To what extent have conservation projects for the re-introduction and re-colonisation of the European Osprey (*Pandion haliaetus haliaetus*) to Britain been successful in aiding their reestablishment as a breeding species? An evaluation of seventeen successful case studies.

**Brittany Maxted**

This report approaches the rate of re-colonisation of the European Osprey (*Pandion haliaetus*) to Britain over the last sixty years, reflecting upon any successes and failures of human intervention via conservation projects. A range of seventeen case studies have been selected and evaluated from across England, Scotland and Wales. The first section provides background information on the European Osprey and its general attributes and life cycle. An account of its decline in the late 19th and early 20th century and the factors by which it was influenced is then provided. A case study of the Ospreys natural re-colonisation to Scotland in the 1950’s and the success of that project since is covered in the third section, followed by a case study on their reintroduction in the form of translocation from the aforementioned site to England. The remaining fifteen case studies follow, before a combined evaluation of all of the data. Finally conclusions and recommendations are provided, explaining why human intervention has been essential to the recent success of the Osprey in Britain and underlining why this work should be continued. All data and content is correct to the understanding of the author as of March 2015.
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### Large-scale charities involved in the projects mentioned in the following report:

<table>
<thead>
<tr>
<th>Charity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Forestry Commission</td>
<td>The Forestry Commission is the government department responsible for the protection and expansion of the woods and forests of England and Scotland (Forestry Commission, 2015).</td>
</tr>
<tr>
<td>Highland Foundation for Wildlife</td>
<td>The Highland Foundation for Wildlife is a Scottish based charitable trust dedicated to wildlife conservation and research. Manager Roy Dennis is an internationally renowned expert on Ospreys and has been involved with the majority of the projects in this report (Highland Foundation for Wildlife, 2015).</td>
</tr>
<tr>
<td>The National Trust</td>
<td>The National Trust is a conservation organisation which protects historic monuments and nature reserves in England, Wales and Northern Ireland (National Trust, 2015).</td>
</tr>
<tr>
<td>The National Trust for Scotland</td>
<td>The National Trust for Scotland is an independent charity for the preservation and conservation of natural and human heritage that is significant to Scotland and the world (National Trust for Scotland, 2015).</td>
</tr>
<tr>
<td>Natural England</td>
<td>Natural England is the government’s adviser on the natural environment, and provides practical scientific advice on how to manage England’s landscapes and wildlife (GOV, 2015).</td>
</tr>
<tr>
<td>The RSPB</td>
<td>The RSPB is the country’s largest nature conservation charity, which works with partner organisations to protect threatened birds and wildlife (RSPB, 2015).</td>
</tr>
<tr>
<td>Scottish Natural Heritage</td>
<td>Scottish Natural Heritage is funded by the Scottish Government, and promotes care for the natural heritage, wildlife, habitats, rocks, and landscapes of Scotland (Scottish Natural Heritage, 2015).</td>
</tr>
<tr>
<td>Scottish Wildlife Trust</td>
<td>The Scottish Wildlife Trust is a Scottish conservation organisation, caring for wildlife and campaigning on wildlife issues in Scotland (Scottish Wildlife Trust, 2015).</td>
</tr>
<tr>
<td>The Wildlife Trusts</td>
<td>The Wildlife Trusts is a collection of 47 individual trusts covering the UK, the Isle of Man and Alderney, all of which are environmental organisations working for nature’s recovery on land and at sea (Wildlife Trusts, 2015).</td>
</tr>
<tr>
<td>Wildfowl and Wetlands Trust</td>
<td>The Wildfowl &amp; Wetlands Trust (WWT) is a conservation charity working globally to safeguard and improve wetlands for wildlife (WWT, 2015).</td>
</tr>
</tbody>
</table>
To what extent have conservation projects for the re-introduction and re-colonisation of the European Osprey (*Pandion haliaetus haliaetus*) to Britain been successful in aiding their reestablishment as a breeding species? An evaluation of seventeen successful case studies.

