

Strasbourg, 17 March 2017
[Inf12e_2016.docx]

T-PVS/Inf (2016) 12

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Standing Committee

36th meeting
Strasbourg, 15-18 November 2016

**PLAN FOR THE RECOVERY AND CONSERVATION
OF OSPREYS IN EUROPE AND THE
MEDITERRANEAN REGION IN PARTICULAR**

- FINAL VERSION -
December 2016

*Prepared by
Mr Roy Dennis MBE*

on behalf of the Council of Europe

PLAN FOR THE RECOVERY AND CONSERVATION OF OSPREYS (*PANDION HALIAETUS*) IN EUROPE AND THE MEDITERRANEAN REGION



SUMMARY

The European osprey population is divided in two parts – healthy populations mainly in northern Europe while the species is absent or in small disjointed populations in much of the southern half of the continent. There is potential for a major increase in distribution and population of ospreys south of the present main range in Europe. This document explores a vision for the recovery and conservation of the species using a combination of pro-active management techniques that have proved successful for ospreys and sound management of healthy populations.

This plan aims to provide guidance to governments for the development of a solid and viable metapopulation of breeding osprey in the whole of Europe and in the Mediterranean Region. For many Bern Convention Parties where the species is abundant and its natural recolonisation is advancing, recommended action focuses on conserving and managing good habitat, dealing with threats that affect many other raptor species (such as unfavourable forestry practices, accumulation of damaging chemicals, collision with technical installations, electrocution and other mortality factors), preserving well balanced aquatic ecosystems and providing where necessary some artificial nesting.

A secondary focus of this plan is placed on the recovery of lost breeding populations in much of the Mediterranean, in South-East Europe and in much of Central Europe. There are at least 15 European states in which breeding populations went extinct because of human persecution, a factor that has much diminished although not completely disappeared in spite of the full protection of the species under the Bern Convention. In Article 11 of the Convention Contracting Parties have, in certain circumstances, undertaken to "*encourage the reintroduction of native species of flora and fauna when this contributes to the conservation of an endangered species*". Truly the species is of less concern in parts of Europe but occupies an important ecological niche in trophic chains of European and Mediterranean aquatic ecosystems. The continued support of countries, where ospreys are breeding in good numbers, is of particular importance for the conservation of the species in Europe. The last decades have shown that natural recolonisation is taking place, although it takes time.

Natural recolonisation can be complemented by reintroduction, depending on the circumstances of each region. In some parts of Europe (such as Central France) natural recolonisation may be enough to get the species back in good numbers. In others this will not happen in the next forty or fifty years so it is reasonable to encourage translocations. The species can be restored to existing favourable habitat using well experimented translocation techniques, matched with appropriate habitat

management., as it has been done in Spain where the number of breeding pairs is growing exponentially after a few well planned translocations (more translocations are planned in East Spain, reinforcing a common Mediterranean population, largely a non-migratory one).

Needless to say for this, as for many other migratory birds, the preservation of wintering grounds and reduction of threats are key elements for the long term survival of the species but such conservation responsibility lies on African states, with whom cooperation is to be promoted through different instruments, bilateral as well as multilateral, such as the Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia and other appropriate agreements under the Bonn Convention on Migratory Species.

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1. OBJECTIVES OF THIS PLAN

The objectives of this action plan are:

1. To allow the continued growth and expansion of the osprey populations in northern Europe, the Baltic countries, Germany and France.
2. To assure the survival of the small relict populations in different areas of the Mediterranean and South-east Europe.
3. In the medium to long term to allow a range expansion in southern Europe.

2. OSPREY BIOLOGY AND DISTRIBUTION IN EUROPE

The osprey is one of Europe's most iconic species, presently breeding mainly in the northern half of Europe and occurring throughout Europe on migration to and from Africa. The osprey is a specialist fish-eating raptor. It is a large raptor with a wing span of 2 metres and a weight of 1.2-2 kg. The upper-parts are brown and the underparts white, with distinctive breast band and eye stripe. The species and its ecology are well described in Poole 1989, Cramp et al 1980, Saurola & Koivu 1987, Schmidt & Mebs 2005, Dennis 2008 and Mackrill 2013. Distribution of ospreys in Europe has been much influenced by humans. Northern populations are either stable or increasing but southern populations are small and disjointed. The species was originally rather widely distributed from the North African coast to the Arctic Circle. Human interference was most severe south of the northern populations. Most European populations have grown in the last half century and the species has recolonised two regions of continental France and has extended its range in Germany from 2 to 7 Bundeslaender. The population of Germany, for example, has increased from its lowest level of c. 70-75 breeding pairs in the 1970ies (Schmidt 2006) to c. 550 in 2007-2009 (Schmidt 2010). Schmidt-Rothmund et al. (2014) write: "The number of osprey (*Pandion haliaetus*) nesting pairs in Europe, northern Africa, and the [Caucasus] has reached between 9500 and 11,500 in the early 21st century. Compared to numbers from the 1980s (ca. 5,500 pairs), the population has almost doubled. "The ban of DDT and better protection from persecution are the main factors contributing to the ongoing recovery. Two translocation projects have been completed and four are ongoing. They have directly or indirectly contributed to c. 30 breeding pairs and to range extensions.

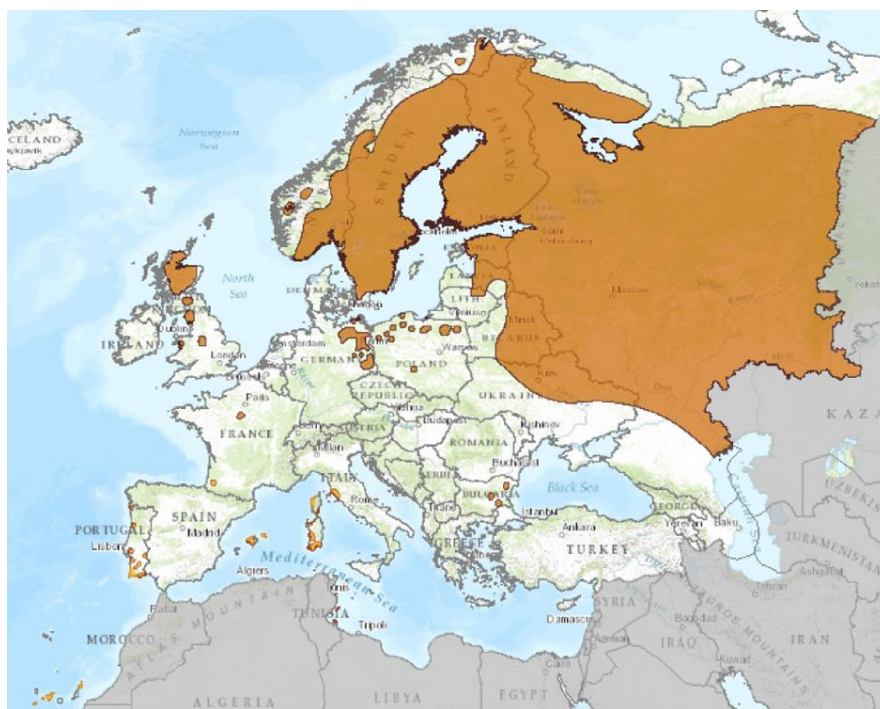


Figure 1: breeding distribution of Osprey in Europe (BirdLife International 2015)

