecies (if appropriate)

200 - 500 characters

Distribution in Croatia

- Summary of **historical development of distribution** (add maps if available in cooperation with SINP)

500 - 1000 characters

Habitat

- Enumeration of **main characteristics** of inhabited habitat(s)
- Listing of habitat types – either Natura 2000 or national classification (if there is a clear linkage of habitat of the species and particular habitat type)
- Notes on food biology (for animal species) and on reproduction biology (if habitat characteristics are relevant)

200 - 500 characters

Phenology and population biology

- Description of the **life cycle**
- Particularities of fluctuations of population size (if relevant)
- Notes on genetic structure of population (if known and relevant).

200 - 1000 characters

Pressures and threats

- Detailed and precise description of known important **influences** from the present and past (pressures) and prospective ones (threats)

200 - 1000 characters

Conservation measures

- Detailed and precise description of measures already **realized as well as needed** to avoid pressures and threats
- Description of **national legislative protection**

200 - 1000 characters

Annexes of the Habitats Directive

- Pick out Annex II, IV or/and V.

Croatian Red List

- Pick out Croatian Red List category.

Specific chapters for biogeographical regions where the given species occurs

MONITORING PROGRAMME FOR THE CONTINENTAL / ALPINE / MEDITERRANEAN BIOGEOGRAPHICAL REGION

EACH MONITORING PROGRAMME INCLUDES FOLLOWING COMMON PRELIMINARY INFORMATION:

- Short description of **basic scheme of surveillance** (what surveillance approaches are chosen)
- **Sharing the data** or methodologies with other monitoring programmes (for other species or habitat types, other projects or monitoring systems)
- Rules of occupational safety and compliance with all relevant statutory instruments including list of permits needed for research when that is case (instructions for the field workers)

THE SPECIFIC WAYS OF SYSTEMATIC DATA COLLECTION ARE DESCRIBED IN DETAIL (IF USED):

Field mapping

Objectives

- Clarification why mapping is chosen for species surveillance (if not the whole chapter "Field mapping" has to be deleted) and **what outputs are awaited**

Field work instructions

- Determination of specialization/minimum knowledge of the field workers
- **Detailed instructions** for the field work including:
 - period for mapping (+ other limits like temperature if appropriate);
 - character of plots to be chosen in the field;
 - description of data recording.

Sampling design

- Detailed description of **selection of areas** for mapping including distribution in time (respecting the six-year official periods of reporting) and potentially also a shape file in GIS
- Specification of number of field workers (or man days per year) needed
- Particularities of potential pilot project (if relevant)

Data forms

- Forms as sheet tables, checklists etc.
- Have to be user-friendly and contain **clear data structure** – no latitude making misinterpretation possible and minimum of free text fields
- Communication with SINP needed because of the structure of actual and prepared official databases (CroFauna etc.) and the forms prescribed

Monitoring on plots

Objectives

- Clarification why monitoring is chosen for species surveillance (if not the whole chapter "monitoring on plots" has to be deleted) and **what outputs are awaited**

Field work instructions

- Determination of field workers specialization
- **Detailed instructions** for the field work including:
 - period for monitoring (+ other limits like temperature if appropriate);
 - character of plots to be chosen in the field and how to mark it;
 - description of data recording.

Sampling design

- Detailed description of the **selection of plots** (classification, random choice etc.) for monitoring including distribution in time (respecting the six-year official periods of reporting) and a shape file in GIS (should be added later)
- Specification of the number of field workers (or man days per year) needed
- Particularities of potential pilot project (if relevant)

Data forms

- Forms as sheet tables, check lists etc.
- Have to be user-friendly and contain **clear data structure** – no latitude making misinterpretation possible and minimum of free text fields
- Communication with SINP needed because of the structure of actual and prepared official databases (CroFauna etc.) and the forms prescribed

Research on localitiesObjectives

- Clarification why this research is chosen for species surveillance (if not the whole chapter "Research on localities" has to be deleted) and **what outputs are awaited**

Field work instructions

- Determination of field workers specialization
- **Detailed instructions** for the field work including:
 - period for research (+ other limits like suitable temperature if appropriate);
 - description of data recording.