The European Osprey has for many years been a focus of conservation projects: extinct from Britain for the first half of the last century, they are now returned and increasing in numbers. The most important factor of this trend has been the actions of humans and, therefore, it is these which must be evaluated for such a development to be understood. It is to human beings whom the Osprey owes its demise and its return, though which of these to the greater extent is yet to be determined.

1. *Pandion haliaetus haliaetus*

The European Osprey falls into a sub species (*P. h. haliaetus* – found in Europe, Asia and North Africa) of the Osprey species (*P. haliaetus*), a large bird of prey found worldwide, which inhabits areas close to large expanses of water (Dyfi Osprey Project, 2012i). Throughout the report the name Osprey will be used though all information refers to the European Osprey.

They are large, brown and white birds with a speckled crown, dark back, light underside and a dark streak across the eye (Dyfi Osprey Project, 2012i). They have piercing yellow eyes, which are orange in juvenile birds, and four reversible toes, with sharp talons and spines covering the underside of their feet in order to hold captured prey. They can also close their nostrils, preventing water from entering the airway when hunting (Forestry Commision, 2007).

As with most birds of prey, females are generally larger than males by around 10 to 15%, with female wingspans reaching 154 to 175 cm, and males between 147 and 166 cm. Males commonly weigh 1.4 to 1.6 kg whereas females tend to be heavier, weighing between 1.6 and 2.2 kg (Dyfi Osprey Project, 2012i). On average Ospreys live to around 10 to 15 years in the wild, though there are exceptions (Scottish Wildlife Trust, 2014b). The highest recorded age in the wild is 32 years (Mebs & Schmidt, 2014).

Ospreys are the only raptor to feed on a diet consisting entirely of fish (Dyfi Osprey Project, 2012i). They hunt for species in freshwater, brackish and marine environments, so their diet is varied, though the required conditions for catching them are more specific. The fish must be of medium size or
greater, in clear and unpolluted water, and must be available close to the surface to accommodate for the Osprey’s hunting style. It dives vertically from as high as 40 m above the water, feet first, and enters to a maximum depth of 1 m to catch its prey; with success roughly every one in four attempts (Forestry Commission, 2007). In Britain, Ospreys are regularly observed consuming species from the groups Mullet, Trout, Flounder, Bass, Roach and Perch, depending on their location (Dyfi Osprey Project, 2012f).

They are a migratory species, with British Ospreys breeding between March and September, and migrating south to West Africa and Southern Europe for the winter months. As British waterways stand a chance of freezing over during the cold winter months and food is scarcer during this time, this migration of up to 8,000 km is made to accommodate for the birds’ needs. They average several hundred km per day, stopping off on route for up to a week at a time at lakes and reservoirs to feed and rest, and arrive after 4 to 6 weeks of migration (Scottish Wildlife Trust, 2014b).

Ospreys are largely monogamous, usually only changing mate if their partner does not return (Scottish Wildlife Trust, 2014b). They begin breeding between the ages of 3 and 7 years (Dyfi Osprey Project, 2012i). They are also extremely faithful to their nests, called eyries, which are made of sticks, lined with mosses, bark and grasses. They generally measure between 120 and 150 cm in diameter and 50 to 60 cm in depth, and are constructed at the top of large trees or man-made structures such as power pylons. Sites are usually chosen within 3 to 5 km of water, in an open area for easy access (Forestry Commission, 2007).