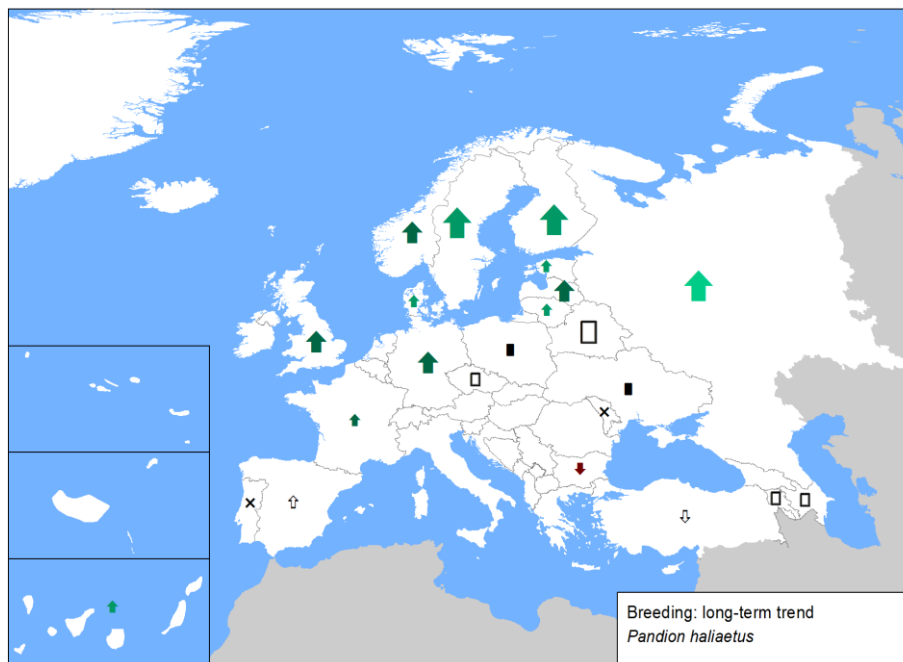


Figure 2: Breeding population sizes and long-term trends (32 y) across Europe (BirdLife International 2015).

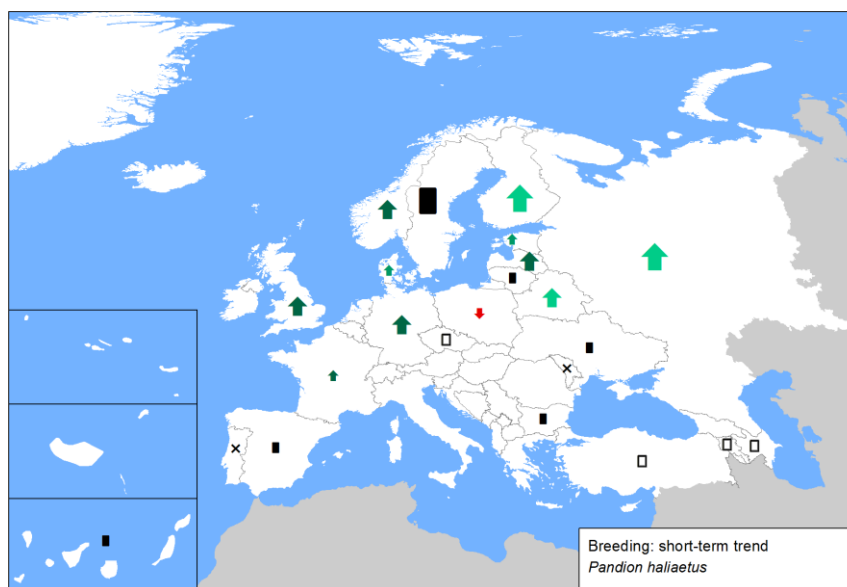


Figure 3: Breeding population sizes and short-term trends (12y) across Europe (BirdLife International 2015).

In most of Europe, ospreys are migratory raptors, which return to breed after wintering in Africa or occasionally as far north as Spain and Portugal. The small numbers breeding in the Mediterranean region are less migratory. A typical pair returns to a large stick-built eyrie in a prominent position, mainly on trees, but also on man-made structures (pylons) and – in the Mediterranean region – on cliffs. The two adults return individually but if both survive they nearly always breed together at the same nest. Eyries can be very large and old, over a metre in height as well as diameter and 30 years or more of age. New eyries built by first-time breeders are smaller and more likely to be destroyed by gales.



Ospreys usually lay three eggs, although young females lay two eggs in their first breeding season and clutches with four eggs occur (Poole 1989, Dennis 2008, Mebs & Schmidt 2006). Hatching success is generally good nowadays, with the pesticide-related failures of the 1950s-60s no longer a problem (Mebs & Schmidt 2006, Dennis 2008). Males do all the hunting, while females defend the nests, carry out most of the incubation and feed and protect the young. There is much individual variation, with males ranging from very proficient hunters to below average providers of fish. There is evidence of a hierarchy at common fishing sites, which means the dominant males have a greater chance of successful fishing. Females also show variation in their ability to ward off intruder ospreys or other species and to care for their young.

The young fly at seven-eight weeks of age and are provided with fresh fish for a further five-six weeks by the male. The female leaves on migration about two-four weeks after the first flights of the young. The family breaks up with the chicks departing in line with age and condition, the male migrating once the smallest chick has departed.

Ospreys prefer to breed near other ospreys as they are semi-colonial and they fish at common feeding sites; males show some level of natal philopatry and immature ospreys prefer to take over an established eyrie, rather than build a new one in a new locality (Poole 1989, Dennis 2008). Ospreys feed exclusively on fish in freshwater lakes, reservoirs and rivers, in brackish estuaries and in the sea. They hunt a wide range of fish species.

In August through to October, most European ospreys migrate to Africa; the western populations to West Africa and some of the eastern ones to East and South Africa, while others winter in a spread across African states. Small numbers winter in southern Europe (Nadal et al. 2012). In winter, ospreys live on sea coasts, estuaries and freshwaters, but there is a greater use of salt water fish. They live as individuals at the same favourite wintering location each winter, within groups of wintering ospreys centred on the richest feeding areas. Adults generally prevent juveniles from living in and using the best fishing locations. Adults return north in March and April, sub-adults in April and May, while most one-year-old ospreys remain in the wintering areas.

2.1 Survival and mortality

An examination of colour-ringed breeding adults in Northern Scotland over many years showed that annual survival was 91%. This means that on average in a 'colony' of 10 pairs of ospreys there is only a requirement for two new replacements per annum, yet we regularly record many intruders at nests within these areas. Non-breeding intruders often visit nests containing pairs throughout the nesting season. Sometimes these visits can be surprisingly aggressive and can result in broken eggs or even the eviction of resident adults. Field research has also shown high degrees of interference by intruders which could be causing density-dependent effects.