Selection of localities

- Description of the **selection of localities** including distribution in time (respecting the six-year official periods of reporting) and potentially also a shape file in GIS
- Determination of number of field workers (or man days per year) needed

Data forms

- Forms as sheet tables, check lists etc.
- Have to be user-friendly and contain **clear data structure** – no latitude making misinterpretation possible and minimum of free text fields
- Communication with SINP needed because of the structure of actual and prepared official databases (CroFauna etc.) and the forms prescribed

Scientific researchObjectives

- Clarification why also scientific research is chosen as a part of species surveillance (if not the whole chapter "Scientific research" has to be deleted) and **what outputs are awaited**

Framework assignment

- Basic instructions with a **hypothesis to be tested**
- Proposal of **academic institutions** or other subjects able to do the research

Unsystematic data gathering

Objectives

- Clarification why also unsystematic data gathering should form a part of surveillance (if irrelevant the whole chapter "Unsystematic data gathering" has to be deleted) and what outputs are awaited

Field work instructions

- Determination of field workers specialization
- Detailed instructions for the field work including:
 - period for monitoring (+ other limits like temperature, if appropriate);
 - description of data recording.

Data forms

- Forms as sheet tables, check lists etc.
- Have to be user-friendly and contain clear data structure – no latitude making misinterpretation possible and minimum of free text fields
- Communication with SINP needed because of the structure of actual and prepared official databases (CroFauna etc.) and the forms prescribed

THE WAY OF EVALUATION NEEDED FOR ALL FOUR COMPONENTS OF THE CONSERVATION STATUS IS DESCRIBED:

Evaluation of the conservation status components

Range

- description of the data use and interpretation for preparation of the **distribution map** (map will be prepared for all biogeographical regions together)
- description of the data use and interpretation to filling in 10 x 10 km **grid cells** (map will be prepared for all biogeographical regions together)
- proposal of rules for **gap closure** to join grids together where appropriate according to the environmental parameters and mobility of the species

Population

- proposal what **population units** should be used (preference for mature individuals)
- description of the data use and interpretation to determination of:
 - the **population size** incl. methodology of analysis
 - the **population structure** (reproduction, mortality and age structure), if possible

Habitat for the species

- description of the data use and interpretation to determine the **habitat area** and **habitat quality**

Future prospects

- description of the information use and interpretation to determination of:
 - main **pressures** and **threats** and their value
 - **conservation measures** and other positive provisions realized to avoid pressures and threats

References

All sources used incl. web pages and reports.

ANNEX V: RECOMMENDED UNIFIED TEMPLATE FOR MONITORING PROGRAMMES FOR HABITAT TYPES

Common chapters

ENGLISH NAME (NATURA CODE)

Equivalents in different classifications

- EUNIS, National habitats classification

Phytocenological conversion (if appropriate)

- Alliances and associations

Range

- Total world and European range of the habitat type with description of its **distribution pattern** (including maps)
- Remarks on phytocenological variability

200 - 1000 characters

Distribution in Croatia

- Summary of **historical development of distribution** (add maps if available in cooperation with SINP)

200 - 1000 characters

Typical species

- List of typical species of the habitat type (or subtypes – e.g. associations/subassociations)

Habitat types generally associated in the field

- Enumeration of habitat types that come in mosaics or are exposed to succession (phytodynamic successions, zonations or mosaics)

Structures and functions

- Description of physical components of the habitat type
- Description of structural and functional characteristics of the habitat type important for typical/threatened/indicator species
- Description of ecological processes occurring at a number of temporal and spatial scales including notes on fragmentation

200 - 1000 characters

Pressures and threats

- Detailed and precise description of known important **influences** from the present and past (pressures) and prospective ones (threats)

200 - 1000 characters

Conservation measures

- Detailed and precise description of measures already **realized as well as needed** to avoid pressures and threats

200 - 1000 characters

Specific chapters for biogeographical regions where the given habitat type occurs

MONITORING PROGRAMME FOR THE CONTINENTAL / ALPINE / MEDITERRANEAN BIOGEOGRAPHICAL REGION

EACH MONITORING PROGRAMME INCLUDES FOLLOWING COMMON PRELIMINARY INFORMATION:

- Short description of **basic scheme of surveillance** (how mapping and monitoring are combined)
- **Sharing the data** or methodologies with other monitoring programmes (for other habitat types or species, other projects or monitoring systems)
- Rules of occupational safety and compliance with all relevant statutory instruments including list of permits needed for research when that is the case (instructions for the field workers)

Field mapping

- Detailed description how the habitat type is surveyed during system of mapping for all habitat types prepared directly by SINP (if no mapping is planned the **whole chapter** "field mapping" has to be deleted)

Monitoring on plots

Objectives

- Clarification why monitoring is chosen for habitat type surveillance (if not the whole chapter "monitoring on plots" has to be deleted) and **what outputs are awaited**
- Description of connection with monitoring of other habitat types

Field work instructions

- Determination of field workers specialization
- **Detailed instructions** for the field work including:
 - period for monitoring (+ other limits like temperature if appropriate);
 - character of plots to be chosen in the field and how to mark it;
 - description of data recording.