The female of the pair will usually arrive back in Britain first, in late March or early April, followed by the male between 1 to 10 days later (Scottish Wildlife Trust, 2014b). Time will be spent adding to and repairing an existing nest, or constructing a new one (a process which takes both birds 14 to 24 days) if the old one is destroyed or the pair have not bred before (Forestry Commision, 2007). Mating then occurs, though there is usually much competition in this time, mainly from younger birds who may attempt to mate with one of the pair, but are often seen off (Scottish Wildlife Trust, 2014b). Eggs (roughly 64 by 42 mm in size) are laid a couple of days apart in late April, usually three eggs to more experienced pairs (rarely four) and two to new pairs (Dyfi Osprey Project, 2012i). Ospreys are single brooded and if a pair fails to breed they will often build a ‘frustration’ eyrie, which may be used the next year. Chicks hatch after around 35 to 40 days of incubation, carried out by both parents but predominantly the female whilst the male provides food and protects the nest (Scottish Wildlife Trust, 2014b). After they hatch during late April and early May the chicks are fed by the mother who remains on or close to the nest and receives fish from the male. At around five weeks, just before the chicks gain their first complete plumage, they are often ringed by conservation charities to allow them to be identified in the future. Two rings are used, one Darvic ring showing identification letters and numbers and one British Trust for Ornithology (BTO) ring (Forestry Commision, 2007).

Chicks fledge on average 53 days (seven to eight weeks) after hatching (Dyfi Osprey Project, 2012i), usually in late July, returning to the nest to be brought food by both parents for at least two weeks. During this time they develop their own hunting skills and become more independent (Forestry Commision, 2007). In early August the female is the first to leave on migration, but the male and chicks remain behind until late August to early September before leaving for Africa themselves (Scottish Wildlife Trust, 2014b). The young do not return to Britain until they are mature and able to breed,
usually at three years, though on occasion birds return early at the age of two (Rutland Osprey Project Online, 2014a).

Mortality rates in Ospreys are extremely high, with an estimated 50% of chicks fail to reach breeding age (Scottish Wildlife Trust, 2014b). These can be due to human influences, or natural causes such as bad weather, starvation or disease (Forestry Commission, 2007).

One behavioural trait commonly displayed by Ospreys, particularly males, is natal philopatry, whereby the birds return to breed in the vicinity from which they fledged (Forestry Commission, 2007). In study in the 1980’s, the natal philopatry displayed by collection of male Ospreys was so high that 80% settled within 10 km of their natal site, with none dispersing more than 50 km from their own site of fledging (Dyfi Osprey Project, 2012e). This behaviour results in slow expansion rates in the population and often intraspecific competition (with the species) for nest sites (Forestry Commission, 2007).

Ospreys are current classified as an Amber list species, a traffic light system of classification of conservation importance used by charities in the UK (RSPB, 2014a). The conservation methods utilised so far in Britain to encourage Ospreys to breed include: the construction of artificial nesting platforms and roosting perches, the protection and surveillance of nest sites, and the close monitoring and management of local fish populations with co-operation from fisheries. Satellite tracking and ringing are also employed in order to aid our understanding of the species and its development (RSPB, 2013b).

2. Extinction

Ospreys are not a rare species; in fact they are one on a numbered list whom can be found on all continents of the world, excluding Antarctica (Wildscreen Arkive, 2014). Their World Conservation Union ‘IUCN Red List of Threatened Species’ status is “Least Concern” and their population trend is ‘Increasing’ (IUCN Red List, 2013), showing there is no concern over their global numbers. So why worry over their absence from British Isles? Put simply, the Osprey was once a common summer sight in the skies of Britain; though predominantly found in the north, their presence was held even throughout the southern counties (Rutland Osprey Project Online, 2014d). But, as is the way with human development, around a two centuries ago their existence came into friction with ours.

There were several factors which lead to their disappearance. The first, persecution, came in two forms: direct persecution, such as the trapping, shooting and poisoning of Ospreys by gamekeepers and skin collectors (Brown, 1976), which was severe at a time when no laws prevented the capture and shooting of birds of prey. Egg collecting posed perhaps the greatest threat, a problem still experienced today at the nest sites of rare birds: eggs being a valuable commodity. Ospreys were also killed as they were seen to threaten fish stocks (Scottish Wildlife Trust, 2014b). Indirect persecution also occurred (though likely had a less dramatic influence over their decline), whereby harm was caused unintentionally or unknowingly (Brown, 1976): for example over exploitation of fish populations which the Osprey feeds on, disturbance of nests or entanglement in fishing lines causing death (Forestry Commision, 2007).