2.2 Habitat requirements

The key elements of the osprey habitat are a suitable nest site and water bodies with sufficient fish populations. The osprey is predominantly a lowland species. For these reasons, extended wetlands with natural woodlands nearby are of particular value to the species. However, artificial structures near water bodies like fish farms can suffice.



2.3 Present distribution and management in Europe

The species is classified as Least Concern (LC) on the IUCN Red List (BirdLife International 2015).

The osprey distribution in Europe has been greatly influenced by humans. Most populations are either stable or increasing but populations in some countries (e.g. Poland, Ukraine) show negative trends and populations in many southern parts of Europe are small and disjointed. Human interference was most severe south of the northern populations. Ospreys presently occur in 19 countries of Europe. Table 1 gives the most recent population totals and estimates, published in the Journal of Raptor Research (Schmidt, Dennis & Saurola, 2014), and with some updated totals. The population estimate for Europe is between 9,400 and 11,500 pairs; approximately 90% of the population is located in five northern countries – Sweden, Russia, Finland, Norway and Germany.

Table 1. Numbers of osprey breeding pairs in Europe and their long term population trends

+ increasing; – decreasing; ± stable; ? trend unknown.

Nations with known breeding populations listed in alphabetical order. For Russia only the European part is considered.

Country	Number	Years	Trend (since 1980)	Reference
Armenia	2-5	2002–2012	?	BirdLife International 2015
Azerbaijan	0–5	1996–2000	?	BirdLife International 2015
Belarus	150–180	1998–2012	±	BirdLife International 2015
Bulgaria	0-5	2005-2012	–	BirdLife International 2015
Denmark	3	2012	+	J. Tofft pers. comm., BirdLife International 2015
Estonia	60–70	2008-2012	+	BirdLife International 2015
Finland	1100-1350	2001-2012	+	BirdLife International 2015
France (cont)	38 – 50	2015	+	R. Wahl pers. comm., BirdLife International 2015
Corsica	28-30	2015	+	F Monti 2015 (PhD thesis); strong decline since 2011

Germany	700-721	2005-2009	+	BirdLife International 2015
Italy	3	2015	+	A. Troisi pers. comm. & Monti et al 2014
Latvia	190–210	2012	+	BirdLife International 2015
Lithuania	30–40	20088–2012	+	BirdLife International 2015
Moldova	0–1	2001-2012– 2000	-	BirdLife International 2015
Norway	415-600	2009-2013	+	BirdLife International 2015
Poland	28–39	2010-2013	–	Chodkiewicz et al. 2015, BirdLife International 2015
Portugal	1	2015		Palma pers comm
Russia	2000–4000	2005-2012	+	BirdLife International 2015
Spain (continent)	13	2013	+	E. Casado pers. comm
Balearic Islands and other Mediterranean Islands	21	2013	+	R. Triay pers. comm.
Canary Islands	14	2008	±	Triay & Siveiro 2008
Sweden	3400-4700	2008-2012	±	BirdLife International 2015
The Netherlands	1	2016	+	Pers. Comm. Sovon 2016
Turkey	0-10	2013	-	BirdLife International 2015
Ukraine	1–2	2013	–	V. Grishchenko pers. comm.
United Kingdom - Scotland	ca. 280	2014	+	R. Dennis pers. comm
United Kingdom - England	21	2016	+	T. Mackrill pers. comm
United Kingdom - Wales	4	2015	+	R.Dennis pers.comm
Total	8498 -12364			

Table 1 shows clearly that ospreys are faring very differently in different regions of Europe and it is wise to look at them separately.

2.4 History in Europe

In 1960, Voous gave the world distribution as approximately 20° N to 65° N in America, discontinuously from 35° S to 65° N in Australasia and Asia but in Europe there was an unusual pattern of scarce breeding in the Mediterranean separated from a widespread distribution in northern Europe. He said that the osprey is lacking in much of Europe where it must have been exterminated by man. Dennis (2005) noted that the range loss in the British Isles and Southern/Central Europe mirrored the Catholic countries and postulated that ospreys and white-tailed eagles (*Haliaetus albicilla*) in south and west Europe, including the British Isles, were subject to even higher levels of persecution than other raptors because they raided fish ponds in a period (Middle Ages) when the eating of fish on Fridays by humans was of great importance for religious purposes. They were also easier to eliminate than other raptors, because they generally nested near water, built obvious eyries and were less shy.

For example, the history of the osprey in the British Isles is in two distinct parts. There is a relatively detailed written knowledge of the decline of the species during the 19th and early 20th centuries, with the loss of the last pairs being due to the collecting of skins and eggs for museum and private collections. Similar losses also occurred in mainland Europe, for example Switzerland. However, evidence of the widespread range of the osprey throughout the British Isles in the first half of the last millennium has to be based on place-names, cultural and historical references and the ecology of the species. The drastic loss of range in the Middle Ages was most likely due to intense human persecution as well as some habitat loss. The osprey should be relatively widely distributed from North Africa to the Arctic Circle, especially along the coasts but also in parts of the inland areas.

Since the late 1970ies, Osprey populations in Europe have increased and spread again. Since then, the Osprey distribution range has expanded by several hundred kilometres in several areas and by more than 1'000km from eastern Germany to western France (cf. Glutz von Blotzheim et al. 1979, Schmidt 2010, Nadal et al. 2012).

Northern Europe

Belarus, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Sweden, United Kingdom (Scotland)

This region has the bulk of osprey breeding pairs in Europe, estimated at 8,356 to 12,193 pairs. The population is increasing to stable, except of Poland where there is a decline. The osprey is increasing in Norway and the estimate is 415 to 600 pairs. The population in Finland, 1,150 to 1,350 pairs, is very well monitored and the population is regarded as increasing. The estimate of 3,400 to 4,700 pairs in Sweden is the result of a survey in 2010; the population is thought to be stable. Further east there are 150 to 180 pairs in Belarus and the Russian population is estimated between 2,000 and 4,000 pairs. Numbers in Scotland rose from one pair in the 1950s and 1960s to nearly 300 pairs in the present day. An increasing population is located in the Baltic States, with approximately 200 pairs in Latvia, 60 to 70 pairs in Estonia and 30 to 40 pairs in Lithuania. The German population is increasing and well studied; and in recent decades there has been a spread from Northern Germany as far south as Bavaria and as far west as western Lower-Saxony. A small number of pairs also started to breed in Denmark.

Central and Western Mediterranean

France (including Corsica & Southern Departments), Western Italy, Morocco, Portugal, Spain, Tunisia

The Central and Western Mediterranean population is around 100 to 113 pairs, North African birds included. Remnant populations survived in the Mediterranean region on Corsica, now at 28 to 30 pairs and declining strongly after 2 decades of increases (main problem is disturbance at nests; Monti PhD Thesis 2015), and on the Balearic Islands, now 21 pairs and increasing. On the North African coast, recent estimates of 9 to 15 pairs in Algeria, 10 to 15 pairs in Morocco and a single pair on the Chafarinas Islands. There are now 13 pairs in mainland Spain, in Andalusia, the result of the reintroduction project with birds from Germany, Scotland and Finland, and three pairs in Tuscany, Italy, the result of the translocation of young from Corsica. 14 pairs breed on the Canary Islands.

