EPCN
European Pond
Conservation Network

A preliminary assessment of Important Areas for Ponds (IAPs) in the Mediterranean Basin and Alpine Arc

Technical Report

Gargano and Tremiti Islands, Italy

Lacs des Gorges du Doron de Termingnon
France

MAVA
FONDATION POUR LA NATURE

CONSULTATION DOCUMENT

Prepared for the
European Pond Conservation Network (EPCN)

by
Naomi Ewald[1], Pascale Nicolet[1-2], Beat Oertli[3] Valentina Della Bella[2], Laila Rhazi[4], Anne-Sophie Reymond[3], Elise Minssieux[3], Er-riyahi Saber[5], Mouhssine Rhazi[6], Jeremy Biggs[2], Nicola Bressi[2], Regis Cereghino[2], Patrick Grillas[2], Thomas Kalettka[2], Andrew Hull[2], Olivier Scher[2] and Laura Serrano[2].

[1] Pond Conservation: The Water Habitats Trust, c/o Oxford Brookes University, Gipsy Lane, Oxford OX3 0BP, United Kingdom
[2] EPCN, European Pond Conservation Network
[3] University of Applied Sciences Western Switzerland, hepia - technology, architecture and landscape - 1254 Jussy/Geneva, Switzerland
[4] Laboratory of Aquatic Ecology and Environment, Hassan II Aïn Chock University, BP 5366 Maarif, Casablanca, Morocco
[5] CEGA-UMR «ESPACE» and University of Provence, Aix-Marseille I, France
[6] Department of Biology, Faculty of Sciences and Techniques of Errachidia, Mouslay Ismail University, BP 509 Boutalamine, Errachidia, Morocco

This report should be cited as:
Ewald N, Nicolet P, Oertli B, Della Bella V, Rhazi L, Reymond A-S, Minssieux E, Saber E, Rhazi M, Biggs J, Bressi N, Cereghino R, Grillas P, Kalettka T, Hull A, Scher O and Serrano L (2010) A preliminary assessment of Important Areas for Ponds (IAPs) in the Mediterranean and Alpine Arc. EPCN.

This work is part of the project “Promoting pond conservation in Europe and the Mediterranean region (ProPond)”. Funding for the ProPond project was provided by the MAVA foundation.

European Pond Conservation Network (EPCN)
c/o Hepia
University of Applied Sciences Western Switzerland
1254 Jussy/Geneva
Switzerland

www.europeanponds.org

ACKNOWLEDGEMENTS

Thanks must go to all the contributors who have volunteered their time to identify and review IAPs. They are listed in full in Appendix 1 and 2.

OVERVIEW

The Important Areas for Ponds (IAPs) concept was developed to raise awareness of geographic regions that support ponds of national or international biodiversity importance, and help focus strategies for pond monitoring, protection and appropriate management and creation.

Ponds are vitally important for freshwater biodiversity and particularly recognised as stepping stone habitats. They also provide a range of ecosystem services and have been used for centuries by local communities. Ponds and pond networks are abundant across Europe and Northern Africa, in spite of significant losses, but are not adequately protected by current legislation even within the European legislative framework for nature conservation and water management. The information gathered during the identification of IAPS will be used to encourage better protection measures for ponds at the regional, national and international level, and their inclusion in biodiversity and water protection strategies (e.g. Water Framework Directive, River Basin Management Plans).

In order to achieve greater protection for ponds in Europe there needs to be coordination between countries. The European Pond Conservation Network (EPCN), as part of the ProPond Project (Promoting Pond Conservation in Europe and the Mediterranean Region, a project supported by the MAVA foundation), has begun this work by concentrating on two biogeographical regions – the Mediterranean Basin and the Alpine Arc.

Selection of IAPs was based on a set of criteria including the presence of species or habitats of conservation importance, pond density, and their socio-economic importance (providing this did not undermine their biodiversity value) and other factors such as important assemblages of species e.g. dragonflies and macrocrustaceans. IAPs were identified using both GIS techniques and expert knowledge from a wide range of pond workers including both researchers and practitioners.

For this first analysis, 140 proposed IAPs (pIAPs) have been identified in the Alpine Arc (30 pIAPs) and in the Mediterranean region (110 pIAPs), the latter including sites both from Northern Africa and the Middle East (28 pIAPs) and from Europe (82 pIAPs). A profile of each IAP has been produced with information on its (i) location, (ii) biodiversity, historical and social value, and (iii) threats.

In the Mediterranean basin, pIAPs have been identified in 17 countries in Southern Europe, North Africa and the Eastern Mediterranean. The selected pIAPs reflect the heterogeneity of pond sites, and range from individual ponds in Spain supporting 18 species of European conservation importance to pond networks in Italy known to contain over 60 species of European conservation importance. Many areas qualified as IAPs because of high pond density (e.g. over 15 ponds per km^2 in Greece) whereas others qualified because they contained many ponds scattered over large areas (e.g. 1613 ponds over 200000 ha in Morocco), representing a dispersed but highly significant freshwater biodiversity resource in the region. The socio-economic value of ponds was also recognised in their identification as pIAPs: some such as in Israel show evidence of continuous use since the Roman occupation.

Many IAPs, particularly in Northern Africa and the Eastern Mediterranean have no current protection, in spite of the habitats and species of conservation concern they support, and all are under significant threat from the increasing pressures of agriculture and development. Raising the profile of these sites through designation as IAPs will help to secure their protection and future sustainable management

Temporary Ponds in Alt Palancia, Spain

In the Alpine Arc, a total of 30 pIAPs were proposed in the four main countries which made up the region. Some had exceptionally high pond densities (e.g. pIAPs with over 30 ponds per km^2 in the French Alps), whereas others in the same region comprise a single pond with important assemblages of species. Pond networks were also identified: some extended over large areas, exceeding 2000 ha in Italy, whilst others (e.g. in Austria) were concentrated within an area of less than 20ha.

The majority of pIAPs in the Alpine Arc contained species of European conservation importance but also high altitude stenothermal species. However, these alpine ponds are not well represented in the list of pond types given under the Habitats Directive leading to a lack of designation within the European legislative framework of protected sites. The identification of networks of ponds in the Alpine region as IAPs will provide greater recognition of their importance to biodiversity at an international level. This is particularly relevant to high altitude sites, as they are under significant threat from climate change, an issue which requires cooperation and implementation of conservation initiatives at an international level. IAPs in the Alpine Arc also demonstrate the cultural importance of ponds. Many have a long history of use particularly within the traditional pastoral economy of the region. More recently pond networks are providing a valuable research and educational tool for both the scientific community and the wider public.

This report is a preliminary assessment of IAPs in the Mediterranean and Alpine Arc region. Proposed IAPs (pIAPs) will be reviewed through a public consultation process and either accepted as a full IAP, modified or declined. The pIAPs identified as part of the ProPond Project will be published on the EPCN website. This should ensure that the information is rapidly disseminated to pond conservation practitioners and turned into positive action to protect and enhance the pond biodiversity resource.

The pIAPs presented in this report incorporate the high quality ponds so far known: we anticipate that, as the profile and knowledge of ponds grows, aided by the IAP process itself, considerably more high quality pond will be found in these regions than have currently identified. The EPCN will now continue to coordinate and facilitate this work, building on the momentum of the ProPond project. A key role of the network and its members is now to disseminate the information presented here as widely as possible as part of a consultation process, but also to inform international and national policymakers.

CONTENTS

1. INTRODUCTION

1.1 The importance of ponds

Ponds are important freshwater habitats that play a significant role in maintaining freshwater biodiversity and provide a significant freshwater resource. There are over 10 million small water bodies (less than 10ha) in Europe, whose total surface area accounts for almost 30% of all permanent surface water (Oertli *et al*. 2005). This is in spite of significant losses in some European countries - up to 90% in Switzerland and the Netherlands, and 50% in Sweden and Poland (EPCN 2008). In Northern Africa there are thousands of ponds recognised for their biodiversity value, but under increasing pressure from urban, agricultural and industrial developments (Rhazi *et al*. 2006).

Ponds have high ecological interest because of the flora and fauna they support, including amphibians, invertebrates, vascular and lower plants and micro-organisms, with many protected species which are threatened at both national and international levels. The value of ponds also lies in the varied network of habitats that they provide, and at a regional level ponds are often more important in maintaining freshwater biodiversity than other more extensive freshwater habitats (Williams *et al.* 2004, Davies *et al.* 2005). They also provide connectivity across landscapes and are recognised as stepping stones vital for the dispersal of species within landscapes (Cereghino *et al.* 2008). When a number of ponds are located in close proximity their biodiversity value increases still further, allowing species to exist as metapopulations, strengthening genetic exchange and buffering populations from extinction events.

Ponds are often of high historical and economic value, used in agriculture, industry and as a source of fresh drinking water for both livestock and local populations. Ponds are also used for recreation and have an intrinsic value to many people because of the association between people and ponds for thousands of years. The relationship between people and ponds provides the opportunity to engage with local stakeholders in their management and conservation (EPCN 2008).

However, ponds are also a vulnerable habitat type. They experience all of the impacts that affect other freshwaters, and additional local pressures specific to small waterbodies. These include changes to farming practices, including loss of traditional methods to more intensive techniques, changes to the hydrological regime from drainage and abstraction, development from urban sprawl and road infrastructure, tourism and the colonization of ponds by invasive species. More generally, ponds are especially vulnerable to pollution stresses because their small size gives them limited buffering capacity compared to rivers or larger lakes. As a result of widespread destruction, pond numbers are now probably close to an all time low across Europe (Hull 1997).

Lac des Saisies, France

However, in spite of the losses and threats facing ponds, they also provide important opportunities for conserving biodiversity. Their small size and high levels of heterogeneity make them easy to create and manage in almost every habitat type. They provide important ecosystem services and connect with the sustainable management of environments at local, regional and global levels. In the right density and if strategically placed, they can provide a link between important areas of biodiversity as well as being an important biodiversity resource in their own right (EPCN 2008).

Because the biodiversity interest of ponds is often widely geographically distributed, and because ponds face an exceptional range of threats, protecting them is a challenge for policy makers and managers. Ponds are generally too small to fit the standard model of site-based protection and they do not fit the standard model of consent-based protection designed to protect waterbodies like lakes and rivers from industrial discharges. Despite much interest in the management of catchments, effective protection of ponds through landscape wide measures is rarely achieved (Section 1.2). For all these reasons, new models of protection are required if we are to maintain the biodiversity and historical value of these small, vulnerable, freshwater habitats.

The European Pond Conservation Network (EPCN) was established in 2004 to address these issues, and already includes over 150 members from almost every country in Europe and Northern Africa. The mission of the EPCN is to promote the awareness, understanding and conservation of ponds in a changing European landscape and its pond protection strategy is set out in the Pond Manifesto (EPCN 2008). The EPCN, funded by the MAVA Foundation, has undertaken the ProPond programme: Promoting Pond Conservation in Europe and the Mediterranean region as its first major programme of work to implement a European conservation strategy for ponds. As part of this, the EPCN, in collaboration with other pond workers, has begun the process of identifying Important Areas for Ponds (IAPs) in the Mediterranean and Alpine Arc regions, providing a protocol which can be applied to the rest of Europe.

1.2 Pond protection

In the EU, one of the most effective measures to ensure habitat protection is the designation of a site within the legislative framework of protected sites. Two pieces of legislation are particularly relevant to ponds: the Habitats Directive (92/43/EEC) and the Water Framework Directive (2000/60/EC). Under the Habitats Directive, member states have international obligations for a range of species found in ponds. Annex 1 of the Directive also lists seven “habitats of high conservation importance” that either partly or wholly include ponds (Appendix 4). In addition, ponds are noted in Article 10 as stepping-stone habitats, which member states need to consider in their planning policies to encourage ecological coherence of the Natura 2000 network.

The other piece of EU legislation relevant to ponds is the Water Framework Directive (WFD), which is intended to protect the ecological quality of *all* waters in a catchment context. However, most national administrations have adopted a lower size limit of 50 hectares for the identification of standing waterbodies to be monitored as part of the WFD implementation. Therefore Europe’s most powerful piece of water legislation, as currently being implemented, is likely to bring little protection for ponds.