Sampling design

- Detailed description of the **selection of plots** (classification, random choice etc.) for monitoring including distribution in time (respecting the six-year official periods of reporting) and a shape file in GIS (should be added later)
- Specification of the number of field workers (or man days per year) needed
- Particularities of potential pilot project (if relevant)

Data forms

- Forms as sheet tables, check lists etc.
- Have to be user-friendly and contain **clear data structure** – no latitude making misinterpretation possible and minimum of free text fields
- Communication with SINP needed because of the structure of actual and prepared official databases (CroHabitat etc.) and the forms prescribed

Scientific research

Objectives

- Clarification why also scientific research is chosen as a part of species surveillance (if not the whole chapter "Scientific research" has to be deleted) and what outputs are awaited

Framework assignment

- Basic instructions with a hypothesis to be tested
- Proposal of academic institutions or other subjects able to do the research

THE WAY OF EVALUATION NEEDED FOR ALL FOUR COMPONENTS OF THE CONSERVATION STATUS IS DESCRIBED:

Evaluation of the conservation status components

Range

- description of the data use and interpretation for preparation of the **distribution map** (map will be prepared for all biogeographical regions together)
- description of the data use and interpretation to filling in 10 x 10 km **grid cells** (map will be prepared for all biogeographical regions together)
- proposal of rules for **gap closure** to join grids together where appropriate according to the environmental parameters

Area covered by habitat type

- description of the data use and interpretation to determination of:
 - the **surface area** incl. methodology of analysis
 - the **distribution pattern**, if possible

Specific structures and functions

- description of the data use and interpretation to determine the **conditions** and status of **typical species**

Future prospects

- description of the information use and interpretation to determination of:
 - main **pressures** and **threats** and their value
 - **conservation measures** and other positive provisions realized to avoid pressures and threats

References

All sources used incl. web pages and reports.

ANNEX VI: NOTES ON MONITORING AND REPORTING UNDER THE BIRDS DIRECTIVE

- The Birds Directive (2009/147/EU), also requires Member States to “forward to the Commission every six years (under the new system since 2011 – before, three-year interval was demanded) a report on the implementation of national provisions taken under this Directive” (Art. 12.1) – an obligation which factually requires, in addition to the monitoring of Special Protection Areas, also to survey the status of all bird species native to particular Member States.
- Despite the fact that the Birds Directive does not recognize the term “conservation status”, it is accepted by the Commission and member states that for the purpose of reporting, similar approach as for the Habitats Directive Annex II, IV and V species should be applied to all bird species.
- The status of any bird species is to be assessed at national level and if breeding, migrating and wintering populations of the given species differ they should be assessed separately (according to the ORNIS Committee decision). On the other hand, neither the report nor the monitoring is divided according to particular biogeographical regions.
- Under the Birds Directive each Member State has to report on the triggering SPA classification for species from Annex I and a selection of key migratory species for which SPAs have been classified. Reporting on SPAs is based on estimation of the population size and its short term trend in the SPAs network on national level.
- In case of birds, all species included in the EU Bird Species Reference List native to the **territory of the given Member State should be referred to as “phenomenon”**.
- The instructions in the chapter IV could also be used to some extent for birds, if appropriate. However, specific different elements have been included in the templates for birds – see the Annexes VII and VIII.