Another contributing factor was the widespread use of pesticides such as DDT. These contain harmful substances which interfere with calcium production, weakening the egg shells of bird species, including the Osprey, who being a large, clumsy species are known to tread on their own eggs during development or crush them during incubation (Dyfi Osprey Project, 2013c). The Ospreys do not
directly consume the crops sprayed with pesticides, but rain causes a large proportion of the chemicals to be washed into the soil, where runoff water flows into streams and eventually out to sea (BBC Education, 2014a). This greatly affects the biodiversity of the water, as it is here that it enters the ecosystem. This can decrease population and species numbers of native fish, as if the chemical enters the diet of the fish by consumption some individuals may be killed, reducing the food available for the next feeding (trophic) level, also known as the biomass (BBC Education, 2014b), and any individuals which survive may be consumed by other species and the concentration of the chemical will grow at higher trophic levels through a process called bioaccumulation (BBC Education, 2014a). This results in a depleted food source for the Ospreys, alongside an increased risk of consuming dangerous or toxic chemicals.

The final damning factor was habitat destruction, of both the Osprey’s habitat and the habitats of prey and species further down food chain (Brown, 1976). Increased numbers of boats on the seas and rivers, alongside the removal of forests for materials and new land, are likely to have had significant negative effects. It is likely that these same factors also occurred abroad at the Ospreys wintering and migration sites (Brown, 1976). Migration is a dangerous task for European Ospreys even today, with over 50% of juveniles dying en-route on their first attempt; though beyond this the mortality rate decreases (Anglian Water, 2008). This low survival rate and decreased number of breeding Ospreys returning Britain undoubtedy limits the increases in breeding numbers seen each year.

The overall expansion of the human population and decreased availability of habitats for breeding forced the birds further north, resulting in their extinction in England in 1847, when the last breeding was recorded in Somerset (Rutland Osprey Project Online, 2014d). Their decline continued for many years, until the last recorded pair bred on an island on Loch Loyne, in Scotland in 1916. After that summer they were extinct as a breeding species in Britain (Dyfi Osprey Project, 2012e).

3. Re-colonisation

Had the country not been engaged in two World Wars over the three decades following their extinction, it is possible that Ospreys may have returned sooner. Unfortunately, it is unlikely any serious effort was made to encourage them back to nest on our shores until at least the late 1940’s. During the time of their absence a small number of Ospreys were observed throughout Britain, with a few over-summering in Scotland (Rutland Ospreys, 2006a). However it was not until spring 1954 that Ospreys nested at the RSPB site at Loch Garten in the Cairngorms National Park, raising two chicks, becoming the first British breeding pair for 38 years. The pair returned the following year but it was not until 1959 that they successfully bred again, due to persecution of the nest, despite RSPB protection (Dyfi Osprey Project, 2012e). A pair has nested successfully at Loch Garten almost every year since (RSPB, 2014g).

Since the original re-colonisation the Scottish population has dramatically increased, though initially very gradually. The data below shows the estimated number of breeding Osprey pairs in Scotland between 1954 and 2001.
<table>
<thead>
<tr>
<th>Year</th>
<th>No. of breeding pairs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1954</td>
<td>1</td>
</tr>
<tr>
<td>1963</td>
<td>2</td>
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<tr>
<td>1966</td>
<td>3</td>
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</tr>
<tr>
<td>2000</td>
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</tr>
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<td>2001</td>
<td>153</td>
</tr>
</tbody>
</table>

*Figure 3.1: No. of breeding pairs, Scotland 1954 – 2001 (Highland Foundation for Wildlife, 2012b) (Rutland Ospreys, 2006a)*