Outside of the EU legislative Framework, ponds can receive some protection if they are on sites designated through international law or initiatives. Of these, the Emerald Network initiative, launched by the Council of Europe under the Bern Convention, is potentially the most important for ponds. This network identifies areas of special conservation interest and represents the de facto extension of Natura 2000 sites to non-EU countries, although it is not legally binding. The concentration of Mediterranean Temporary Ponds, as defined by Natura 2000, within Northern Africa should qualify many sites identified as part of the IAP process for inclusion in the Emerald Network. Several other international designations may also afford pond sites some protection, although designations tend to be non-legally binding, including e.g. Biosphere Reserves (UNESCO) and Important Areas for Birds (IBAs).

The IAP process will help increase awareness of the importance of the pond resource generally, and of IAP pond sites in particular. It can be used to encourage better protection measures for these sites at the regional, national and international scale, and their inclusion in biodiversity and water protection strategies. IAPs should be considered in all strategic plans which aim to achieve the sustainable management and protection of biodiversity at regional, national and local administrative levels.

Presidential Estate of Castelporziano, Italy

1.3 Pond definition

In order to protect a resource it is necessary to define the habitat type. Ponds have been part of human civilization for thousands of years but their variability in type and differences in use have led to multiple definitions based on various aspects of their size, depth, type of water supply, use, geographical location, formation, and water quality (see Biggs *et al*. 2005 for a review of pond definitions).

The EPCN (EPCN 2008) has taken a broad definition of what constitutes a pond which will apply across administrative boundaries to include the full range of pond habitat type.

"A temporary or permanent standing waterbody between 1m^2 and 5 hectares in surface area."

2. IMPORTANT AREAS FOR PONDS (IAP)

2.1 Identifying IAPs

The Important Areas for Ponds (IAP) concept was proposed and developed by Pond Conservation to raise awareness of geographic regions that support ponds of national or international biodiversity importance. The project was successfully piloted in Wales, UK (Nicolet *et al.* 2007) and has since been applied to two other regions in the UK. Identifying areas that are important for biodiversity is a concept which has been applied at the global scale - Biodiversity Hotspots (Myers *et al*. 2007), within Europe - Key Biodiversity Areas (Edger *et al*. 2008) and for different taxonomic groups (Areas of Importance, including birds and plants).

As with the pond definition above, the EPCN has agreed a broad definition for IAPs which can be applied to a range of geographical scale depending on the characteristics of the ponds of interest.

"An IAP is a geographical area which supports a pond site or network of high biological, social or economic importance."

The aim of IAPs is to identify networks of the most important ponds and their biodiversity. These areas can then be used to help focus strategies for pond monitoring, protection and appropriate management and creation. Specifically, knowledge of IAPs will:

- Highlight IAPs for practitioners (including conservation agencies, government authorities and non-governmental organisations), creating a better understanding and recognition of the pond resource.
- Increase awareness of the importance of special and often overlooked pond types (e.g. temporary ponds), and the species they protect. IAPs can also be used as a guide to best practice in pond conservation and management.
- Help to protect pond networks and prevent fragmentation of freshwater resources. Sites should be viewed as part of the wider landscape, with management seeking to protect and extend pond habitats.
- Inform regulatory agencies of areas where ponds should be given particular protection. This can be achieved by using existing legislation more effectively, influencing policy development and integrating IAPs in local development strategies.
- Give a sense of ownership to local communities and help to ensure that the profile of ponds is raised in the public consciousness.

2.2 Selection criteria

The selection of important areas is based on a set of criteria to provide a robust justification for their designation. These criteria can be qualitative, based on the presence of protected habitats or the presence of protected species, or they may be quantitative, for example, the size of an area or number of habitat units within a given area. Subjective measures also include the importance which local communities give to the pond resource. In the absence of published data, pond practitioners can also use expert personal knowledge to identify important ponds within a region.

The EPCN has developed the following five criteria to identify IAPs (Table 1):

- A region with a high density of ponds interconnected at the landscape level (pond network).

A methodology to identify pond networks using GIS and remote sensing techniques was developed in Switzerland (Reymond 2008, Minssieux 2008) and has proved to be an effective technique in identifying pond clusters in the Alpine Arc and in the some part of Morocco. However, remote sensing techniques are often less effective for ponds which are small in size, temporary, within dense vegetation or hidden under trees. In such cases, and where detailed remote sensing analysis was not possible for other reasons, and in the absence of set threshold figures on pond density, expert knowledge and the use of other criteria were used to identify pond networks.

- One or several High Quality Pond(s). A HQP is a pond with a high biological value because of the rarity of habitat and species they support.

Ponds supporting populations of European protected, rare, threatened or endemic species qualify as a HQP. A list of all species used in the identification of IAPs has been included in Appendix 3. Identification of ponds based on species relies on good quality and accessible data, something which is lacking for many of the taxonomic groups associated with ponds in many countries. The best available data has been collated for only a few groups including plants, amphibians, Odonata and in the Mediterranean, macrocrustaceans.

Ponds which support habitats of European importance also quality as HQPs (as listed in Annex 1 of the Habitats Directive). The habitats used in the identification of IAPs are listed in Appendix 4. In Northern Africa and the Middle East, the presence of Annex 1 habitats was also used to assess sites, as in the Emerald Network.

- Places recognised for their present or historical social interest (e.g. places of tourism, swimming ponds, fish farming pond, recreational angling pools, ponds recognised for their scenic beauty, etc.).

It has been shown that ponds with high socio-economic value are often managed more sustainably than sites which are undervalued or neglected. In France a registry exists for sites having ‘artistic, historical, scientific, legendary or picturesque value’. Switzerland has a federal inventory of natural and cultural heritage. The ponds within Morocco are relied upon by local communities for fresh water for livestock and villagers. It was important however that these uses remained compatible with the biodiversity importance of the site.

- Other qualitative and quantitative measures.

Although it is desirable to select IAPs using standardized criteria some areas, which expert judgment clearly indicate to be important, lack the data necessary to qualify using the formal criteria. To avoid the exclusion of such sites IAPs may also be selected on the basis of other criteria based on expert knowledge about a site or region. The identification of IAPs in this category should include a description of the qualifying other criteria with an aim to fill in missing data as it becomes available.

Table 1 summarises the criteria used in the selection of IAPs. For more information on the development of the criteria refer to Reymond (2008) and Minssieux (2008).

Table 1: Selection criteria for IAPs in the Mediterranean Basin and Alpine Arc regions.

Criteria types	**Selection criteria**
A. Sites with a high pond density	Pond complexes or clusters which are likely to support metapopulations of pond-associated plants and animals
B. Sites with habitats of European or Mediterranean importance	Habitats listed in Annex I of the Habitat Directive
C. Sites with species of European or Mediterranean conservation importance	B.1. Sites hosting species protected by international or European legislation : I. Species listed in Annex I, II and III of the Berne Convention II. Species listed in Annex II and IV of the Habitat Directive B.2. Site hosting threatened species at international or European level: I. Species listed on the IUCN Red List II. Species listed on the European Red List B.3. Sites hosting endemic species: Species which are unique to Europe or the Mediterranean region and are found nowhere else in the world B.4. Other status: species without particular status but potentially threatened: I. Species which small localised populations II. Relict species
D. Sites of high social (historical, cultural or scientific) or economic importance	Pond sites which represent *exceptional* examples of the social or economic uses of ponds
E. Other selection criteria	Pond sites which do not qualify under criteria A to D above, but which are deemed of exceptional importance for other reasons: for example because of their high species diversity at national level, their geomorphology, etc.

2.3 IAP selection process

In summary, the selection of IAPs is a three step process (Figure 1) which begins with the identification of (i) ponds qualifying as High Quality Ponds, based on the presence of species or habitats of conservation importance, (ii) areas with a high pond density, or (iii) pond sites of particular socio-economic importance. This leads to the identification of proposed IAPs (pIAPs) which are then reviewed through a consultation process and then either confirmed or rejected as IAPs. In practice, pond data are not available or at least difficult to access in many countries, and expert knowledge was heavily relied upon to identify IAPs. The selection of IAPs and collation of proposed IAPs was coordinated within each region by members of the EPCN.

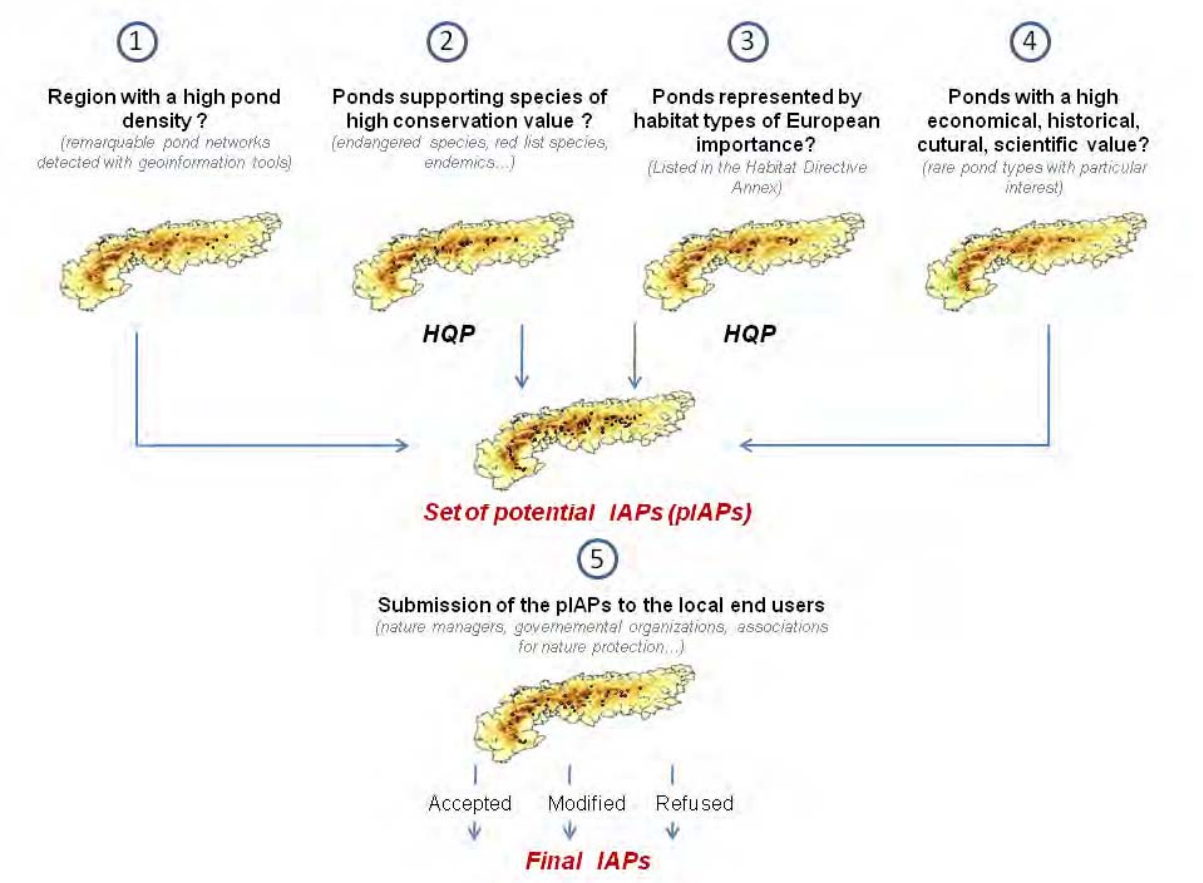


Figure 1: The IAP selection process

A profile of each pIAP has been produced with information on its (i) location, (ii) biodiversity, historical and social value, and (iii) threats. These site profiles are collated in a separate document which is available on the EPCN website (www.europeanponds.org). Here we provide a summary of the pIAPs identified in each country within the Mediterranean Basin and Alpine Arc, including a map of pIAP locations and a cross-reference to the page numbers of each pIAP site profile in the accompanying document.

3. THE MEDITERRANEAN BASIN

The Mediterranean region is defined by its climate. During the summer it receives subtropical dry and warm air, whilst in the winter the region experiences cyclonic maritime storms from the Polar Regions. This is often described as a winter-rain, summer-dry climate.