Western and Central Europe

Austria, Belgium, Central France, Ireland, Luxembourg, Netherlands, Switzerland, United Kingdom (except Scotland)

This population is still small, about 51 to 79 pairs but increasing. Osprey is still missing as breeding bird in a number of these countries. The most noticeable change in this region are the natural recolonisation of the United Kingdom and France - both several hundreds to almost 1'000 km from the closest breeding grounds at the time of recolonisation. England was recolonised in 1999 and Wales in 2004 as a result of a translocation project at Rutland Water in central England as well as natural expansion of the Scottish population into northern England. On mainland Europe, a pair of ospreys was found in the Orléans region of France in the 1980s and subsequently increased, with the French population now at 38-50 pairs.

Central and Eastern Europe

Bulgaria, Czech Republic, Hungary, Republic of Moldova, Romania, Serbia, Slovak Republic, Ukraine

Breeding ospreys are very scarce or absent in this part of Europe with an estimated 1 to 8 pairs. Osprey breed with just 0 to 5 pairs in Bulgaria, and possibly single pair in Moldova, and 1 to 2 pairs in Ukraine.

South East Europe

Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Croatia, Cyprus, Georgia, Greece, Malta, Montenegro, Slovenia, "the former Yugoslav Republic of Macedonia", Turkey

The countries where the osprey is currently breeding in South East Europe is Turkey (0 to 10 pairs), 2 to 5 pairs in Armenia and between 0 and 5 pairs in Azerbaijan.

There have been dramatic improvements in osprey populations in the last half-century but it remains a fact that the species is still absent from part of its ancestral range in more southern parts of Europe. Table 2 illustrates the loss in range.

Table 2. European states where breeding Ospreys disappeared.

Country	Last bred	Comments
Austria	1932	
Belgium	Early 20 th C	Recent attempt
Czech Republic	1850s	
Greece	1966	
Ireland	18 th C	
The former Yugoslav Republic of Macedonia	1940	
Romania	1961	Pair attempted nesting
Switzerland	1911	Reintroduction started 2015

Ospreys should be breeding over a much larger area of Europe, though with southern inland areas only partly occupied.

2.5 Present conservation in Europe

The osprey is legally protected throughout Europe, often at the highest levels of national protection. The species is on annex 1 of the EU Birds Directive, annex III of the Bern Convention, Annex II of the Bonn Convention and Appendix II of CITES. Under the EU Habitats Directive, special protection areas (SPAs) have been designated for ospreys; the species is classified as Least Concern (LC) on the IUCN Red List. (SPAs are visible through the public Natura 2000 Network Viewer <http://natura2000.eea.europa.eu/#>). In addition the Birds Directive requires the EU Member States to establish a strict protection regime which prohibits e.g. deliberate killing, destruction of nests or eggs and disturbance of these birds during breeding and rearing. The EU Member State report every six years to the European Commission on the status and trend of the bird species protected under the Birds Directive. The latest population status assessment (2008-2012) shows that the breeding population trend in the EU27 is increasing both in the short term and the long term and the EU population status is Secure (<http://bd.eionet.europa.eu/article12/summary?period=1&subject=A094>). The species is classified as Least Concern (LC) on the IUCN Red List both at the European level and within EU27 (<http://www.birdlife.org/sites/default/files/attachments/RedList%20-%20BirdLife%20publication%20WEB.pdf>).

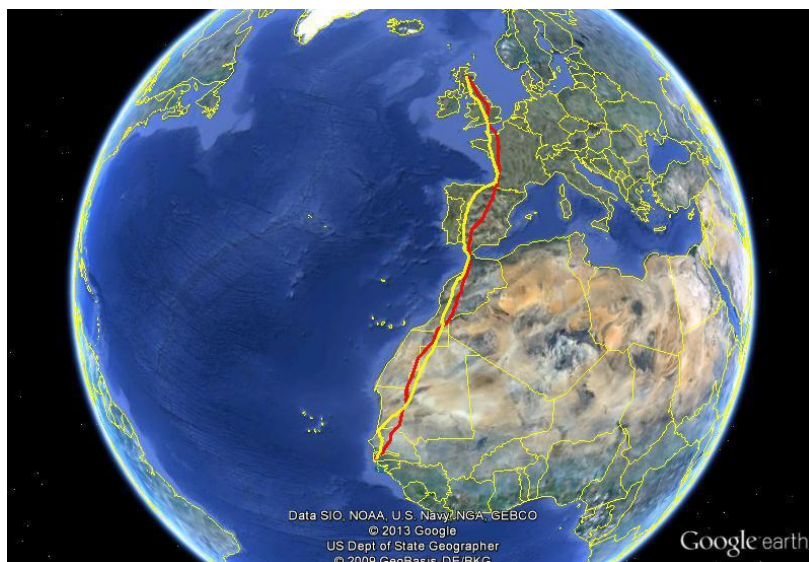
2.6 Tolerance to disturbance

As the species has increased in Europe and persecution has declined, the bird has become more tolerant of humans and, as in the USA, has started to nest near to people. Once established in such areas, ospreys are often carefully protected and breed successfully. Consequently, they become more tolerant of humans and can increasingly accept people closer to their nests and feeding areas. They are capable of nesting on human-made structures, such as pylons, buoys and piers, as well as accepting artificial nests.

In Scotland, some ospreys are now breeding successfully within 50 metres of regular human presence, quite unlike 40 years ago when they were regarded as shy birds, living in remote locations. This change in behaviour of both people and birds allows a re-assessment of very large areas of European landscape previously thought unsuitable for ospreys.

2.7 Migrations and wintering of European ospreys

The migrations and winter distribution of northern ospreys has been well documented over many decades through the use of bird ringing, especially the data for Sweden, Finland, Germany and Scotland. Migration in spring and autumn is on a broad front with no concentrations at short sea crossings, used by raptors such as honey buzzard, in southern Spain and the Bosphorus. These studies have demonstrated that the westernmost breeding ospreys, e.g. those in Scotland, winter in western West Africa, particularly Senegal, The Gambia and Guinea Bissau, while some of the easternmost breeding individuals in Finland migrate on an eastern route with some wintering south to South Africa. There is a spread of wintering sites south and east in West Africa to Nigeria and in some central states.