What has made the return of this species, and its’ population growth since, possible? The protection provided to Ospreys dramatically increased upon their return to Britain: nests have been provided with security and surveillance to prevent egg theft, disturbance or any other threatening activities. In the 1970’s the pesticide DDT was phased out (Forestry Commission, 2007), reducing the risk of damage to eggs or complications in chicks which would prevent their survival. Similar protections were being made in Europe and the Osprey population there is growing also (Forestry Commission, 2007), increasing the likelihood of birds overshooting on migration and continuing on to Britain to breed.
Then in 1981 the Osprey was afforded the highest degree of legal protection under Schedule 1 of the Wildlife and Countryside Act 1981. It states that:

“It is an offence to intentionally take, injure or kill an osprey or to take, damage or destroy its nest, eggs or young. It is also an offence to intentionally or recklessly disturb the birds close to their nest during the breeding season. Violation of the law can attract fines up to £5,000 per offence and/or a prison sentence of up to six months.” (RSPB, 2014d)

This protection is widened, alongside further provided protection, by the Nature Conservation (Scotland) Act 2004. (Forestry Commission, 2007). In more recent years, satellite tracking has provided a greater insight into the threats that the birds face on migration and at their wintering sites, allowing interventions and the prevention of killings or avoidable Osprey deaths (Rutland Ospreys, 2006e).

Loch Garten continues to be a successful breeding site for British Ospreys and has played a large part in promoting their conservation. In 1958 when a new nest was adopted by the returning Ospreys, a ‘Watch Point’ was added nearby for public viewing, which attracted 14,000 visitors during the 1959 season. This site was later developed into the Loch Garten Osprey Centre, which is visited by up to 50,000 members of the public each year (Roberts, 2011).

The data below is for the main nest at Loch Garten between 2007 and 2014.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of eggs laid</th>
<th>No. of chicks hatched</th>
<th>No. of young fledged</th>
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</thead>
<tbody>
<tr>
<td>2003</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
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<tr>
<td>2005</td>
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<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>28</td>
<td>24</td>
</tr>
</tbody>
</table>

Figure 3.4: No. of eggs laid, chicks hatched and young fledged each year, Loch Garten (Imagicat, 2014a)
The female present on the nest in 2003 had returned for her tenth year but failed to breed, and the female that has bred there since 2003 first bred on a nest 25 kilometres from Loch Garten, in 2002 (Imagicat, 2003). Competition on the nest for many years has often resulted in the damaging of eggs and killing of chicks (Imagicat, 2005), which could imply that the Osprey population at Loch Garten is greater than can be sustained.

The Loch Garten Ospreys have also largely impacted the local economy, and in 2004 the estimated spending as a result of the Ospreys was £1.89 million (Dickie, et al., 2006). That year Scottish Natural Heritage provided a £4,169 grant towards improving viewing equipment and visitor engagement material at the Loch Garten Osprey Centre. The site has seen many investments in its time, in order to provide for over 2 million visitors since 1959 (Scottish Natural Heritage, 2004).

4. Re-introduction

Rutland Osprey Project

The Rutland Osprey Project is based at Rutland Water, a nature reserve in central England, and is run by the Leicestershire and Rutland Wildlife Trust in partnership with Anglian Water (Rutland Osprey Project Online, 2015). The main site is a 1255 hectare reservoir, constructed in 1975 and surrounded by 182 hectares of reserve land (Highland Foundation for Wildlife, 2012a). It has become an internationally important site for nature and is a SSSI (Site of Special Scientific Interest), SPA (Special Protection Area) and Ramsar site (Convention on Wetlands of International Importance) (Rutland Osprey Project Online, 2014d).

Despite nearly 30 years of breeding success in Scotland there had still been no known breeding attempts in England and Wales. Several Ospreys had been observed stopping off on migration: mostly Scottish, and on occasion Swedish, birds. In 1986, in an attempt attract passing migrants to Scotland,
an artificial Osprey nest was constructed at Rutland. During 1994 a young female over summered (Rutland Osprey Project Online, 2014d), and in 1995 five further artificial nest platforms were constructed (Highland Foundation for Wildlife, 2012a).