The rigours of living in this type of extreme climate have resulted in a high degree of endemism in the area. This is reflected in the number of priority species (Natura 2000) recorded here (59% of all priority species on Annex II). The climate also promotes the formation of temporary ponds. In Northern Africa these are the predominant pond type, supporting a unique and diverse plant and animal community. Temporary ponds, however, do not constitute a homogeneous group and vary considerably depending on local physico-chemical characteristics such as soils and surface area. The dayas of Morocco, for example, often have a surface area of several hectares, whereas the cupular pools of Sicily can be less than one square metre.

The ponds of the Mediterranean region also have a huge significance for local populations as a source of freshwater. In North Africa they are often located in or near to wadis, dry riverbeds which only fill during heavy rainfall. The ponds persist longer than the river water and become oases for grazing animals.

Threats to ponds in the Mediterranean region are similar to those faced by small waterbodies everywhere, but their vulnerability is greater. The pools are shallow and often small in area and volume. This makes them exceptionally susceptible to pollution, drainage and destruction by man. In Southern Europe these threats include the abandonment of agricultural practices, eutrophication due to agriculture and inappropriate management (Medail *et al*. 1998).

Malladas de la Devesa, Spain

Mediterranean temporary ponds protected under the EU Habitats Directive include only a small proportion of all temporary pools: specifically those which have oligotrophic water and support particular plant and invertebrate, mammal and bird communities. Other temporary ponds receive little or no protection under national or international legislation. As a result identification of IAPs is essential to raise the profile of these important habitats and ensure their recognition in water management strategies.

Massif du Bouhachem, Morocco

A total of 110 IAPs have been identified in the Mediterranean region (Figure 3). The availability of data and levels of information to support their selection varied greatly depending on the country. For example the location of French IAPs was based predominantly on literature review, whilst the location of pIAPs in Albania was based on analysis of GIS to identify pond clusters. In Menorca a remarkable LIFE BASSES project has surveyed and mapped the temporary ponds on the whole island providing detailed information on all aspects of these ponds (Fragai i Arguimbau 2010). This example should be used as a best practice case study because of the quantity and quality of Mediterranean Temporary Ponds found there.

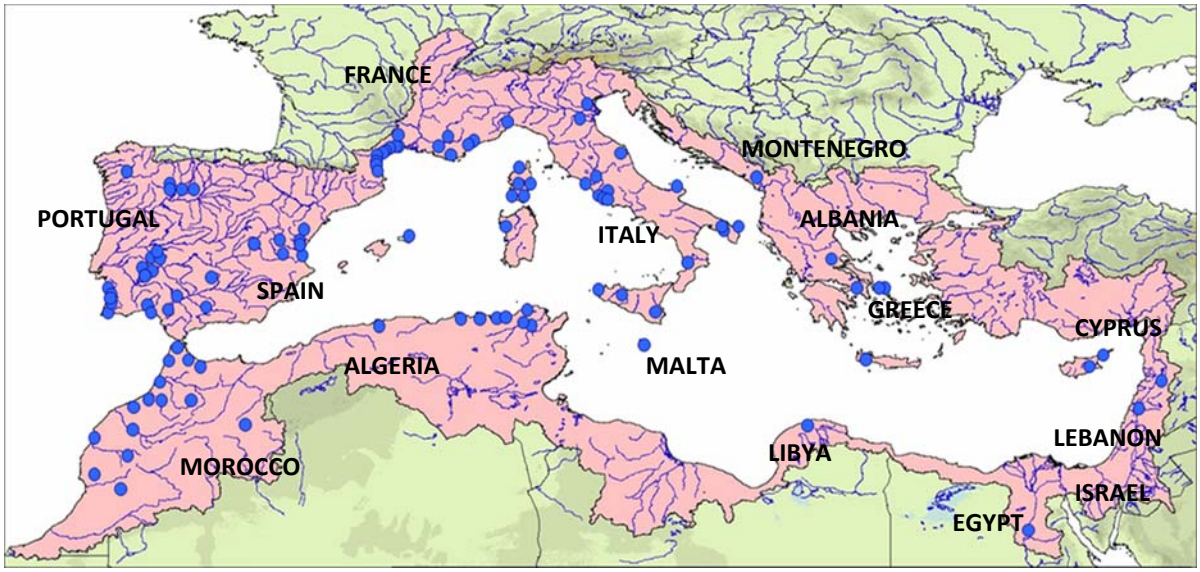


Figure 2: Overview of the location of pIAPs in the Mediterranean Region.

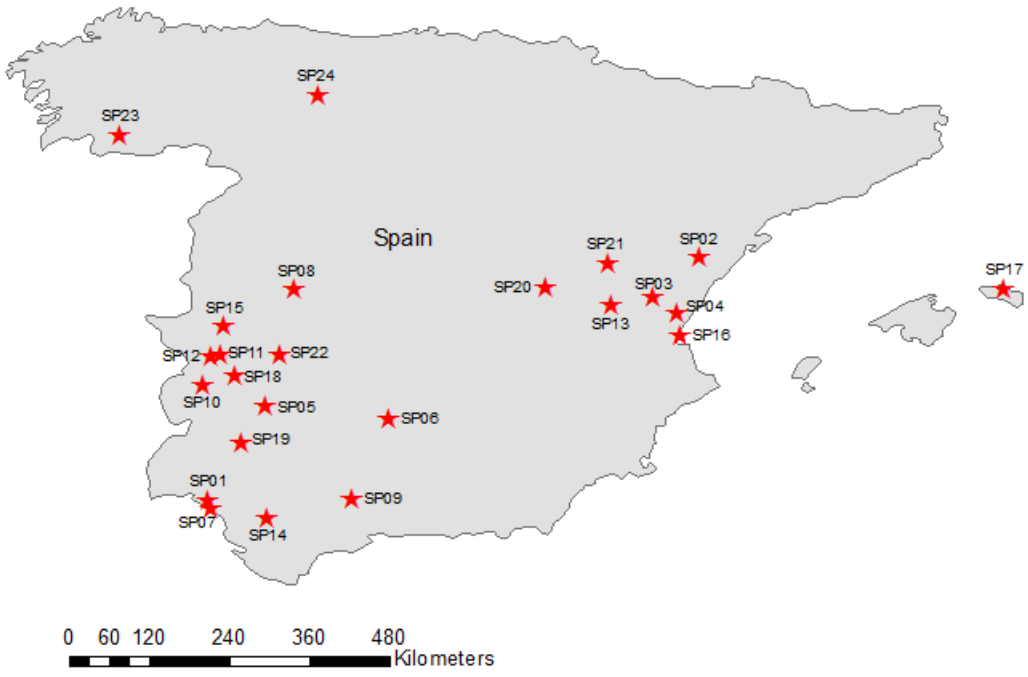
In Northern Africa and the Eastern Mediterranean many potentially degrading activities occurred in or around the pools in each of the IAPs identified. Many of these were the result of agriculture (including grazing and cropping), but also included disruption of the hydrological regime (complete loss of water due to abstraction, irrigation, climate change, etc.). Very few ponds in these IAPs carried any form of international recognition (2 IAPs) and only 25% were covered by a national conservation designation. In the European Mediterranean region the level of protection was much greater. However, interestingly the number of reported threats for these IAPs was as high as those in Africa in spite of the level of protection afforded to them.

3.1 Spain

In Spain 27 pIAPs have been identified. This reflects the combination of bedrock and climate, which results in development of numerous temporary ponds, but also the number of pond workers in this country. The ponds support a large number of specialist species, many of which are endemic to this region.

Lavajo de Abajo de Sinarcas, Spain

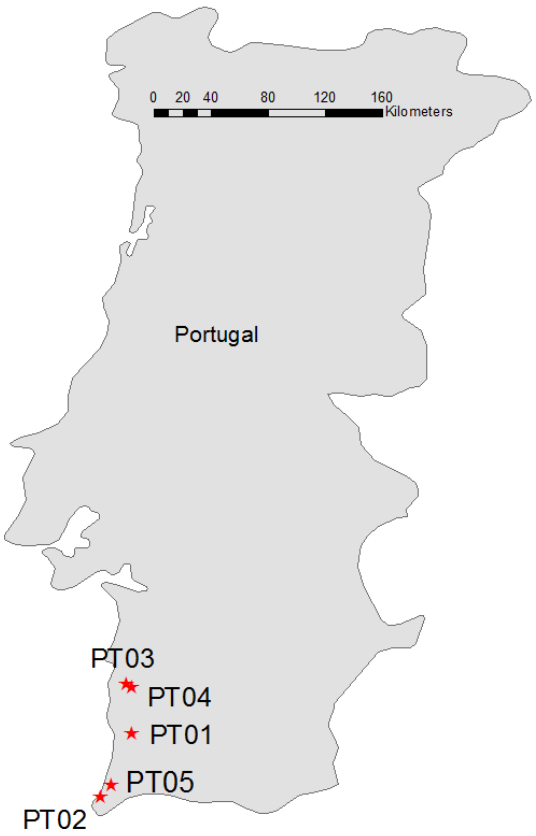
There was a notable difference in the pIAPs identified in this region. Some comprise outstanding examples of high quality ponds (e.g. Donana and Menorca) where detailed information exists on the presence of species from a wide range of taxonomic groups and priority pond habitats. Projects are on-going in these pIAPs to maintain and enhance the pond resource. For other pIAPs (e.g. Douro Basin), information exists on the presence of priority pond habitats but there is a lack of information under the other IAP criteria. These sites are under a high level of threat due to their lack of recognition and urgent action is required to ensure their protection. Even at sites such as Donana, which are designated under many international and national schemes, temporary ponds are threatened by water abstraction, intensification of agriculture invasive species and pressures from tourism. These threats are common to all virtually all Mediterranean pIAPs, illustrating the need to increase the protection afforded to these habitats.



3.2 Portugal

At the western limit of the European Mediterranean biogeographic region 5 pIAPs were identified in mainland Portugal. These ranged from altitudes of 50m (Galeado) to over 2000m a.s.l. (S Miguel). The pIAPs ranged in size from 12.8ha to 3200 ha and contained one or more priority habitats associated with or surrounding the ponds. Some sites also qualified on the basis of pond density with up to 8 ponds per km^2 (Malhao).

In spite of this level of biodiversity value only one site (Sagres Ponds) is afforded protection under EU legislation. However the other sites were afforded some protection at the National level. These pIAPs are threatened by a combination of human activities including change in agricultural practice from traditional grazing to intensive agriculture and planting of crops, with associated drainage and mismanagement of water resources, and increasing pressure from tourist developments.



Galeado, SW Portugal Ponds

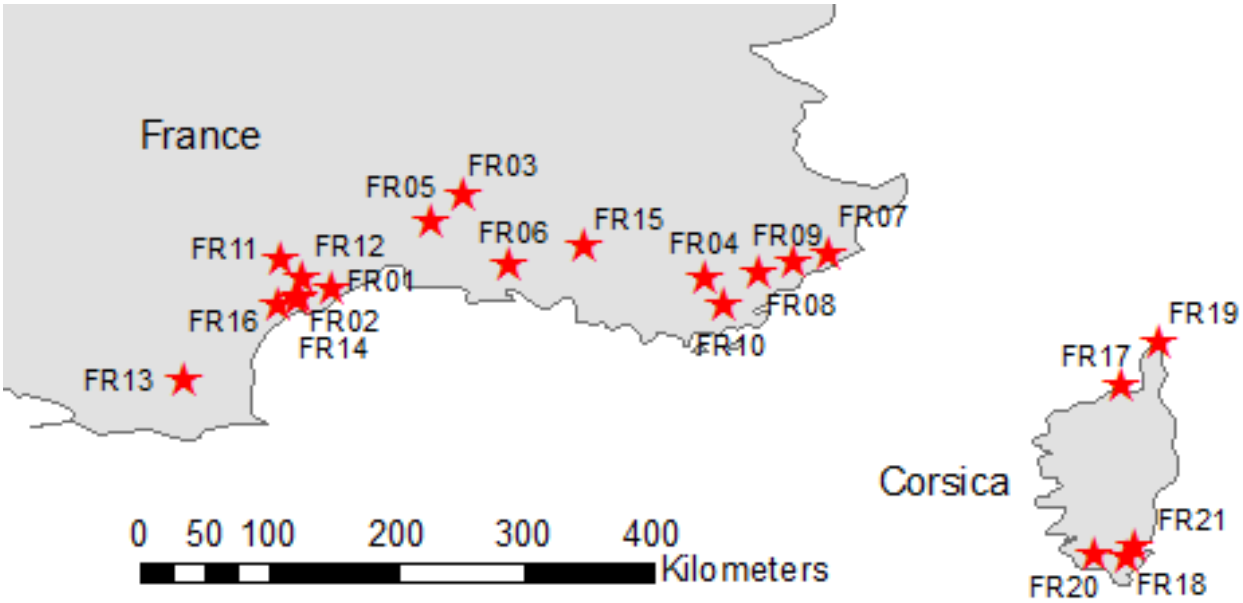
IAP code	Site name	IAP Site Profile Page no
PT01	S Miguel	65
PT02	Sagres Ponds	68
PT03	Malhao	71
PT04	Galeado	74
PT05	Vila Do Bispo	77

3.3 France

The French Mediterranean supports numerous temporary pools (3170*), including sites which are both man-made (Roque-Haute) and natural (Biot) in origin. A total of 21 pIAPs have been identified in this area, based on the density of ponds, the presence of protected plant species and identification of priority pond habitats. All the sites included in this preliminary assessment are afforded protection within the Natura 2000 network. As in Spain many of these sites are still threatened from intensification of agriculture and development.