Osprey migrations tracked by GPS transmitter – spring track yellow and red track autumn

Satellite tracking studies, since 1999, have refined the ringing data knowledge, especially since the advent of GPS transmitters in the mid 2000s. This research has identified the importance of regular stop-over locations used by individual ospreys, and also the fact that, in general, adult ospreys return to exactly the same wintering sites throughout their lifetime. Adult ospreys use the best available coastal and estuarine locations, where fish is plentiful, for example the Sine Saloum National Park in Senegal. Juvenile ospreys tend to be excluded by the adults from these optimum habitats and range through a series of less good locations, for example inland freshwaters, including temporal wetlands. These fishing opportunities can be lost when pools dry out in years of lower rainfall. The ospreys may also use areas irrigated for crops such as rice.

2.7b Migrations and wintering of Mediterranean ospreys

The migratory pattern for osprey breeding in the Mediterranean and Atlantic starts to be understood thanks to GPS tracking (F Monti 2015 PhD). A part of the population (ca. 30%) is resident and stays on the coasts of Corsica, Balearics, North African coasts, as well as in the Canary and Cape Verde Islands. However, the remaining or short distance migrants which mostly stay near the coastlines of the Mediterranean basin, especially in North Africa, Sardinia, Sicily and Spain. Tracks of Mediterranean ospreys can be visualized at this [Movebank link](#).

2.8 Threats and limiting factors

Availability of nest sites

Away from the coasts of Mediterranean countries, ospreys in Europe nest on trees and electricity pylons - some also on other human-made structures.

The availability of suitable nest sites is a major limiting factor for the osprey population in Europe, and also elsewhere (Mebs & Schmidt 2006, Nadal & Taniel 2008, Schmidt & Müller 2008). Modern forestry practices lead to short turnover times and tall, flat-topped trees in relatively undisturbed locations are too scarce.

Illegal killing/persecution

Illegal killing is regarded as one of the main limiting factors for the osprey population in Poland (Mizera 2009), which is decreasing despite its vicinity to the strongly growing German population. Illegal killing has also been documented for one of the very few known nests in Bulgaria (Iankov 2007, P. Iankov pers. comm.) and in Portugal (Mebs & Schmidt 2006, Palma 2001, Palma et al. 2013). It may also be an issue in Ukraine, where the species occurs in only few breeding pairs and is threatened (Shcherbak 1994), Republic of Moldova, and other countries.

In the review of illegal killing in the Mediterranean (Brochet et al. 2016), between 47 and 349 Ospreys are estimated to be killed each year. Out of the 27 countries illegal killing was especially reported in France, Italy, Lebanon, Portugal, Serbia, Spain and Syria.

Illegal killing is a serious problem on migration and in the wintering quarters (Meyburg et al. 2016).

Egg collection has been a problem in several countries even in recent decades (Dennis 2008). Generally, the significance of this threat factor is nowadays reduced, though.

Importance: medium

Interspecific competition

Other raptor species occurring in the breeding range of ospreys could cause influence on osprey population. Sea eagles could disturb the adult ospreys during the breeding and eat the fish caught by ospreys. Goshawks and Golden Eagle could predate on breeding birds and their offsprings.

Intraspecific competition

The very first sentence of Greenwood's seminal work on philopatry and dispersal (1980) reads: "Faithfulness to a site or group is a well-documented trait of many species of birds and mammals." Several large raptors including species of eagles *Aquila*, sea-eagles *Haliaeetus* and the Osprey are no exception (Dennis 2008, Haller 1994, Mebs & Schmidt, Whitfield et al. 2009). This philopatry leads to competition for resources and sometimes to aggressive behaviour. For the Golden Eagle *Aquila chrysaetos*, intraspecific aggression is a known mortality factor (Haller 1982, Jenny 1992, Mebs & Schmidt 2006) and it has been suspected that it could cause mortality also in the osprey (Dennis 2008). Intraspecific competition leads to higher age at first breeding and to lower breeding success in the osprey and thus to a decreased "production" of young at the population level.

Male ospreys prefer to breed near their natal site while females may breed anywhere within the population, occasionally including over long distances, even between Sweden to Scotland, northern Germany to France. When a pair of ospreys move to a new locality in an expanding population, rarely more than 50 kilometres from the present breeding range, new pairs join them to establish a loose 'colony'. If they are not joined by other pairs within a period of several years, the chances are that the pioneering pair will not establish a new 'colony' and on the loss of one or both of the original adults, the colonisation attempt fails. The growth of each new 'colony' is slow at the outset but, if successful, it rapidly increases and then levels out. In some case it may even decrease.

Importance: low to medium

Collision and electrocution

Collision with powerlines, wind turbines, or other structures as well as electrocution can be a relevant mortality factor.

Importance: medium, potentially high

Human disturbance

The osprey is sensitive to human activities in most of its breeding areas. On the other hand, birds can get used to, and breed near, human activity.

Importance: high

Poisoning / contamination

There are no present toxic chemical alerts for osprey breeding performance.

Importance: low

There is an increasing dialogue between people in Europe and Africa, and this has been enhanced by flyway cooperation in schools using tracked birds and the internet, on both the western and eastern flyways. This may reduce indiscriminate killing: see the work of Tim Mackrill at Rutland Water (www.ospreys.org.uk/world-osprey-week). On an official level the CMS Migratory Raptors Convention came into being in 2013 and as all raptor species, osprey is included in this programme. The CMS Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptors MOU) aims to promote internationally coordinated actions to achieve and maintain the favourable conservation status of migratory birds of prey throughout their range in the African-Eurasian region, and to reverse their decline when and where appropriate. The EU is a signatory to this MoU and is currently drafting the EU Raptor Conservation Strategy following the Raptors MoU Action Plan.

There is a need to have a better understanding of the numbers and distribution of European ospreys in Africa and to understand the conservation issues. There should be better co-operation between states with breeding and wintering ospreys. Fishing activities by European countries off the African coast will probably cause problems in the future and is probably already doing so; firstly for the indigenous coastal fishermen and then as they have to concentrate more on inshore fish, bringing possible knock-on impacts on food availability for wildlife, including ospreys.

3. RECOVERY AND CONSERVATION PROJECTS UNDERTAKEN TO DATE IN EUROPE

Finland

In Finland, provision of artificial platforms as well as monitoring and management of nests in the framework of “Project Pandion” has been successful and led to a growing osprey population. With c. 1300 pairs, the Finnish population is the third-largest of Europe.

Finnish Osprey Foundation <http://www.saaksisaatio.fi/index.php/en/>

France

The osprey had disappeared as a breeding species from mainland France by the early 20th century. However, the island population of Corsica has always been present although had all but disappeared by the early 1970s (4 pairs in 1974).

The species came back spontaneously to breed in mainland France in 1984, in Orleans forest (central France). Currently, the population in central France is estimated to be more than 40 pairs, that of Corsica around 35 pairs (MEEDDAT 2009, Mission LPO raptors 2012; Recorbet 2016).

The osprey has been officially recognised as a protected species in France, since January 1972. The French Ministry of Ecology, in addition to the creation of the Scandola National Nature Reserve (Corsica) in 1975, has carried out two National Action Plans for the species between 1999 and 2012, both in the Centre Val de Loire region and in Corsica (National Action Plan 2009 / DREAL Centre - LPO Mission Rapaces).