Later that year, after work failed to instigate breeding yet again, it was proposed by Roy Dennis and Reserve manager Tim Appleton, that a method of greater intervention might be used. A proposal was put forward for a translocation to occur, whereby chicks from Scotland would be removed from their natal nests, then raised and released under strict protection at Rutland (Highland Foundation for Wildlife, 2012a). The Scottish population was chosen as opposed to a European population as they were believed to be (genetically) closest to the original British population. This was immediately supported by the Leicestershire and Rutland Wildlife Trust, and Anglian Water pledged funding for the project (Rutland Osprey Project Online, 2014d). Through 1995 several evaluations took place including a study predicting the impacts of the project on local conservation and fishing societies and corporations. An independent analysis was also conducted on the Scottish population to ensure it was sufficiently stable to undergo removals from clutches. Approval of English Nature was also sought after in order to hold the birds in temporary captivity. During May 1996 the Rutland team visited a raptor centre with 20 years of translocation experience in Minnesota, USA, hoping to gain an insight into the procedure (Rutland Ospreys, 2000).

Licence was granted in June 1996 by Scottish Natural Heritage, under section 16 of the Wildlife and Countryside Act, for up to twelve chicks to be removed each year from 1996 to 2001 from 35 nests in the Eastern Scottish Highland region (Dyfi Osprey Project, 2012e). It was required that the appeal was reviewed every year of the project’s duration. A total of eight, six-week-old chicks were removed from Scottish broods of three or two in July 1996 (all on Forestry Commission private land), and transported by van down to Rutland during the night (Rutland Ospreys, 2000). Upon arrival the chicks were ringed and placed, in clutches of three, in pens overlooking the reservoir. These pens were approximately 2 m² in size, containing an artificial nest and perches (Highland Foundation for Wildlife, 2012a).

During their period of captivity the chicks were fed two to three times a day, with food passed through hatches in the back of the pen to avoid disturbance and human interaction. Close monitoring took place 24 hours a day with CCTV used to observe the birds’ every movement: the number of wing flaps of each bird and their time spent feeding was recorded. In addition, the chicks were checked by a vet from London Zoo, when faeces samples were taken for analysis and blood samples to determine the sex of each bird (Rutland Osprey Project Online, 2014d). Finally a satellite tag weighing 15 grams and capable of tracking over short distances was attached to the central tail feather of each chick, allowing their first movements after release to be monitored. These tags fall off with the first moulting at one year, when the feathers are shed, and provides no impediment to the flight of the bird (Rutland Ospreys, 2006c).

When the chicks in an individual pen were ready for release, volunteers and wardens would watch from key points on the reserve with binoculars. The front of the pen would be lowered and, after several hours in the majority of cases, the chicks would take their first flights and land on nearby trees and artificial nests (Rutland Osprey Project Online, 2014d). Food was provided for the Ospreys for the time they remained at Rutland, whilst they were still learning to hunt, placed out on these artificial nests. By late August some of the chicks were observed on other lakes in the area, out of range of the trackers, though still returning at night to feed. During this time four of the chicks died due to natural
causes, an occurrence no different than that in wild situations. By the end of September all of the four remaining chicks had left on migration (Rutland Ospreys, 2006b).

The following year the process was repeated and eight chicks were translocated, this time all male. Every year from 1998 to 2001 twelve chicks were taken from Scotland, three females and nine males each time. Of those released in 1999, five were fitted with satellite transmitters which track the Ospreys’ location on the globe at all times, allowing their migration to be monitored. In 2000 five more chicks were tagged and in 2001 a further four (Rutland Ospreys, 2006d).

Of this original translocation in which a total of 64 chicks were released, thirteen were known to have returned to the UK by 2012, ten of these to Rutland Water (Dyfi Osprey Project, 2012g).