The Mediterranean region of France is under pressure from development, drainage and intensification of land use. This is leading to the degradation of pIAP sites because of isolation and habitat fragmentation. There is a need to improve the status of ponds in France through collation and dissemination of knowledge about pond biodiversity, sustainable management of ponds and legislation to protect the pond resource.

Mare de Catcheou, France



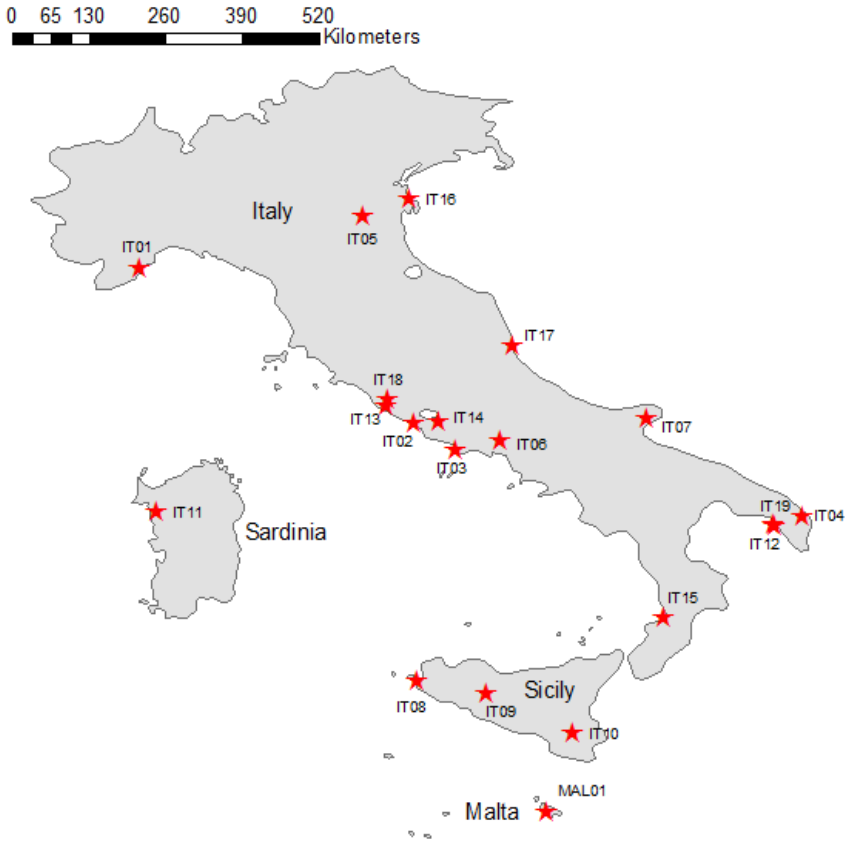
3.4 Italy and Malta

Within Italy, 19 pIAPs were identified. The pIAPs were widely distributed across the Italian mainland and adjacent islands and as a result were highly variable because of changes in topography and the underlying bedrock. Sites ranged in altitude from sea level (Isola Grande e Pantano di San Teodoro) to 1096m a.s.l. (Monte Carcaci). Site area was also very variable from only 3 ha (Stagni della Mercareccia) to 125 000 ha (Monte Minerva Wet Area).

Porto Caleri Coastal Ponds, Italy

All sites qualified as a pIAP because of the presence of protected species or the presence of a European protected habitat. As a result almost all were protected at European level. The Gargano and Tremiti Islands are worthy of special mention because of the number of protected species and level of protection afforded to them, representing a very high quality pond resource. Some sites were also selected because of their historic value, for example the Ferrara retting pool landscape.

The pond resource in Italy is under immense pressure from urbanization, land cover conversion, changes in agricultural practices and tourism. Recognition of their importance in local planning policies is essential.



3.5 Balkan States and Cyprus

In the Eastern Mediterranean, 7 pIAPs were identified in Greece and Cyprus. These sites qualified because of the presence of protected species and habitats, and all were within the Natura 2000 network, with the exception of Kampos Karystou pIAP. These pIAPs were predominantly in low-lying areas which puts them under significant pressure from human activities including development, extensive agriculture, over exploitation of water resources and tourism. However, projects are already underway to protect and enhance the pond resource in this region e.g. the European Life funded project "Action for the conservation of Mediterranean Temporary Ponds" in Crete.

Schinias Marathon Ponds, Greece

For the remaining Balkan states within the Mediterranean few pIAPs have been proposed. This reflects the lack of information on the pond resource in these countries, rather than the quality of the pond resource. Montenegro has proposed 1 pIAP which contains both protected species and habitats, important assemblages of other species and which contains a high density of ponds. Yet the ponds of this pIAP are currently afforded only National protection. Other countries are at the beginning of the IAP selection process. Albania has identified IAPs using GIS techniques, whilst Slovenia has requested more information on the selection criteria so that it can feed into the process at a later date.

IAP code	Site name	IAP Site Profile Page no
MTG01	Moromis pond	193
ALB01	Albania	195
GR01	Kampos Karystou Ponds	200
GR02	Mount Ochi Area Ponds	203
GR03	Omalos pond	205
GR04	Schinias Marathon Ponds	208
GR05	Sperchios Valley Ponds	210
CYP01	Oroklini Lake Saltmarsh Ponds	212
CYP02	Paralimni Lake Ponds	214

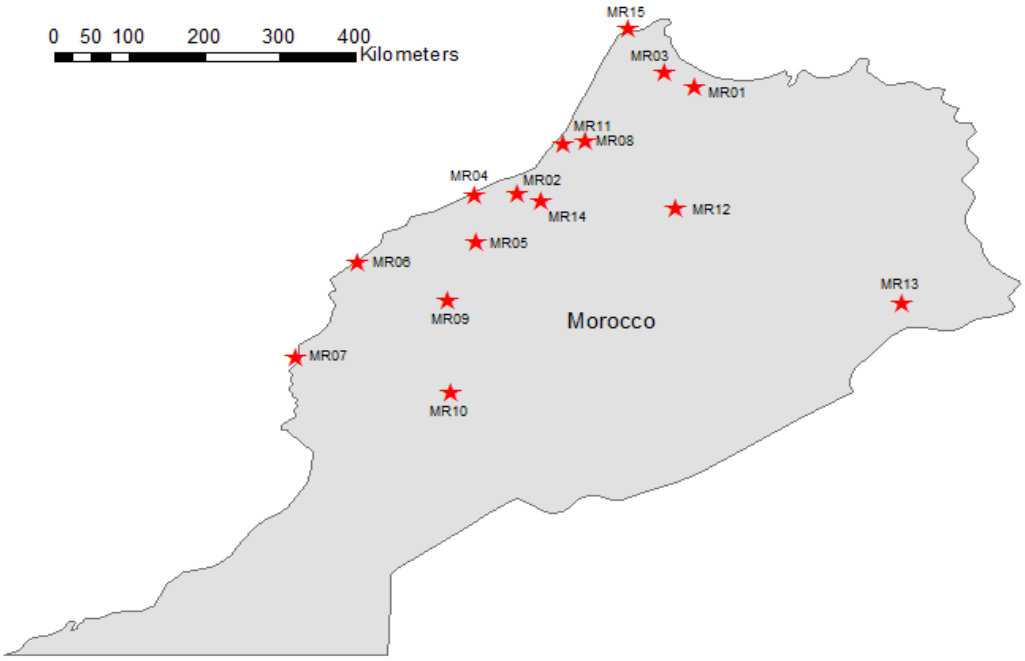
3.6 Morocco

Within Morocco, a total of 15 pIAPs have been identified. These ranged in size from 100 ha (Haut Atlas) to 151 000 ha (Mamora) and in altitude from 10m to 770m. All sites qualified on the basis of habitats of high conservation importance, and the presence of protected species. Sites also qualified on the basis of pond density. These are relatively low (high density = 0.2 ponds per km^2, Haut Atlas), reflecting the arid nature of the region. The freshwater these ponds provide is a major factor in the high socio-economic importance afforded to ponds in the pIAPs.

Chaouia, Morocco

Only one site was afforded recognition by its designation as a UNESCO Biosphere Reserve (Massif du Bouhachem). The others receive no protection at all, in spite of the presence of protected species and important habitat types.

Threats to the pond resource in Northern Africa are significant including extraction of minerals from the pond basin, excessive grazing pressure, pollution, eutrophication, mismanagement of water resources, climate change and a combination of all of the above.

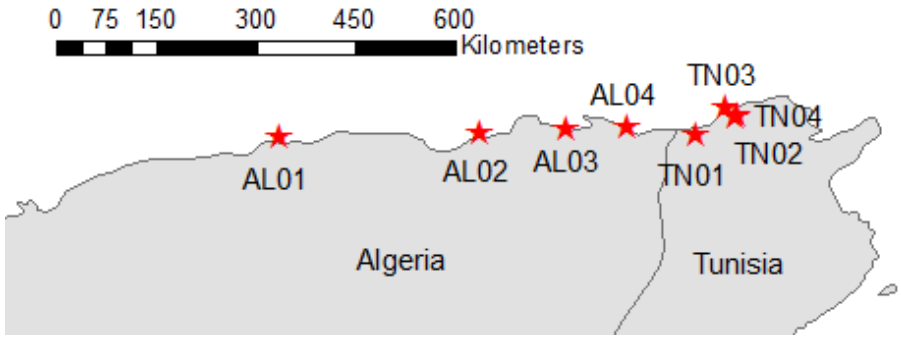


3.7 Algeria and Tunisia

Only 4 pIAPs were identified in Algeria. All qualified because of the density of ponds, presence of protected species, habitats of high conservation importance, and socio-economic value. pIAPs ranged in size from 70 805 ha (Western Numidia) to 300 000 ha (Alger). The density of ponds in these areas was very high for this biogeographic region and in common with Morocco, local communities depended on these ponds for freshwater, industry and agriculture. Two sites, Eastern and Western Numidia, were designated as Ramsar sites whilst the other two pIAPs were afforded no legislative protection.

Western Numidia, Algeria

In Tunisia another 4 pIAPs were selected. These varied widely in size, from 0.6 ha (Majen Coucha) to 30000 ha (Kroumirie). The sites qualified under every criterion including the importance and rarity of wetland habitat within this region (Criteria E - Other). Two sites are designated as Ramsar wetlands (Kroumirie and Majen Chitane) whilst the other two sites receive no protection. Threats to these ponds relate to human activities and an increase in the duration of summer drought, due to climate change.