Besides the systematic ringing of the young (CRBPO- National Natural History Museum), several scientific studies have been carried out in the Orleans forest since the specie's return; the main results were presented at the International Orleans Symposium in September 2013. A booklet was published for the Orleans symposium that summarises the research and conservation work for the last 30 years.

The main conservation work included nest surveillance, erecting artificial nest platforms (mainly in state owned forest or on electricity pylons, especially in Sologne), restore or consolidate natural nests, to raise public awareness and to ensure the non-disturbance of the breeding areas, both in the forest and on the Mediterranean cliffs of Corsica (so far clearly insufficient in Corsica).

In state forests, the National Forestry Office (ONF) is conducting appropriate management of woodlands to protect birds of prey and has established specific requirements, preserving pockets of old trees, restricting forest activities in breeding areas and creating a protective perimeter around nesting sites, beneficial for the regional population of ospreys.

In the region Centre Val de Loire, in 2016, a major awareness campaign was launched by the National Forestry Office (ONF), the NGO "Loiret Nature Environnement", the Electricity Distribution Network (Rte) and the Orleans Museum of Natural Sciences, within the concept of the Pan-European Plan. Ecological and behavioural studies are planned, as well as multimedia activities and a permanent display in the Museum of Orleans, under renovation.

Today a third Action Plan has been claimed by the LPO and naturalist NGO to the Ministry for Ecology, to continue the actions in favour of the Osprey, including supporting the species in other regions where it is likely to settle. Reintroduction is not a priority action in France but two projects are being studied, in Réserve naturelle du Marais d'Orx (Landes de Gascogne) and in Grande Camargue (Bouches du Rhône).

Corsican authorities have been appealed for more active protection to ensure the non-disturbance of the nests in the Scandola Nature Reserve, that keep being disturbed by touristic boat tours during the breeding season.

All the partners of the action plan consider dynamic osprey conservation is much more than a remarkable raptor preservation campaign but also a symbol of protection of biodiversity in aquatic environments (freshwater and marine) and of natural forests.

Germany

The *Bundesländer* of Brandenburg and Bavaria have published official **action plans** for the osprey. Main actions defined in both action plans are protection of nest sites and the construction of artificial nest,

Translocation or reintroduction is not foreseen in these action plans.

Also in other *Bundesländer*, conservation action is undertaken. There is a group of specialists for the species collaborating across Germany. One of the objectives is to extend the German breeding population to the Danube in order to facilitate recolonisation of South-east Europe (D. Schmidt, *pers. comm.*).

Hungary

Hungary does not currently host breeding osprey, but two breeding attempts took place between 1990 and 2010 (Kotyman et al. 2011). The species is a regular migrant.

Italy

The osprey reintroduction started in the Maremma Natural Park (Tuscany/Italy) in 2006. It has been undertaken from 32 chicks coming from the natural marine reserve of Scandola (Corsica) in close collaboration with the Natural regional Park of Corsica. Two pairs were breeding there in 2014 (Monti et al, 2014). In 2015 and 2016, three pairs were breeding.

The Netherlands

Ospreys have repeatedly spent the summer in the Netherlands over the last years. In 2016, one

pair successfully bred in the Biesbosch (province of Brabant) in a tree and a single male build a nest on a powerline (Sovon).

Poland

In 2015, a Polish-German conference on protection of osprey in the borderland was organized. As a result of cooperation with Polish electric power companies, in 2016 several nesting platforms for ospreys were installed on poles of high voltage power lines in the western part of Poland.

Portugal

The last breeding pair of osprey occurred in 2001. A reintroduction program was started in 2011 at an inland reservoir. In 2015, a pair of ospreys naturally re-colonised the “old” breeding area on the south-west rocky coast line.

Spain

Osprey went extinct in Spain in 1991. A reintroduction project was started in Andalucia in 2005 and a second one in the Basque country in 2013. The latter is too recent to know its success to date. 182 young Osprey were translocated to Andalucia until 2013. Already in 2006, when the Ospreys released in the framework of the reintroduction projects had not yet returned from Africa, two wild ospreys started breeding on a different reservoir about 30-40 km away. Possibly, the ospreys breeding in northern Morocco have incited migrant ospreys to settle in Andalucia. Another hypothesis is that the ospreys were attracted after having interacted on their migration with the translocated juvenile ospreys.

The first breeding pair fledged young only thanks to very close management and the adoption of a nestling from Germany. Reintroduced and migrant birds joined the first wild breeding pair and, in 2014, 15 pairs were breeding in Andalusia.

United Kingdom

Wardening and effective protection of nests along with installation of artificial nests/platforms has allowed the population in Scotland to grow from a single pair in 1954 to c. 280 in 2015 and to re-colonise large parts of Scotland as well as (in 1999) northern England.

In 1996, the first translocation project for osprey in Europe was started at Rutland, England. 64 young were brought from Scotland to Rutland until 2001 and another 11 in 2005. In 2016, 8 pairs bred there.

Two males released at Rutland paired up with probably Scottish-born females in Wales, about 200 km from both, Rutland and the Scottish breeding population. In 2015, four pairs of ospreys bred in Wales.

Osprey reintroduction and translocation was pioneered in North America from the 1970s to restore populations exterminated or severely reduced by DDT poisoning in the 1960s (Poole 1989). The first project in Europe was at Rutland Water Nature Reserve, in Central England, in 1996-2001 (Dennis 2008 & Mackrill 2013). This has been successful with 117 young being reared between 2001 and 2016, when eight pairs bred. The English translocation and immigration from Scotland together resulted in the recolonisation of Wales in 2004, where 4 pairs bred in 2015, rearing 11 young.

The next reintroduction project was carried out in Spain at two sites in Andalusia from 2003 and that population reached 15 nesting pairs in 2014. A translocation of young ospreys from Corsica to a release site in Tuscany, Italy, resulted in successful recolonisation, with two pairs breeding in Italy in 2014.

A translocation of young ospreys from Finland and Sweden to eastern Portugal commenced in 2011; in 2015 it was proved that a pair of ospreys naturally colonised a coastal location last used in 2001 and more than 100 km from the site of the translocation project.

A translocation of young ospreys from Scotland to the Basque Country in north Spain started in 2013 and a project started in western Switzerland in 2015, initially using six young ospreys from Scotland. These are tentative but successful steps towards restoring breeding ospreys in the southern range of the species. The techniques are now well tested and have been shown to be successful.

Taken together, these translocation projects have until today led to about 30 new breeding pairs and a range extension in four sites or regions.



Hacking cage and released young ospreys at Urdaibai Biosphere Reserve

4. POTENTIAL FUTURE DISTRIBUTION AND NUMBERS OF OSPREYS IN EUROPE

The most glaring fact about the distribution and numbers of ospreys in Europe is the difference in their status between the northern and southern countries. There is no reason why the osprey should not be a relatively widely-distributed species in the southern countries of Europe, rather than being in the present disjointed distribution of small pockets of breeding pairs. Importantly, they could use biologically richer areas, such as coastal estuaries. The species could regain its original distribution from North Africa to the Arctic but there are various reasons why this is difficult. This plan attempts to raise these issues and address them, although it is important to recognise that there are different management requirements in different regions of Europe.