ANNEX VII: RECOMMENDED UNIFIED TEMPLATE FOR MONITORING SCHEMES FOR BIRD SPECIES

ENGLISH NAME(S)		
Author(s)		
Group of species		
<i>List of similar species (both English and scientific names) that can be grouped together taking into account the potentially involved staff and logistics.</i>		
Species' description		
<u>Ecology & biology</u>		
<i>Very brief description of basic characteristics</i>		
Species scientific name		
Distribution	<i>One or two sentences only, concerning world/Europe/Croatia</i>	
Sub-specific population		
Occurrence in Croatia	<i>"Resident" or indicate the appropriate season</i>	
Breeding season	<i>Definition (pair formation/egg laying ... fledging/flying/independence of youngs) and usual (average) duration in decades (early – mid - late of given month)</i>	
Croatian Red List status + year		
Global Red List status + year		
<u>Current surveillance</u>		
<i>Description of activities undertaken in Croatia after the year ~ 2000. Unsystematic ones could be mentioned and actual monitoring distinguished.</i>		
<u>Existing data</u>		
<i>Listing of Croatian datasets including description of their structure. Notes on potential application should be added.</i>		
<u>Planning</u>		
Progress in work related to International Species Action Plan (SAPs), Management Plans (MPs) and Brief Management Statements (BMSs)		
<i>If such document has been adopted, enter the full reference (incl. the date and authority), if no, please describe the measures and initiatives taken pursuant the SAP / MP / BMS or similar activities</i>		
<u>Main pressures and threats</u> <i>(regardless the current and future status, list up to maximum 20 factors selected from the standard checklist that is shared for the species reporting under both nature directives and available via the EC reporting Reference Portal; use the 2nd or more precise level of the hierarchical structure)</i>		
Code & factor	Description: Impact, Quality of impact assessment, location, Sources	Way of finding out/monitoring/recording (if it is going to be monitored within Programme)
<u>Proposed SPA coverage and current conservation measures</u>		

Scheme of surveillance

Monitoring scheme is framed by the data filled in the table below:

Component of the conservation status	Way of surveillance	Complementary notes
Population size	mapping - monitoring - research on localities - scientific research ¹	
Population trend	mapping - monitoring - research on localities - scientific research ¹	
Breeding distribution map and range size	mapping - monitoring - research on localities - scientific research ¹	
Breeding range trend	mapping - monitoring - research on localities - scientific research ¹	

¹ Delete what inappropriate

Logistics and roles of participants

Following general arrangement could be changed dependent upon specific scheme characteristics - use what is appropriate for the current species). Indicate and justify any possible changes.

The Working Group

Number of members: 3-5

Who:

(2-)4 experts - ornithologists (one appointed as the National Monitoring Coordinator)

Skills needed:

- ▶ good knowledge on target species ecology and biology
- ▶ experience in the target species survey & monitoring
- ▶ knowledge on large scale bird monitoring techniques and principles

1 expert – SINP (=The Working Group Coordinator)

Skills needed:

- ▶ leading nature conservation projects,
- ▶ good organizational skills, human resource management and PR
- ▶ knowledge large scale monitoring principles

Common tasks of WG

- ▶ to nominate national and regional coordinators
- ▶ to decide about eventual changes in schemes and programmes
- ▶ to consult and agree about field work organization and position of exact routes for transects and plots
- ▶ to check and confirm processing of data and interpretation
- ▶ to assure the input of data into database and communication with IT experts
- ▶ to develop a coordinated system for archiving and accessing bird monitoring data
- ▶ to ensure long-term continuity
- ▶ to verify educational programs for field workers and agree on its implementation

The Working Group Coordinator tasks

- ▶ to coordinate members of the Working Group and organize WG meetings
- ▶ to prepare agreements for all paid contractors
- ▶ to prepare agreements with cooperating institutions
- ▶ to assure that results will be spread to all participants of monitoring, responsible Ministry, Public Institutions and wider public
- ▶ to organize or delegate organization of educational training workshops of field-workers¹

¹ Training workshops for field-workers could be organized simultaneously for different bird species as many field-workers will participate in different monitoring programmes (for example training work-shop

- ▶ to obtain, from MZOP, licences for field-work specified in monitoring (common licence for all listed field-workers; on annual bases)
- ▶ if target species is forest species: **to obtain access permission from Hrvatske šume d.o.o.** to all forests compartments containing transects or plots as well as contact list of contract persons in Local Forestry Offices (responsible for selected compartments)
- ▶ to obtain data on forest structure, management and annual forest management activities in all compartments containing transects or plots
- ▶ to inform the Croatian Hunting Association and relevant local Hunting Association(s) as well as other hunting right owners on planned monitoring activities and routes

The National Monitoring Coordinator tasks

- ▶ to design and prepare, based on principles developed in a monitoring programs, exact routes for transects and plots
- ▶ to assign survey transects/plots to fieldworkers
- ▶ to ensure and distribute materials (instructions, maps, forms and coordinates) to field-workers
- ▶ to ensure quality control of field data through communication with regional coordinators and field workers
- ▶ to analyse data and prepare annual report
- ▶ to ensure strict follow of procedures described in monitoring programmes and solve possible problems
- ▶ to develop educational program for field-workers

Regional coordinators (optional, if needed for all target species)

Skills needed

- ▶ educated and experienced in the target species monitoring methodology
- ▶ owls songs and calls determination skills
- ▶ good organizational skills
- ▶ good knowledge about field-situation in region (habitat distribution, local infrastructure important for monitoring, key-people in regional institutions...)