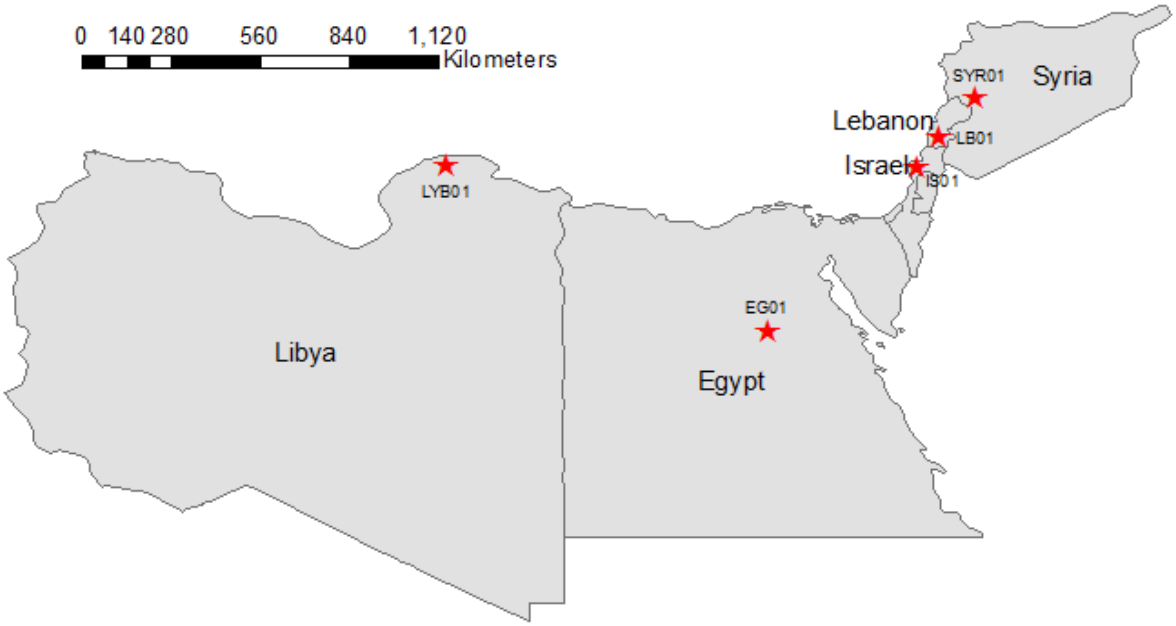
IAP code	Site name	IAP Site Profile Page no
AL01	Alger	261
AL02	Jijel	264
AL03	Western Numidie	267
AL04	Eastern Numidie	270
TN01	Kroumirie	273
TN02	Majen Choucha	276
TN03	Majen Chitane	279
TN04	Garaa Sejnane	282

3.8 Middle East

In the Middle East, a single pIAP was identified in each of Libya, Syria, Lebanon, Egypt and Israel. All qualified because of the presence of protected species, including Secher in Israel which is part of a complex of ponds providing breeding habitat for metapopulations of several different amphibian species. This IAP is afforded some protection at a national level.

In the other countries all sites qualified under the four main criteria: presence of a protected species and habitat, pond density and socio-economic importance. However, none of these sites received any protection. As a result they are very vulnerable to high levels of threat from human activities.

Brichat Secher pool, Israel



IAP code	Site name	IAP Site Profile Page no
EG01	Nile	285
IS01	Brichat Secher pool	288
LB01	Bekaa	291
LYB01	Cyrenaique	294
SYR01	Homs	297

4. THE ALPINE ARC

The Alps are the most significant mountain range in Europe covering an area of 190 000 km^2. They form a crescent around 1,200km long and 200km wide, resulting from the collision between Africa and Europe. Large differences in climate from north to south and with altitude create a continuum of different habitat types. These habitats support a rich diversity of plant (13000) and animal (30000) species many of which are endemic to this region. However, the Alps are also home to 14 million people and a significant number of tourists year round.

The Alpine Arc includes parts or all of Germany, Austria, France, Italy, the Principality of Liechtenstein, the Principality of Monaco, Slovenia and Switzerland. These countries are signatories to the protocol agreed at the Alpine Convention (1991) which aimed to create a "national and cross-border network of protected areas, biotopes and other environmental assets protected or acknowledged as worthy of protection".

As a result of this initiative the Alps is now largely protected by national parks and nature reserves (25% of the Alpine region). However, even this level of protection has not secured the survival of many important ponds which remain outside of protected areas. The primary threat is from degradation due to habitat fragmentation resulting in isolated populations which cannot be sustained in the long-term even if they are within a protected area. This is especially true in the face of climate change which has had and will continue to have negative effects on these high altitude sites. Ponds and lakes in this region provide vital steeping stones across the landscape as well as being an important biodiversity resource in their own right.

For the identification of IAPs four countries within the Alpine Arc were selected, Switzerland, France, Austria and Italy, concentrating on land over 1500m. At this altitude three habitat zones can be identified, subalpine, alpine and nival, where ponds support many species adapted to low temperatures living within a narrow temperature range (stenothermal species).

Zones Humides des Menuires, France

Platzier Joch, Austria

A total of 30 IAPs have been identified in the Alpine Arc region (Figure 3). These pond clusters were identified using both GIS remote sensing techniques and biological data, particularly the presence of Odonata and amphibians. In the Alpine region, the main threat to proposed IAPs is linked to high levels of tourist activity. In addition climate change is a significant threat to species adapted to high altitude ecosystems (Rosset *et al*. 2010), which will require thinking beyond protected site boundaries.

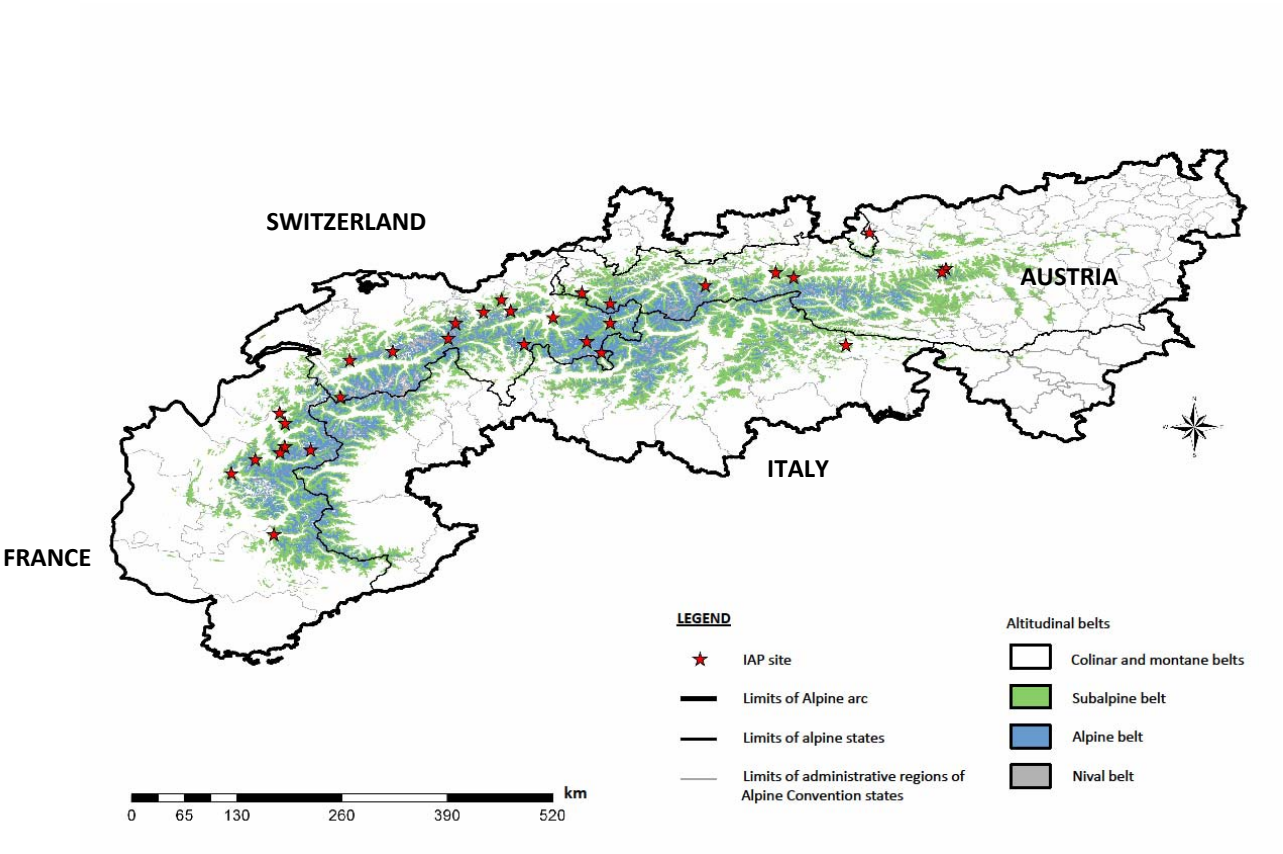
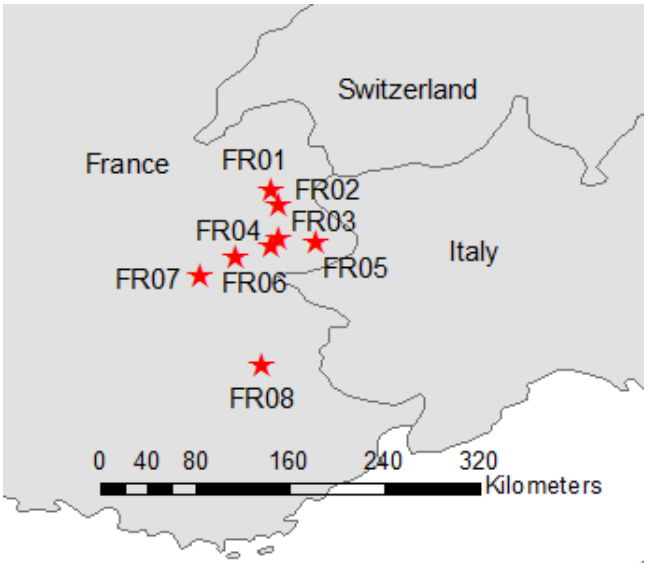


Figure 3: Overview of the location of pIAPs in the Alpine Arc Region.

4.1 France

In the French region of the Alpine Arc, 8 pIAPs have been identified. Most are located within the Savoie district, in the Rhône-Alps region. These pIAPs qualified because of the presence of priority species, or because of the presence of important assemblages of stenothermal dragonflies. Dormillouse Ponds also qualified because of the presence of priority habitats. Some sites had high pond densities, between 10 and 50 ponds per km^2, whilst others were only formed of 1 pond. Sizes ranged from 16 ha (Lac des Saisies) to over 1000 ha (Zones Humides des Menuires).



Sites also qualified as IAPs on the basis of their socio-economic importance, which included grazing and tourism. However, these two factors also represent significant threats to the ponds. These IAPs received some level of protection as "Zones naturelle d'intérêt écologique, faunistique et floristique" and 5 were within Natura 2000 sites. However, the threat of climate change, a significant threat to these high altitude ecosystems, will need to be addressed beyond these designated areas.

Dormillouse Ponds, France

IAP code	Site name	IAP Site Profile Page no
FR01	Lac des Saisies	300
FR02	Zones humides des lacs de la Tempête et du col de la Louze	302
FR03	Zones humides des Menuires	304
FR04	Zones humides du col des Encombres	306
FR05	Lacs de gorges du Doron de Termignon	308
FR06	Zones humides des lacs Potron	310
FR07	Lacs du plateau du Taillefer	312
FR08	Etangs de Dormillouse	314

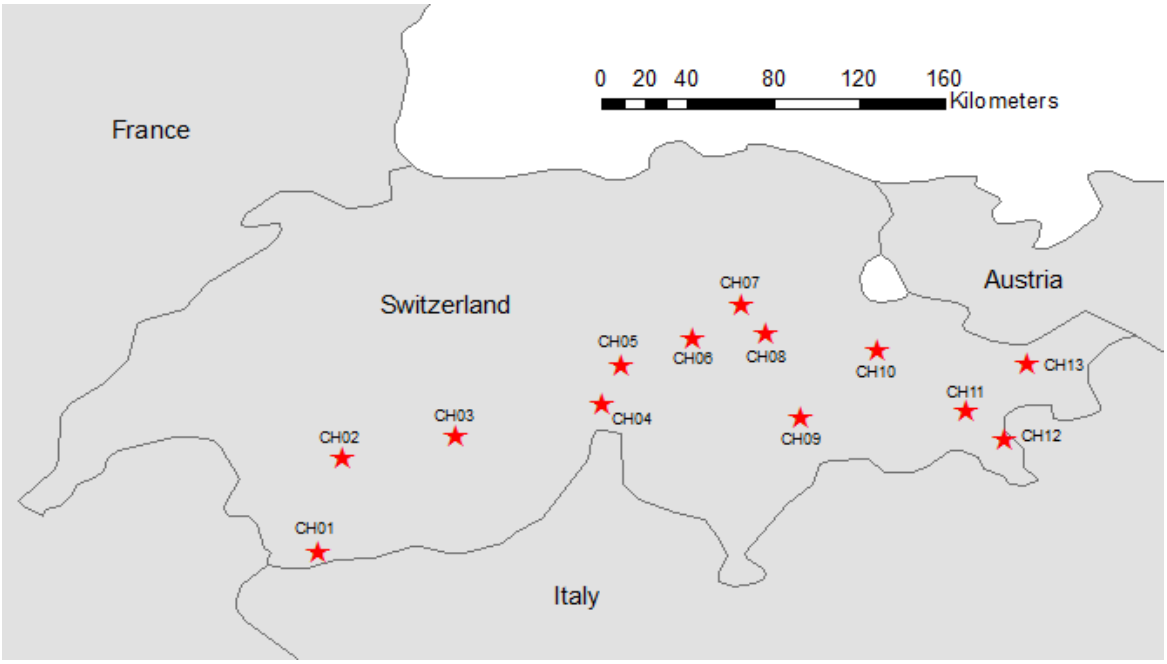
4.2 Switzerland

In the Swiss region of the Alpine Arc, 14 pIAPs have been identified. The types of pond represented were alluvial wetlands, postglacial margins, glacial cirques, or high altitude bogs and marshes. This region is notable in having all pIAPs located above 2000m, with the exception of Golf Samedan (1700m); one site (Lais da Macun) was above 2650m. As a result these sites support cold stenothermal specialists (including Odonata), which are at particular risk of climate change.