Finally in 2001 a translocated male from 1997, who had returned in both 1999 and 2000, mated with an un-ringed female, presumed to be Scottish born and produced three eggs, fledging one chick: the first know Osprey born in England for 150 years (Rutland Ospreys, 2006d). Since then breeding at Rutland has dramatically increased.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of breeding pairs</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2002</td>
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<tr>
<td>Total</td>
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</tbody>
</table>

Figure 4.1: No. of breeding pairs and young fledged each year, Rutland Water (Rutland Osprey Project Online, 2013b)
In 2004, six adult males were frequently seen at Rutland all of which were original translocated birds and all of which failed to attract a mate. In 2005 a further and final large-scale translocation took place, and nine out of the eleven chicks selected were female, in an attempt to even up gender numbers and provide partners for the many returning males (Rutland Osprey Project Online, 2014d). A total of 69 of the 75 chicks translocated between 1996 and 2005 successfully migrated, and excluding the birds from 2005 there was a 22% return rate of these chicks to Britain by 2006 (Rutland Ospreys, 2006d), and ten of the original 64 had returned to Rutland Water by 2012 (Dyfi Osprey Project, 2012g).

The success of the translocation project at Rutland Water has directly led to similar successful projects for Ospreys in Spain and Italy. It is now thought that the Rutland site has a sufficiently stable population to eliminate the need for future translocations, and both Rutland born and translocated Ospreys have returned to breed in many parts of Britain, adding hugely to the population. The project has also encouraged Scottish Ospreys to begin breeding in England and Wales (Rutland Osprey Project Online, 2014d).

The male from the first successful breeding at Rutland raised a total of 32 chicks at the same nest between 2001 and 2013, with three different females. This amounts to 42% of all the chicks bred on site to that date. Eight of the Rutland chicks born before 2014 have returned to breed, and one third of all 87 chicks that fledged there from 2001 to 2014 did so from a collection of just five nests between 2013 and 2014 (Rutland Osprey Project Online, 2013b).

In 2010 a webcam was added to a nest occupied by a returning male, born 2004 and an un-ringed female, first breeding that year (Rutland Osprey Project Online, 2013b). They continued to breed here.
raising a total of eleven chicks (Rutland Osprey Project Online, 2013b) until the male did not return in 2014, when the female subsequently bonded and bred with a 2010 born Rutland male. They successfully laid three eggs but these were kicked out by a 2011 born male, who then bonded with the female too late in the season to attempt a second breeding (Rutland Osprey Project Online, 2014b). This nest is the main public attraction with two viewing hides constructed no more than 250 metres away, which are staffed during the breeding season (Rutland Osprey Project Online, 2013b).

Additionally, in 2014 two photographic hides were constructed at separate sites on the reserve where the Ospreys can be photographed fishing for trout and other fish from small lakes (Rutland Osprey Project Online, 2014c).

5. Further Re-colonisation

Scotland

Loch of the Lowes

The Loch of the Lowes Visitor Centre and Wildlife Reserve is located near Dunkeld in Perthshire, and is managed by the Scottish Wildlife Trust (Scottish Wildlife Trust, 2014a). Ospreys have been breeding here since 1969 and as of 2014, of those 45 years of breeding, the same female has returned to breed for 26 of them. She has been named Lady of the Loch and she is the oldest breeding osprey known in Britain. Estimated to be 30 years old, in her time she has laid 78 eggs and has fledged 51 chicks over a period of twenty four years (Scottish Wildlife Trust, 2012). The observation hide at Loch of the Lowes is 150 metres from her nest, allowing her breeding to be watched by the public for many years (Scottish Wildlife Trust, 2014a).