As long as people accept them without persecution, ospreys are able to exploit areas with richer food supplies, often near humans, and thus increase breeding productivity, population size and range more quickly. It is important to note that the documented historical range of remnant populations was often a reflection of refugia of low persecution rather than solely an indicator of high quality habitat or food.

Age of first breeding

Ospreys normally breed at three years of age and in the early years of population growth, breeding at three or four years is normal. Ospreys can breed at two years but it is very unusual. In established 'colonies' more individuals are forced to delay first breeding and this is believed to be linked to birds being intent on breeding within established 'colonies', rather than moving to unoccupied regions.

This failure to breed at the earliest opportunity is also shown in an examination of non-breeding intruders at established nests. At the famous Loch Garten nest in the Scottish Highlands, for example, 11 colour ringed birds of three years of age in the Badenoch and Strathspey population had not found their way into the breeding population, five of four years of age, two of five years and four of six years.

What is clear is that many ospreys are now not breeding when first mature and capable of doing so. They are waiting until later to find a place within a favoured 'colony', usually due to the death or non-return of an older bird at an established nest. Each delayed season for an individual means a 9% chance of dying before the next breeding attempt. This is due to the fact that average annual survival of adults is approximately 90%. A bird failing to establish itself until its fourth, fifth, sixth or seventh year therefore has a greater chance of death before breeding successfully, an additional 9%, 18%, 27% or 36% chance respectively of dying. Earlier research in North America showed that the mean age of

first breeding in an expanding population in New England was 3.6 years, but in an established population in Chesapeake Bay was 5.7 years (Poole, 1989).

Older age at first breeding is one mechanism of density-dependent regulation. Dispersal is also density-dependent: the greater breeding density of a longer-established population forced young white-tailed eagles to disperse further to find vacant breeding sites (Whitfield et al. 2009) and higher breeding densities were correlated with longer dispersal distances (Struwe-Juhl & Grünkorn 2007). Thus a certain level of density-stress can also be a necessary driver of dispersal.

5. MANAGEMENT TECHNIQUES FOR RESTORING BREEDING OSPREYS

Artificial (human-made) nest building

Artificial nest building increases breeding success and productivity, and range expansion. It is most effective in extending the edges of breeding areas and creating intermediate nesting locations between established ‘colonies’

This technique has been widely used in Europe, especially Finland, Germany and UK, for a variety of reasons, some as above, but also to encourage the birds to nest in forests where harvesting operations leave very few large or damaged-topped trees suitable for ospreys. In some countries this can mean that many of the nests have been built by ornithologists in commercial forests with unsuitable trees. Nests have also been built on poles and platforms in areas with few suitable trees, such as marshlands and agricultural areas. In Mediterranean area, artificial nest built on rock pinnacles was a major factor to increase the breeding population in Corsica, and hopefully soon in the Tuscany archipelago and Sardinia. Proactive management of pairs/nests is essential to optimise production of young to increase the breeding population.



Man-made nest at Rutland Water reservoir in England

Of course ospreys can build their own nests, but in stable populations and ‘colonies’ most ospreys choose to breed for the first time in an old established nest that is vacant or, ideally, occupied by a bird of the opposite sex which has lost its mate. The natural behaviour of ospreys then is to look for big old nests rather than build their own. If ospreys have been exterminated from a region the lack of ‘old nests’ is a disincentive for ospreys to stop and breed. For that reason, the building of artificial nests is an important management tool for recovery. These man-made nests must be very well built in the best sites, must replicate previous use by ospreys and be regularly monitored and repaired.

Adapted forestry practices and habitat management

This plan aims at a large increase of the European osprey population. Consequently, forestry practices should take into consideration the needs of Ospreys and other raptor species. Otherwise, large populations will depend on thousands of artificial nests that need regular monitoring and maintenance. This would not be sustainable. Forestry practices should thus be adapted in order to allow for a sufficient number of large and old trees, including Scots Pine *Pinus sylvaticus* with broken or dry tops.

The osprey is to be used as a flagship for good management of wetlands.

Reducing mortality

Mortality of ospreys occurs due to collisions with human installations, electrocution, wrongly applied monofilament nets, and illegal persecution, among others. While the osprey is less concentrated at migration corridors than other large raptors, these sources of mortality should be reduced in regions of increased osprey migration as well as on breeding and wintering grounds.

Translocation, reintroduction and recovery

Reintroduction of raptors and other species to areas where the species has become extinct is now an accepted wildlife management practice throughout the world. Osprey reintroduction and translocation was pioneered in North America from the 1970s, and is increasingly being used in Europe.

Translocations and nest manipulation (supplementing broods of remote pairs with translocated young) are further techniques that may help in range recovery. 'Colonies' reaching their peak are the best sites to provide donor young and because of natal philopatry and delayed breeding age, the removal of young has little effect on local populations. Translocation projects can possibly be reduced in cost and effort as techniques become well proven.

If countries or regions decide to embark on a translocation project, a reintroduction project proposal should be established, including a feasibility and impact assessments. This proposal should be evaluated against the IUCN criteria and national standards or regulations as appropriate. Only if the project is in line with all these standards, it should go ahead (IUCN 2012).



Successful nest site at Rutland Water population with three young

Ospreys as a flagship species

In some parts of Europe – particularly in the United Kingdom and Finland – ospreys generate widespread interest among the general public. In some areas they have become vital to the rural economy through increased tourism revenue. . Across the UK it's estimated that 290,000 people a year visit nine key osprey watching sites, generating £3.5m extra for local economies (Dickie et al. 2006) Although the impact of newly-established osprey populations will vary between different European countries, the economic benefits of restoring the species to other parts of its former range could be considerable.

In addition to the potential economic impact, flagship species such as the osprey can play an integral role in raising the profile of nature conservation. Recent efforts to link schools along the migratory flyways of ospreys demonstrate the potential of this iconic bird to help establish important and meaningful links between European countries and further afield (www.ospreys.org.uk/world-osprey-week).



Children learning about ospreys in World Osprey Week

6. RECOMMENDATIONS

The following proposals outline a series of objectives, actions and timelines for osprey conservation in individual countries and for regional groups of countries, aimed principally at the restoration of breeding ospreys in the 'lost' breeding range.