The Swiss pIAP sites were identified under the criteria of pond density, which varied between 10-30 ponds per km^2. The highest pond density was recorded at Glacier de Tsanfleuron, Steisee am Sustenpass and Grimselpass (Totesee). The pIAPs in this region varied in surface area from 81 ha (Rinderstock, Plattisee) to 360 ha (Lais da Macun).Some sites qualified because of the presence of protected amphibians, but for many biological data were not available.

Most of the pIAPs were located on the northern edge of the Grisons and Valais Alps, within areas designated as a Federal District Francs (FDF) reserves. In addition these sites were often part of the inventory of landscapes and natural monuments (IFP). One site (Lais da Macun; in the Swiss National Park) is afforded global recognition as a Biosphere Reserve. The attraction of these sites for tourists makes them vulnerable in spite of these designations.

Grimselpass, Totesee, Switzerland



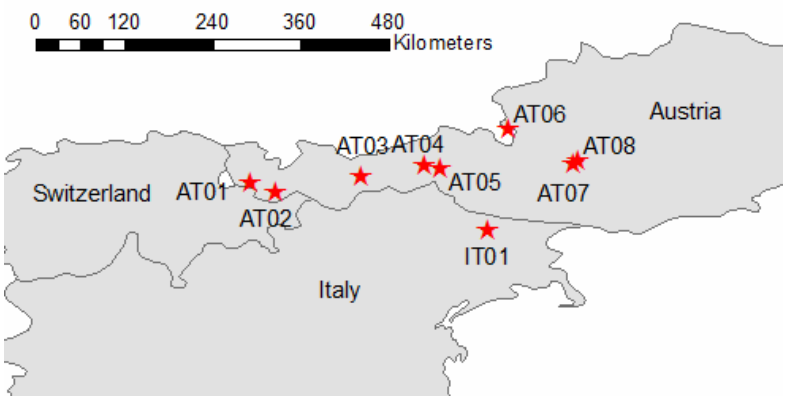
IAP code	Site name	IAP Site Profile Page no
CH01	Gouilles des Chaux des Planards	316
CH02	Glacier de Transfleuron	318
CH03	Lötschberg	320
CH04	Grimselpass, Totesee	322
CH05	Steisee am Sustenpass	324
CH06	Rinderstock, Plattisee	326
CH07	Hinter-Silberenalp	328
CH08	Hüenderbüel Muttsee	330
CH09	Passo del San Bernardino	332
CH10	Pradischierer Alp	334
CH11	Golf Samedan	336
CH12	Passo del Bernina	338
CH13	Lais da Macun	340

4.3 Austria and Italy

Eight pIAPs have been identified in the Austrian region of the Alpine Arc. These sites were identified primarily on the basis of the density of ponds within each pIAP, which exceeded 100 ponds per km^2 at one site (Seen im Rauriser Urwald). Sites were also selected on the basis of supporting protected amphibians (*Rana temporaria* and *Mesotriton alpestris*). Sites varied in surface area from 17 ha (Platizer Joch) to 400 ha (Widdersberg).

Seen im Rauriser Urwald, Austria

Various types of pond have been identified in this region, including bog pools, forest ponds and pools in bedrock. Almost all these ponds are within a nationally protected landscape, but only two (Sieben-Moser-Gerlosplatte and Seen im Rauriser Urwald) are within a Natura 2000 site. Two sites Vallüaseen and Schaflacken are not afforded any level of protection.



In the Italian region of the Alpine Arc only 1 pIAP was identified; further investigation should identify additional sites. Stagni Malghe Pieltinis pIAP is located within the Province of Udine on the border with Austria. This IAP qualified under almost every criterion. This pIAP is, like many areas in Europe, under threat because of the potential loss of extensive agricultural practices, such as traditional alpine grazing.

IAP code	Site name	IAP Site Profile Page no
		Page
AT01	Platizer Joch	342
AT02	Vallüaseen	344
AT03	Widdersberg	346
AT04	Schaflacken	348
AT05	Sieben-Möser-Gerlosplatte	350
AT06	Seen im Rauriser Urwald	352
AT07	Klafferkessel-Seen	354
AT08	Goldlacken und trattenscharte	356
IT01	Stagni Malghe Pieltinis	358

5. Recommendations and Conclusions

This preliminary assessment of IAPs in the Mediterranean and Alpine Arc has identified 140 pIAPs which will now be reviewed through a consultation process. The criteria which have been used in the selection of these IAPs are applicable across administrative boundaries, using a combination of landscape mapping and expert knowledge in addition to biological data on species and habitats of conservation importance. This combination of approaches allows for the identification of IAPs in regions where biological data are not available in, e.g. published literature. It also enables important pond sites, not currently protected under the limited legislation afforded to ponds, to be selected.

It is likely that the pIAPs identified here represents only a small proportion of high quality sites, at least in some regions. The availability of data on the distribution of freshwater species and habitats is very limited, and in many cases biased towards the most studied taxa, but even for these species the quality and quantity of data varies widely between countries. Where they exist, the data are often not published or accessible. This highlights the need for systematic surveys of pond biodiversity and centralisation of available data.

The IAP process can be viewed hierarchically:

- The criteria for their selection have been developed at the highest level, and this can be used to inform international policies for their protection and recognition of their importance to global biodiversity.

- The criteria can then be applied at the national and regional levels, to identify IAPs in other European countries. These IAPs should be included in all strategic plans to conserve and develop aquatic biodiversity at the landscape scale.

- At the local level recognition of IAPs will act as best practice examples of the value and sustainable management of pond complexes and should encourage stakeholder involvement to establish ponds as a valuable social and economic resource.

The success of the IAP initiative will now depend of successful communication of these findings to stakeholders. This preliminary IAP project for the Mediterranean Basin and Alpine Arc will be disseminated to researchers and practitioners at international conferences, in EPCN publications and on the European Pond Conservation Network (EPCN). Given the increasing interest in aquatic biodiversity, particularly in the face of global change, this development and identification of IAPs is a valuable asset in the conservation of freshwater biodiversity.

Following this preliminary work, it is important to ensure that EPCN members and other pond workers disseminate these finding to policy makers in their countries to ensure these IAPs are adequately recognised and protected and, where possible, monitored and enhanced. The EPCN will also continue to facilitate the identification of IAPs in other biogeographical regions of Europe, a process which has already begun in countries such as the Netherlands and the United Kingdom.

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Appendix 1. List of contributors to the Mediterranean IAPs

Initials	Surname	Institution/Organisation/e-mail
		Network of Protected Areas of Andalusia, España
		Consell Insular de Menorca (CIMe) – LIFE BASSES Project. www.cime.es/lifebasses.
		Aquatic Entomology Group, University of Vigo, Spain. (http://webs.uvigo.es/jgarrido/)
		National Office of Forests (NOF), Mediterranean Territorial Directorate, France.
		The Pond Terrapin conservation programme: http://www.provincia.savona.it/temi/ambiente04/emys/progetto.htm.
		Natural Regional Reserve «Monterano» Rome, Italy
Fernández	Aláez Camino	Universidad de León,E-mail : camino.alaez@unileon.es
Giuseppe	Alfonso	University of Salento: giuseppe.alfonso@unisalento.it
Claudio	Angelini	University of Rome La Sapienza, SHI member: oppela@tin.it
Antonis	Apostolakis	Wetland Center (EKBY), Mihaniona. e-mail : antonis@ekby.gr. http://www.ekby.gr
Simonetta	Bagella	Dipartimento di Scienze Botaniche, Ecologiche e Geologiche. University of Sassari
Pedro	Beja	pbeja@mail.icav.up.pt
Ignacio	Bel Haj Jilani	
S	Ben Saad-Linam	
Amaia Pérez	Bilbao	Universidad de Vigo amaiapb@uvigo.e
Leon	Blaustein	University of Haifa
Marco	Bologna	University of Rome Roma Tre, e-mail: bologna@uniroma3.it.
Paula	Canha	Universidade de Évora.
Maria Carmela	Caria	Dipartimento di Scienze Botaniche, Ecologiche e Geologiche. University of Sassari
José Jesús	Casas Jiménez	Universidad de Almería jjcasas@ual.es
Stefano	Chelli	Sentina Natural Regional Reserve. stefano.chelli@gmail.com.
Carla	Corazza	Museo Civico di Storia Naturale di Ferrara. c.corazza@comune.fe.it.
SD	Daoud-Bouattour	
Gerard	de Belair	
Valentina	Della Bella	European Pond Conservation Network (EPCN) email: valentina.dellabella@gmail.com.
Patrizio	Demartis	Regional Natural Reserve of Macchiatonda. Email: patriziodema@libero.it.
Carmen	Díaz-Paniagua	Doñana Biological Station-CSIC
Elias	Dimitriou	Hellenic Center for Marine . elias@ath.hcmr.gr
Paola	Ernandes	University of Salento. e.mail: paola.ernandes@unile.it
N	Ewald	Pond Conservation, UK newald@pondconservation.org.uk
H	Ferchichi-Ben Jamaa	
R	Fernández-Zamudio	Department of Plant Biology and Ecology, University of Seville
Mário	Ferreira	CIBIO, Universidade do Porto.
Mário	Ferreira	CIBIO, Universidade do Porto
M	Florencio	Doñana Biological Station-CSIC
Luis	Fonseca	fonseca@ualg.pt
Francisca	Fuentes	Universidad de Almería ffuentes@ual.es
Irene	Gallego	Universidad de Almería igallego@ual.es
P	García-Murillo	Department of Plant Biology and Ecology, University of Seville
Marco	Gasponi	Responsible of Park guard Service of natural regional Reserve Monterano marcgasp@gmail.com
Paolo	Genta	Provincia di Savona, Settore difesa del Suolo e Tutela Ambientale. p.genta@ provincia.savona.it.