Tasks

- ▶ to coordinate the monitoring efforts on the regional/county level
- ▶ to develop wide group of collaborators and field workers for monitoring activities
- ▶ to instruct & supervise the field workers in the regions
- ▶ to collect data on regional level and to provide them to the National Coordinator and Working Group in timely manner
- ▶ to collaborate with WGC on administrative and technical issues and with NMPC on issues regarding monitoring protocols and data collection
- ▶ to acknowledge the work of local collaborators

Field workers

Skills needed

- ▶ educated and experienced in the target species monitoring methodology
- ▶ target species determination skills

for woodpeckers and owls could be organized simultaneously; and even training for common forest species could be included if training session is expanded). Training workshop organization could be delegated to NGOs and other subjects if they have experts and skilled field observers capable to follow instruction given in the educational program developed by the National coordinator.

Tasks

- ▶ to carry out the monitoring activities on timely manner and in strict compliance with the monitoring instructions
- ▶ to provide the data to national coordinators on timely manner
- ▶ if target species is forest species: to inform contact persons in a Local Forestry Offices on exact dates of filed-work visits; if necessary ask them to ensure the passage (leave ramps open)
- ▶ to inform Publics Institutions (if surveys are going to be carried out in the protected areas) on exact dates of filed-work visits

Current overview of both available and needed capacities is summarized in the table below:

Kind of work	Specialisation & capacities needed	Current specialists & institutions	Missing skills, specialisation and capacities
Preparation of methodologies			
Expert examination (peer-reviews, consultations) of methodologies			
Working Group coordination (incl. communication with IT experts)			
Monitoring programme coordination (national)			
Monitoring programme coordination (regional)			
Field work			
Data analysis & evaluation			
Education and training			

Pilot project

Clarification if a pilot project is or is not needed.

Funding

General estimation of costs for monitoring programmes of the species providing a framework for planning of capacities and preparation of monitoring programmes:

	costs per 6 year period	trend in following periods
Preparation of methodologies	<i>Partly covered by MaMon project</i>	
Expert examination (peer-reviews, consultations) of methodologies		
Working Group		
Monitoring programme coordination (national)		
Monitoring programme coordination (regional)		
Pilot project		
Collection of existing data	"NIP First-Phase" project	
Monitoring on plots ¹		
Scientific research		
Data evaluation		
Education and training		
TOTAL		

¹ incl. daily allowances and travel and accommodation costs for fieldworkers

References

Only those with relevance to monitoring of the given species should be mentioned.

ANNEX VIII: RECOMMENDED UNIFIED TEMPLATE FOR MONITORING PROGRAMMES FOR BIRD SPECIES

ENGLISH NAME (*SCIENTIFIC NAME*)

Range

- Total world and European range of the species with description of its **distribution pattern**
- Remarks on subspecies (if appropriate)

200 - 500 characters

Distribution in Croatia

- Summary of **historical development of distribution** (add maps if available in cooperation with SINP)

500 - 1000 characters

Habitat

- Enumeration of **main characteristics** of inhabited habitat(s)
- Listing of habitat types – either Natura 2000, EUNIS or national classification (if there is a clear linkage of habitat of the species and particular habitat type)
- Notes on food biology (for animal species) and on reproduction biology (if habitat characteristics are relevant)

200 - 500 characters

Phenology and population biology

- Description of the **life cycle**
- Particularities of fluctuations of population size (if relevant)
- Notes on genetic structure of population (if known and relevant).

200 - 1000 characters

Pressures and threats

- Detailed and precise description of known important **influences** from the present and past (pressures) and prospective ones (threats)

200 - 1000 characters

Conservation measures

- Detailed and precise description of measures already **realized as well as needed** to avoid pressures and threats
- Description of **national legislative protection**

200 - 1000 characters

Annexes of the Birds Directive

- Pick out Annex I, II or non-annex regularly occurring wintering waterbird

Croatian Red List

- Pick out Croatian Red List category.