General conservation recommendations

1. Promote habitat conservation of both, inland and coastal wetlands favourable for osprey – in particular salt marshes - both in Europe, the Mediterranean and Western Africa; ensure that appropriate areas are included in Natura 2000 and Emerald Networks;
2. Promote habitat conservation measures aimed at osprey that may include retrofitting of powerlines (or building new “raptor-safe” powerlines), keeping of old trees suitable for nesting, construction where necessary of artificial nests, reducing effects of pollution in aquatic ecosystems where the species feeds and protection of shores of reservoirs where the species feeds; control impacts from recreation activities close to nests;
3. Identify, map and protect osprey nests from human disturbance; promote the creation of “nesting opportunities” in areas close to nests in expanding breeding populations;
4. Strictly control illegal killing of ospreys both residents and in migration;
5. Support a good monitoring of the species in the whole territory of the Convention, using internationally accepted methodologies;
6. Promote awareness on the interest, ecological significance and conservation of ospreys; in that context use the species as an indicator of ecosystem quality and as a flagship species for the conservation of aquatic ecosystems;
7. Co-operate with neighbouring countries as appropriate, as well as with all states hosting wintering populations, including those in Africa;

Expanding populations and reintroductions

8. Identify areas with suitable habitat and potential for further natural recolonisation as well as areas in need of future reintroductions of ospreys;
9. Build platforms and artificial nests in order to encourage osprey to recolonise suitable areas identified under point 8.

10. When using translocations for reintroductions or to reinforce breeding populations, carefully select birds for translocation, making sure that the genetic stock used is as close as possible to the one previously present in the geographical area where the reintroduction is carried out (Monti et al., 2015);
11. In translocation operations keep records of the origin of birds and of breeding success; report on return of migratory birds, on new nesting couples and also on failed reintroductions; assess regularly the success of reintroduction efforts and report on both lessons learnt and failures;

Recommended action for specific regions and populations

a) *Northern Europe: Belarus, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Sweden, United Kingdom (Scotland)*

- A1. Improve the habitats for the species and make efforts to maintain population levels of osprey in the region;
- A2. Keep good monitoring of the species and be alert for possible threats and problems; and investigate reasons for decline and provide remedial measures, where appropriate;
- A3. Explore potential for enhanced collection of donor young for translocations to other territories;

b) *Central and Western Mediterranean: France (including Corsica & Southern Departments), Western Italy, Morocco, Portugal, Spain, Tunisia*

- B1. Continue the restoration of the breeding populations of ospreys in western Mediterranean to pre-persecution levels and consider formulating national action plans for recovery of the species;
- B2. Enhance the conservation of small populations of ospreys, particularly in areas where breeding success is threatened by human activities;
- B3. Reduce disturbance and threats in wintering areas in the Mediterranean area.
- B4. Enhance the management of pioneering pairs;
- B5. Build, where appropriate, man-made nests to encourage pioneering pairs to expand the range of small populations and to link sub-populations;
- B6. Evaluate pro-active recovery of breeding ospreys to suitable breeding areas; in that context prepare reintroduction project proposals, evaluate them against IUCN guidelines as well as other appropriate standards and where appropriate translocate and release young ospreys to create new populations;

c) *Western and Central Europe: Austria, Belgium, Denmark, Central France, Ireland, Luxembourg, Netherlands, Switzerland, United Kingdom (except Scotland)*

- C5. Consider formulating national action plans for recovery of the species;
- C1. Consider programmes to increase the breeding populations of ospreys in Western and Central Europe, where appropriate, taking into account IUCN Guidelines for Re-introductions and other Conservation Translocations;
- C2. Ensure the conservation of small populations of ospreys;
- C6. Where appropriate build man-made nests to encourage pioneering pairs and to expand the range of small populations;
- C3. Take appropriate action to support the establishment of pioneering pairs ;

d) *Central and Eastern Europe: Bulgaria, Czech Republic, Hungary, Republic of Moldova, Romania, Serbia, Slovak Republic, Ukraine*

- D1. Consider formulating national action plans for recovery of the species;
- D2. Where necessary build man-made nests to encourage pioneering pairs and to expand the range of small populations;
- D3. Ensure good habitat management for ospreys and other raptors in wetlands and forests;

D4. Protect pioneering pairs;

D5. Assess the need for pro-active recovery of breeding ospreys to suitable breeding areas and ensuring good habitat management in areas where reintroduction takes place; in that context consider preparing reintroduction project proposals, evaluate them against IUCN guidelines as well as other appropriate standards and, where appropriate, translocate and release young ospreys to create new populations.

e) South East Europe: Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Croatia, Cyprus, Georgia, Greece, Malta, Montenegro, Slovenia, "the former Yugoslav Republic of Macedonia", Turkey

E3. Consider formulating national action plans for recovery of the species;

E2. Build man-made nests to encourage pioneering pairs to settle and breed;

E3. Ensure good habitat management for ospreys and other raptors in wetlands and forests;

E4. Protect pioneering pairs;

E1. Promote the restoration of breeding populations of ospreys in South-East Europe and the Eastern Mediterranean region through pro-active recovery to suitable breeding areas; in that context, prepare reintroduction project proposals, evaluate them against IUCN guidelines as well as other appropriate standards and, where appropriate, translocate and release young ospreys to create new populations;

Regional meetings

States are invited to further the above recommendations by organising specific workshops in the following regions:

- a. Northern Europe:** aimed to discuss improvement of management of existing populations and exploring the potential for providing more donor young for osprey reintroduction programmes in other regions.
- .b. Central and Western Mediterranean:** aimed to review the reintroduction projects (Spain, Italy and Portugal), discuss the present growth and potential populations and plan further recovery of breeding ospreys in this region. Potential attendees would come from Spain, Portugal, the southern French coast, Italy, Mediterranean islands and North Africa
- .c. Western and Central Europe:** aimed to review the reintroduction projects (United Kingdom and Switzerland), discuss present growth and potential population and plan further conservation and recovery of breeding ospreys in this region. Potential attendees would come from United Kingdom, Ireland, France, Luxembourg, the Netherlands, Belgium, southern Germany, Switzerland and Austria
- d. Central and Eastern Europe:** aimed to review the potential for the recovery of breeding ospreys in the region and agree a programme of actions. Potential attendees would come from Hungary, Czech Republic, Slovak Republic, Serbia, Romania, Bulgaria, Republic of Moldova and Ukraine.
- e. South East Europe:** aimed to review the potential for the recovery of breeding ospreys in this region and agree a programme of actions. Potential attendees from Greece, Albania, Croatia, Slovenia, 'the former Yugoslav Republic of Macedonia', Montenegro, Bosnia, Eastern Italy and including the eastern Mediterranean islands.



Building man-made nest in Urdaibai Biosphere Reserve

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8. APPENDIX

Table 3. Nearby countries with populations which may interact with European breeding populations.

Country	Number	Years	Trends	Reference
Algeria	9–15	1980s	+-	Isenmann and Moali 2000
Morocco	10-15	2013	+(-)	Monti et al, 2013
Spain. Chafarinas Islands	1	2008	+-	Triay and Siverio 2008
Total	32-38			

In 2014, it was reported that a colour-ringed osprey from Morocco had joined the new Andalusian breeding population.

Table 4. Countries with ospreys in Palaeartic Region (outside Europe)

Country	Number	Years	Trends	Reference
Canary Islands	7	2013		D. Trujillo and M. Siverio pers. comm
Cape Verde Islands	72–81	2001	-	Palma et al. 2004
Egypt	150–180	1984–89		Fisher et al. 2001a
Totals	229-268			