Initials	Surname	Institution/Organisation/e-mail
Z	Ghrabi-Gammar	
C	Gomez-Rodriguez	Doñana Biological Station-CSIC
Patrick	Grillas	Tour du Valat, Research Centre for the Conservation of Mediterranean Wetlands, Le Sambuc, France
Zacharias	Ierotheos	University of Ioannina Agrinio izachari@cc.uoi.gr
N	Koutsikos	Hellenic Center for Marine Research
Ignacio	Lacomba	Generalitat Valenciana, Regional Ministry of Environment
Sandro	Lanfranco	University of Malta
Elisa	Lanzuisi	Circeo National Park: biodiversita@parcocirceo.it.
David	Leon Muez	Universidad de Sevilla leonmuez@us.es
Margarida	Machado	mmalo@ualg.pt
Francesco	Mantero	Director of natural regional Reserve Monterano f.mantero@libero.it
Federico	Marrone	federico.marrone@unipa.it; federico.marrone@neomedia.it
Juan	Melchor	Universidad de Almería meljuca@ual.es
Maria Rosa	Miracle	University of Valencia
Fabrizio	Montarsi	Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe): fmontarsi@izsvenezie.it.
Luigi	Naselli Flores	Flores University of Palermo: luigi.naselli@unipa.it.
Dario	Ottonello	Università degli Studi di Genova. dario.ottonello@studionatura.net.
Patricio	Peñalver Duque	Universidad de Sevilla patriciopd@universia.es
Jose Luís	Pérez Bote	Universidad de Extremadura, jlperez@unex.es
Vladimir	Pesic	University of Montenegro, Podgorica. E-mail: pesicv@t-com.me
Carla	Pinto Cruz	Departamento de Biologia, Universidade de Évora, Portugal (ccruz@uevora.pt).
Giuseppe	Puddu	Agriculture and Sustainable Development Office, natural regional Reserve Monterano, Lazio Region puddu@parchilazio.it
Laila	Rhazi	Laboratory of Aquatic Ecology and Environment, Hassan II Aïn Chock University
Mouhssine	Rhazi	Department of Biology, Faculty of Sciences and Techniques of Errachidia, Mouslay Ismail University
Miguel	Rodríguez-Rodríguez	University Pablo de Olavide; email: mrodrod@upo.es
Er-riyahi	Saber	Laboratory of Aquatic Ecology and Environment, Hassan II Aïn Chock University
Maria	Sahuquillo	Universitat de Valencia Valencia, maria.sahuquillo@uv.es
Sebastiano	Salvidio	Università degli Studi di Genova. salvidio@dipteris.unige.it
Vicente	Sancho	Generalitat Valenciana, Regional Ministry of Environment
Laura	Serrano	Department of Plant Biology and Ecology, University of Seville
Vasco	Silva	Instituto Superior de Agronomia vascosilva@isa.utl.pt
Juan	Soria	Universitat de Valencia Estudi General. Department of Microbiology and Ecology. juan.soria@uv.es.
Giuliano	Tallone	Circeo National Park: direzione@parcocirceo.it.
Carlo	Utzeri	La Sapienza, Università di Roma, carlo.utzeri@uniroma1.it.
Paola	Virgilietti	Servizio Forestale Regionale di Padova e Rovigo, paola.virgilietti@regione.veneto.it.
Stamatis	Zogaris	Hellenic Center for Marine . zogaris@ath.hcmr.gr

Appendix 2. List of contributors to the Alpine Arc IAPs

Contributor (people)	Institution/Organisation/e-mail
Sébastien Goguely	Agence de l'Eau Rhône-Méditerranée-Corse, Délégation Rhône-Alpes, Unité Planification
Cyrille Deliry	Association Sympetrum
Bernard Bal	ASTER (Conservatoire des espaces naturels de Haute-Savoie)
Céline Balmain	AVENIR (Conservatoire des espaces naturels de l'Isère)
Raymond Delarze	Bureau d'Etudes Biologiques
Gilles Pache, Jean-Michel Genis, Pascal Chondroyannis	CBNA (Conservatoire National Botanique Alpin Gap-Charance)
Lionel Quelin	CEEP (Conservatoire-Etudes des Ecosystèmes de Provence), pôle Alpes sud
Delphine Danancher	Conservatoire Rhône-Alpes des espaces naturels
Eladio Fernanderz-Galiano	Council of Europe, Biological Diversity Unit
Béatrice Navette, Marc Insermann, Philippe Freydier	CPNS (Conservatoire du Patrimoine Naturel de la Savoie)
Claude François	CSCF (Centre Suisse de Cartographie de la Faune)
Caroline Brobecker	DDAF (Direction Départementale de l'Agriculture et de la Forêt) Haute-Savoie, Service Eau et pêche
Carole Ray-Barman	DIREN (Direction Régionale de l'Environnement) Rhône-Alpes, Service de l'Intégration et de l'Evaluation Environnementale, Unité Méthodes, Données, Informations
Olivier Scher	Fédération des Parcs Naturels Régionaux, Pôle-Relais "Mares, zones humides intérieures, vallée alluviales"
Andrea de Bono, Diana Rizzolio, Anthony Lehmann	GRID-UNEP
Carole Genty	IFEN (Institut Français de l'Environnement), Observatoire National des Zones Humides
Anna Sagnier	IGN (Institut Géographique National)
Philippe Maquère	Intercarto
Jane O'Rourke	hepia
Olivier Travaglini	hepia
Silvia Zumbach	karch (Centre de coordination pour la protection des amphibiens et des reptiles)
Benedikt Schmidt	karch (Centre de coordination pour la protection des amphibiens et des reptiles)
Pirot Françoise	Maison des Sciences de l'Homme, CNRS (Centre National de Recherche Scientifique), UMR 8564
Lucile Rambaud	Minstère de l'Ecologie, de l'Energie, du Développement Durable et de l'Aménagement du Territoire, Direction de l'eau et de la biodiversité
Florence Carone	Parc Naturel Régional du Verdon
Ortega Isabelle	Planet Action, Spot Image
Andreas Maletzky	Salzburg University
Nicola Bressi	Trieste National Museum
Adolfo Cordero Riviera	Universidade de Vigo, Grupo de Ecoloxia Evolutiva e da Conservacion
Pierre Joly	Université Claude Bernard Lyon 1, UMR 5023 Ecologie des Hydrosystèmes fluviaux
Dominique Auderset	University of Geneva, Laboratory of Ecology and Aquatic Biology
Elise Minssieux	University of Lyon

Appendix 3. Species associated with ponds in the Mediterranean and Alpine Arc.

Plants

Agrostis curtisii
Agrostis pourretii
Agrostis tenerrima
Airopsis tenella
Alopecurus aequalis
Alopecurus bulbosus
Alternanthera sessilis
Althenia filiformis
Althenia orientalis
Anacamptis coriophora subsp. fragrans
Anagallis crassifolia
Anagallis minima
Anagallis tenella
Anemone palmate
Antinoria insularis
Apium crassipes
Apium inundatum
Apium repens
Armeria gaditana
Artemisia molinieri
Avellara fistulosa
Baldellia ranunculoides
Baldellia repens
Bellis prostrata
Blechnum spicant
Blysmus compressus
Bulbostylis cicoiana
Butomus umbellatus
Callatriche truncata subsp. truncata
Callitriche truncata
Callitriche brutia
Callitriche hamulata
Callitriche hermaphroditica
Callitriche lusitanica
Callitriche obtusangula
Callitriche platycarpa sensu
Callitriche truncata
Callitriche truncata subsp. truncata
Carex acutiformis
Carex hirta
Carex mairii
Carex riparia
Caropsis verticillaoinundata
Carum foetidum
Carum verticillatum
Centaurea exarata
Ceratophyllum submersum
Chara aspera
Chara fragilis
Chara hispida
Chara vulgaris
Chara vulgaris var. contraria
Chara vulgaris var. longibracteata
Cicendia filiformis
Cladium mariscus
Crassula vaillantii
Cressa cretica
Crypsis schoenoides
Dactylorhiza elata
Damasonium alisma
Damasonium bourgaei
Damasonium polyspermum
Damosonium alisma subsp. bourgaei
Drosophyllum lusitanicum
Elatine alsinastrum
Elatine brochonii
Elatine gussonei
Elatine macropoda
Eleocharis acicularis
Eleocharis multicaulis
Eleocharis palustris
Eleocharis uniglumis
Epilobium angustifolium
Epilobium atlanticum
Epilobium obscurum
Erica ciliari
Eryngium atlanticum
Eryngium barrelierii
Eryngium corniculatum
Eryngium galioides
Eryngium pusillum
Eryngium viviparum
Exaculum pusillum
Frangula alnus subsp. baeticum
Fuirena pubescens
Galium debile
Gaudinia hispanica
Genista ancistrocarpa
Glinus lotoides
Glyceria fluitans
Gratiola linifolia
Gratiola officinalis
Groenlandia densa
Heliotropium supinum
Hippuris vulgaris
Hyacinthoides vicentina
Hydrocharis morsus-ranae
Hypericum afrum
Illecebrum verticillatum
Ipomoea sagittata
Iris pseudacorus
Isoetes duriei
Isoetes histrix
Isoetes olympica
Isoetes setacea
Isoetes setaceum
Isoetes tiguliana
Isoëtes velata
Isoetes velatum
Isoetes velatum subsp. velatum
Isolepis cernua
Isolepis fluitans
Isolepis pseudosetaceus
Juncus acutiflorus subsp. rugosus
Juncus bufonius mogadorensis
Juncus bulbosus
Juncus emmanuelis
Juncus heterophyllus
Juncus pygmaeus
Juncus striatus
Juncus subnodulosus
Juncus tingitanus
Juncus x donyanae
Juniperus oxycedrus subsp. macrocarp
Kickxia cirrhosa
Kickxia commutata subsp. commutata
Kosteletzkya pentacarpos
Lemna gibba
Lemna trisulca
Limonium asparagoides
Limonium dufforei
Limosella aquatica
Littorella uniflora
Lotus angustissimus
Lotus benoistii
Lotus conimbricensis
Ludwigia palustris
Lysimachia vulgaris
Lythrum baeticum
Lythrum borysthenicum
Lythrum thesioides
Lythrum thymifolia
Lythrum tribracteatum
Mariscus hamulosus
Marsilea minuta
Marsilea strigosa
Mentha cervina
Mentha gattefossei
Menyanthes trifoliata
Mibora minima
Micropyropsis tuberosa
Miriophyllum alterniflorum
Molineriella minuta
Molinia caerulea
Morisia monanthos
Myosorus minimus
Myosotis debilis
Myosotis macrosiphon
Myosotis retusifolia
Myosotis sicula
Myosurus minimus
Myosurus sessilis
Myotis sicula
Myriophyllum alterniflorum
Nananthea perpusilla
Nasturtium africanum
Nitella flexilis
Nitella mucronata

Plants

Nitella ornithopoda
Nitella translucens
Nymphaea alba
Nymphoides peltata
Oenanthe aquatica
Oenanthe pimpinelloides
Oldenlandia capensis
Ophioglossum azoricum
Ophioglossum lusitanicum
Ophioglossum vulgatum
Orchis palustris
Osmunda regalis
Paspalidium obtusifolium
Phyla nodiflora
Pilularia minuta
Pinguicula fontiqueriana
Pinguicula lusitanica
Plantago algarbiensis
Plantago crassifolia
Poa dimorphanta
Polygonum amphibium
Polygonum romanum subsp. gallicum
Potamogeton trichoides
Potamogeton coloratus
Potamogeton crispus
Potamogeton gramineus
Potamogeton lucens
Potamogeton natans
Potamogeton polygonifolius
Potamogeton pusillus
Potentilla maura
Pulicaria sicula
Pulicaria vulgaris
Pycreus polystachyos
Ranunculus baudotii
Ranunculus flammula
Ranunculus lateriflorus
Ranunculus marginatus
Ranunculus nodiflorus
Ranunculus ophioglossifolius
Ranunculus paludosus
Ranunculus peltatus
Ranunculus peltatus baudotii
Ranunculus peltatus subsp. fucoides
Ranunculus revelieri subsp. revelieri
Ranunculus revelieri subsp. rodiei
Ranunculus revelieri susp. revelieri
Ranunculus sardous
Ranunculus sceleratus
Ranunculus trichophyllus
Ranunculus trichophyllus subsp. trichophyllus
Ranunculus tripartitus
Ranunculus lateriflorus
Reseda battandieri
Rhynchospora modesti-lucennoi
Ricciocarpus natans
Romulea requienii
Rorippa hayanica
Rorripa amphibia
Rumex algeriensis
Rumex palustris
Rumex tunetanus
Ruppia drepanensis
Ruppia maritima
Rynchospora rugosa
Salvinia natans
Schoenoplectus corymbosus
Schoenoplectus supinus
Sedum Jahandiezii
Sedum maireanum
Serapias neglecta
Serapias olbia
Serapias parviflora
Serapias vomeracea
Serapias vomeracea subsp. longipetala
Solenopsis bicolor
Solenopsis laurentia
Solenopsis minuta subsp. corsica
Solenopsis minuta subsp. nobilis
Sparganium erectum
Sphagnum auriculatum
Sphagnum inundatum
Sphagnum recurvum
Spirodella polyrrhiza
Stipa gigantea subsp. donyanae
Teucrium aristatum
Tillaea vaillanti
Tollipella glomerata
Trifolium ornithopodioides
Trifolium ornithopodioides
Triglochin bulbosum subsp. barrellieri
Triglochin bulbosum subsp. laxiflorum
Utricularia australis
Utricularia exoleta
Utricularia gibba
Utricularia minor
Utricularia vulgaris
Utricularia vulgaris subsp. major
Verbena supina
Wolffia arrhiza
Zannichellia melitensis
Zannichellia obtusifolia
Zannichellia palustris