MONITORING PROGRAMME

PRELIMINARY INFORMATION:

- Short description of **basic scheme of surveillance** (what surveillance approaches are chosen)
- **Sharing the data** or methodologies with other monitoring programmes (for other species, other projects or monitoring systems)
- Rules of occupational health & safety and compliance with all relevant statutory instruments

including list of permits needed for research when that is case (instructions for the field workers)

THE SPECIFIC WAYS OF SYSTEMATIC DATA COLLECTION ARE DESCRIBED IN DETAIL (IF USED):

Field mapping

Objectives

- Clarification why mapping is chosen for species surveillance (if not the whole chapter "Field mapping" has to be deleted) and **what outputs are awaited**

Field work instructions

- Determination of specialization/minimum knowledge of the field workers
- **Detailed instructions** for the field work including:
 - period for mapping (+ other limits like temperature if appropriate);
 - character of plots to be chosen in the field;
 - description of data recording.

Sampling design

- Detailed description of **selection of areas** for mapping including distribution in time (respecting the six-year official periods of reporting) and potentially also a shape file in GIS
- Specification of number of field workers (or man days per year) needed
- Particularities of potential pilot project (if relevant)

Data forms

- Forms as sheet tables, checklists etc.
- Have to be user-friendly and contain **clear data structure** – no latitude making misinterpretation possible and minimum of free text fields
- Communication with SINP needed because of the structure of actual and prepared official databases (CroFauna etc.) and the forms prescribed

Monitoring on plots

Objectives

- Clarification why monitoring is chosen for species surveillance (if not the whole chapter "monitoring on plots" has to be deleted) and **what outputs are expected**

Field work instructions

- Determination of field workers specialization
- **Detailed instructions** for the field work including:
 - period for monitoring (+ other limits like temperature if appropriate);
 - character of plots to be chosen in the field and how to mark it;
 - description of data recording.

Sampling design

- Detailed description of the **selection of plots** (classification, random choice etc.) for monitoring including distribution in time (respecting the six-year official periods of reporting) and a shape file in GIS
- Specification of the number of field workers (or man days per year) needed
- Particularities of potential pilot project (if relevant)

Data forms

- Forms as sheet tables, check lists etc.
- Have to be user-friendly and contain **clear data structure** – no latitude making misinterpretation possible and minimum of free text fields
- Communication with SINP needed because of the structure of actual and prepared official databases (CroFauna etc.) and the forms prescribed

Research on localitiesObjectives

- Clarification why this research is chosen for species surveillance (if not the whole chapter "Research on localities" has to be deleted) and **what outputs are expected**

Field work instructions

- Determination of field workers specialization
- **Detailed instructions** for the field work including:
 - period for research (+ other limits like suitable temperature if appropriate);
 - description of data recording.

Selection of localities

- Description of the **selection of localities** including distribution in time (respecting the six-year official periods of reporting) and potentially also a shape file in GIS
- Determination of number of field workers (or man days per year) needed

Data forms

- Forms as sheet tables, check lists etc.
- Have to be user-friendly and contain **clear data structure** – no latitude making misinterpretation possible and minimum of free text fields
- Communication with SINP needed because of the structure of actual and prepared official databases (CroFauna etc.) and the forms prescribed

Scientific researchObjectives

- Clarification why also scientific research is chosen as a part of species surveillance (if not the whole chapter "Scientific research" has to be deleted) and **what outputs are expected**

Framework assignment

- Basic instructions with a **hypothesis to be tested**
- Proposal of **academic institutions** or other subjects able to do the research

Unsystematic data gatheringObjectives

- Clarification why also unsystematic data gathering should form a part of surveillance (if irrelevant the whole chapter "Unsystematic data gathering" has to be deleted) and what outputs are awaited

Field work instructions

- Determination of field workers specialization
- Detailed instructions for the field work including:
 - period for monitoring (+ other limits like temperature, if appropriate);
 - description of data recording.

Data forms

- Forms as sheet tables, check lists etc.
- Have to be user-friendly and contain clear data structure – no latitude making misinterpretation possible and minimum of free text fields
- Communication with SINP needed because of the structure of actual and prepared official databases (CroFauna etc.) and the forms prescribed

Evaluation of the conservation status components

Population size

- proposal what **population units** should be used
- description of the data use and interpretation to determination of:
 - the **population size** incl. methodology of analysis
 - the **population structure** (reproduction, mortality and age structure), if possible

Breeding distribution map and range size

- description of the data use and interpretation for preparation of the **distribution map**
- description of the data use and interpretation to filling in 10 x 10 km **grid cells**
- proposal of rules for **gap closure** to join grids together where appropriate according to the environmental parameters

Main pressures and threats

- description of the information use and interpretation to determination of:
 - main **pressures** and **threats, their location** and their value
 - **conservation measures** and their location

References

All sources used incl. web pages and reports.