Amphibians

Alytes cisternasii	Iberian midwife toad
Alytes maurus	Midwife toad
Alytes obstetricans	Common midwife toad
Bombina pachypus	Appenine yellow-bellied toad
Bombina variegata	Yellow-bellied toad
Bufo balearicus	Balearic toad
Bufo bufo	Common toad
Bufo viridis	European green toad
Discoglossus galganoi	Iberian painted frog
Discoglossus pictus	Mediterranean painted frog
Discoglossus sardus	Tyrrhenian painted frog
Discoglossus scovazzi	White-bellied painted frog
Epidalea calamita	Natterjack toad
Hyla arborea	Common tree frog
Hyla meridionalis	Mediterranean tree frog
Hyla savignyi	Savingny's tree frog
Lissontriton boscai	Bosca's newt
Lissotriton italicus	Italian newt
Lissotriton vulgaris	Smooth newt
Mesotriton alpestris	Alpine newt
Pelobates cultripes	Western spadefoot toad
Pelobates fuscus insubricus	Common spadefoot toad
Pelobates varaldii	Varaldi's spadefoot toad
Pelodytes ibericus	Iberian parsley frog
Pelodytes punctatus	Common parsley frog
Pelophylax kl. esculentus	Edible frog
Pelophylax lessonae bergeri	Italian pool frog
Pelophylax perezi	Perez's frog
Pelophylax ridibundus	Eurasian marsh frog
Pleurodeles waltl	Spanish ribbed newt
Pseudepidalea balearica	Balearic green toad
Rana dalmatina	Agile frog
Rana italica	Italian frog
Rana latastei	Italian agile frog
Rana temporaria	European common frog
Salamandra algira	Algerian fire salamander
Salamandra infraimmaculata	Israel fire salamander
Salamandra salamandra	Fire salamander
Salamandrina perspicillata	Spectacled salamander
Triturus carnifex	Italian crested newt
Triturus cristatus	Great crested newt
Triturus pygmaeus	Southern marbled newt
Triturus vittatus vittatus	Southern banded newt
Triturus vulgaris	Common newt

Reptiles

Elaphe quatuorlineata	Four-lined snake
Elaphe situla	Leopard snake
Emys orbicularis	European pond turtle
Hierophis viridiflavus	Western whip snake
Lacerta viridis	Green lizard
Malpolon monspessulanus	Montpellier snake
Mauremys leprosa	Mediterranean pond turtle
Mauremys rivulata	Balkan terrapin
Natrix maura	Viperine snake
Natrix natrix	Grass snake
Natrix natrix cypriaca	Cyprus grass snake
Natrix tessellata	Dice snake
Podarcis muralis	Wall lizard
Podarcis sicula	Italian wall lizard
Testudo hermanni	Herman's tortoise
Vipera ammodytes	European long-nosed viper

Mammals

Barbastella barbastellus	Barbastelle bat
Crocidura leucodon	Bicoloured shrew
Crocidura suaveolens	Lesser white-toothed shrew
Eptesicus serotinus	Serotine bat
Erinaceus europaeus	European hedgehog
Galemys pyrenaicus	Pyrenean desman
Hypsugo savii	Savi's pipistrelle
Lutra lutra	Otter
Martes foina	Beech marten
Meles meles	Badger
Mustela nivalis	Least weasel
Myotis capaccinii	Long-fingered bat
Myotis daubentonii	Daubenton's bat
Myotis myotis	Greater mouse-eared bat
Neomys fodiens	Eurasian water shrew
Pipistrellus kuhlii	Kuhl's pipistrelle
Rhinolophus ferrumequinum	Greater horseshoe bat
Rhinolophus hipposideros	Lesser horseshoe bat
Suncus etruscus	Etruscan shrew
Tadarida teniotis	European free-tailed bat

Fish

Cobitis paludica	Lamprehuela
Anguila anguila	European eel
Aphanius fasciatus	Mediterranean killifish
Aphanius iberus	Spanish toothcarp
Chondrostoma polylepis	Iberian nase
Pelasgus marathonicus	Marathon minnow
Pungitius hellenicus	Greek ninespine stickleback
Rutilus arcasii	Roach
Valencia hispanica	Valencia toothcarp

Birds

Alcedo atthis	Common kingfisher
Anas acuta	Northern pintail
Anas clypeata	Northern shovler
Anas crecca	Common teal
Anas penelope	Eurasian wigeon
Anas platyrhynchos	Mallard
Anas querquedula	Garganey
Anas strepera	Gadwall
Anser anser	Greylag goose
Anthus pratensis	Meadow pipit
Ardea cinerea	Grey heron
Ardea purpurea	Purple heron
Ardeola ralloides	Squacco heron
Aythya ferina	Pochard
Aythya fuligula	Tufted duck
Aythya marila	Greater scaup
Aythya nyroca	Ferruginous duck
Botaurus stellaris	Eurasian bittern
Bulculus ibis	Cattle egret
Burhinus oedicnemus	Stone-curlew
Calidris canutus	Red knot
Caprimulgus europaeus	Nightjar
Casmerodius albus	Great egret
Charadrius dubius	Little ringed plover
Chlidonias hybridus	Whiskered tern
Chlidonias niger	Black tern
Ciconia ciconia	White stork
Ciconia nigra	Black stork
Circus aeruginosus	Western marsh harrier
Circus cyaneus	Hen harrier
Circus pygargus	Montagu's harrier
Columba palumbus	Wood pigeon
Coracias garrulus	European roller
Corvus corone	Carrion crow
Coturnix coturnix	Common quail
Egretta garzetta	Little egret
Egretta alba	Great egret
Emberiza calandra	Corn bunting
Emberiza cirlus	Cirl bunting
Falco columbarius	Merlin
Falco subbuteo	Hobby
Fulica atra	Eurasian coot
Galerida cristata	Crested lark
Galerida theklae	Thekla lark
Gallinago gallinago	Snipe
Gallinago media	Great snipe
Gallinula chloropus	Moorhen
Glareola pratincola	Collared pratincole
Grus grus	Common crane
Himantopus himantophus	Black-winged stilt
Hoplopterus spinosus	Spur-winged lapwing
Ixobrychus minutus	Little bittern
Lanius collurio	Red-backed shrike
Larus melanocephalus	Mediterranean gull
Limosa limosa	Black-tailed godwit
Lullula arborea	Woodlark
Luscinia svecica	Bluethroat
Accipiter brevipes	Levant sparrowhawk
Accipiter gentilis	Goshawk
Acrocephalus melanopogon	Moustached warbler
Actitis hypoleucos	Common sandpiper
Aix galericula	Mandarin duck
Netta rufina	Red-crested pochard
Numenius tenuirostris	Slender-billed curlew
Nycticorax nycticorax	Black-crowned night heron
Pandion haliaetus	Osprey
Phalacrocorax carbo	Great cormorant
Philomachus pugnax	Ruff
Phylloscopus collybita	Chiffchaff
Platalea leucorodia	Spoonbill
Plegadis falcinellus	Glossy ibis
Pluvialis apricaria	Golden plover
Pluvialis squatarola	Grey plover
Podiceps cristatus	Great crested grebe
Podiceps ruficollis	Little grebe
Porphyrio porphyrio	Purple swamphen
Porzana parva	Little crake
Porzana porzana	Spotted crake
Porzana pusilla	Baillon's crake
Rallus aquaticus	Water rail
Recurvirostra avosetta	Avocet
Regulus ignicapillus	Firecrest
Sterna albifrons	Little tern
Sterna hirundo	Common tern
Sterna sandvicensis	Sandwich tern
Sylvia atricapilla	Blackcap
Sylvia undata	Dartford warbler
Tringa erythropus	Spotted redshank
Tringa glareola	Wood sandpiper
Tringa hypoleucos	Common sandpiper
Tringa nebularia	Common greenshank
Tringa totanus	Common redshank
Turdus iliacus	Redwing
Turdus merula	Blackbird
Turdus philomelos	Song thrush
Vanellus spinosus	Spur-winged lapwing
Vanellus vanellus	Northern lapwing

Odonata

Melanitta fusca	Velvet scooter
Mergus serrator	Red-breasted merganser
Milvus migrans	Black kite
Motacilla alba	White wagtail
Motacilla cinerea	Grey wagtail
Ceonagrion mercuriale	Southern damselfly
Coenagrion scitulum	Dainty bluet
Crocothemys erythraea	Scarlet dragonfly
Ischnura elegans	Blue-tailed damselfly
Lestes barbarus	Southern emerald dragonfly
Lestes dryas	Scarce emerald damselfly
Lestes macrostigma	Dark spreadwing
Lestes virens	Small spreadwing
Orthetrum cancellatum	Black tailed skimmer
Orthetrum coerulescens	Keeled skimmer
Orthetrum nitidinerve	Yellow-veined skimmer
Oxygastra curtisii	Orange-spotted emerald
Sympecma fusca	Common winter damsel
Sympetrum fonscolombii	Red-veined darter
Sympetrum meridionale	Southern darter
Sympetrum striolatum	Common darter
Aeshna affinis	Southern migrant hawker
Aeshna isoceles	Norfolk hawker
Aeshna mixta	Migrant hawker
Anax imperator	Emperor dragonfly
Anax parthenope	Lesser emperor

Other invertbrates

Acilius duvergeri	Coleoptera
Aulacochthebius exaratus	Coleoptera
Bagous revelieri	Coleoptera
Bagous vivesi	Coleoptera
Cerambyx cerdo	Coleoptera
Coelambus confluens	Coleoptera
Cybister tripunctatus africanus	Coleoptera
Cyphon pandellei	Coleoptera
Donacia sp.	Coleoptera
Dryops doderoi	Coleoptera
Eretes sticticus	Coleoptera
Helophorus seidlitzii	Coleoptera
Hydraena corrugis	Coleoptera
Hydrophilus piceus	Coleoptera
Hydroporus lucasi	Coleoptera
Hygrobia tarda	Coleoptera
Hygrotus lagari	Coleoptera
Lacobius revelieri	Coleoptera
Microcara dispar	Coleoptera
Ochthebius auropallens	Coleoptera
Porhydrus obliquesignatus	Coleoptera
Gerris thoracicus	Hemiptera
Micronecta scholzi	Hemiptera
Naucoris maculatus	Hemiptera
Notonecta glauca meridionalis	Hemiptera
Notonecta maculata	Hemiptera
Notonecta viridis	Hemiptera
Sigara basalis	Hemiptera
Sigara stagnallis	Hemiptera
Hirudo medicinalis	Hirudinidae
Hirudo verbana	Hirudinidae
Euplagia quadripunctaria	Lepidoptera
Lycaena dispar	Lepidoptera
Trigonidium cicindeloides	Orthoptera

Appendix 4. Pond associated habitats and species protected under the Habitats Directive

Code	Habitat
1150	Coastal lagoons
1310	*Salicornia* and other annuals colonising mud and sand.
1410	Mediterranean salt meadows (*Juncetalia maritimii*).
1420	Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosii*).
2190*	Humid dune slacks.
2250	Coastal dunes with *Juniperus* spp.
3110*	Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*).
3120	Oligothrophic waters containing very few minerals generally on sandy soils of the West Mediterranean, with *Isoetes* spp.
3130*	Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or the *Isoeto-Nanojuncetea.*
3140*	Hard oligo-mesotrophic standing waters with benthic vegetation of *Chara spp.*
3150*	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation.
3160*	Natural dystrophic lakes and ponds.
3170*	Mediterranean temporary ponds
3190	Lakes of gypsum karst.
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation.
4020	Temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix.*
5310	Laurus nobilis thickets
6420	Mediterranean tall humid grasslands of the *Molinio-Holoschoenion*.
7210	*Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*

* Habitats protected under the Habitats Directive which relate directly to ponds.

The remaining habitats were used in the selection of IAPs in the Mediterranean Basin because ponds were located within this habitat type.