The data below is for Lady of the Loch at Loch of the Lowes between 2007 and 2014.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of eggs laid</th>
<th>No. of chicks hatched</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2008</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2009</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2010</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2011</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2012</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2013</td>
<td>4</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2014</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td><strong>25</strong></td>
<td><strong>11</strong></td>
<td><strong>9</strong></td>
</tr>
</tbody>
</table>

Figure 5.01: No. of eggs laid, chicks hatched and young fledged each year, Loch of the Lowes 2007 - 2014 (Imagicat, 2014b)
Figure 5.02: No. of eggs laid, chicks hatched and young fledged each year, Loch of the Lowes 2007 - 2014 (Imagicat, 2014b)

Lady has had four partners in her time: an un-ringed male between 1991 and 1995, a ringed male from then until 2009 (Scottish Wildlife Trust, 2014b) and a third took over in 2010 before the fourth came in 2012 (Scottish Wildlife Trust, 2012). The three unhatched eggs from 2013 and two from 2014 were analysed and found that, in each case, just one was fertile (Imagicat, 2013). The third egg from 2014 was predated from the nest by a crow (Imagicat, 2014b).

**Aberfoyle Osprey Project**

The Aberfoyle Osprey Project is based in the Trossachs region, where ospreys have been breeding since the 1970’s, and is a partnership between the RSPB and Forestry Commission Scotland (Forestry Commission, 2014a). In 2004, to mark the 50th anniversary of Ospreys returning to Britain, the David Marshall Lodge forest visitor centre and viewing facilities were set up near Aberfoyle, where the public can view live feeds from the main Osprey nest (Wild About Britain, 2005).

The data below is for the Aberfoyle Osprey Project between 2008 and 2014.
<table>
<thead>
<tr>
<th>Year</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>2</td>
</tr>
<tr>
<td>2009</td>
<td>0</td>
</tr>
<tr>
<td>2010</td>
<td>3</td>
</tr>
<tr>
<td>2011</td>
<td>0</td>
</tr>
<tr>
<td>2012</td>
<td>2</td>
</tr>
<tr>
<td>2013</td>
<td>3</td>
</tr>
<tr>
<td>2014</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

Figure 5.03: No. of young fledged each year, Aberfoyle (Aberfoyle Ospreys, 2008a) (Aberfoyle Ospreys, 2009b) (Aberfoyle Ospreys, 2010a) (Aberfoyle Ospreys, 2011b) (Aberfoyle Ospreys, 2012) (Aberfoyle Ospreys, 2013) (Aberfoyle Ospreys, 2014)

In 2009 the resident ringed female of six years bred with an un-ringed male, who was assumed to be her partner of that time (Aberfoyle Ospreys, 2008b), but the single egg that she laid was kicked out by an intruder male following the un-ringed males’ disappearance (Aberfoyle Ospreys, 2009c). The following year, when eggs on the first nest were once again kicked out, a camera was added to a second nest which successfully raised three chicks (Aberfoyle ospreys, 2010b). In 2011 a new female and the intruding male bred from 2010, laying three eggs, which the female abandoned before they had hatched (Aberfoyle Ospreys, 2011a). A third, new nest was home to the only successful pair in 2012, which raised two chicks (Aberfoyle Ospreys, 2012) and have returned each year since (Aberfoyle Ospreys, 2014).
Tweed Valley Osprey Project

The Tweed Valley Osprey Project was started in 1999, in a partnership between the RSPB and the Forestry Commission Scotland (BBC, 2008a), after a pair of Ospreys successfully re-colonised the Scottish Borders in 1998, raising one chick. Following this a number of artificial nests were constructed (Forestry Commission, 2014b) and the following year the pair returned to breed again. By 2006 there were a total of five breeding pairs in the Borders and nine known nest sites (Forestry Commission, 2007), the main ones at Tweed Valley Forest Park, near Peebles (Kailzie Gardens, 2014).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of breeding pairs</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1999</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2000</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2001</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>2002</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2003</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>2004</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>2005</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td>2006</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

Figure 5.05: No. of breeding pairs and young fledged each year, Scottish Borders 1998 - 2006 (Forestry Commission, 2007)

Figure 5.06: No. of breeding pairs and young fledged each year, Scottish Borders 1998 - 2006 (Forestry Commission, 2007)
A female chick born on the main nest in 1999 was found breeding at a site in Aberfoyle in 2007 (Wild About Britain, 2007). In 2005 one of the four breeding pairs raised and fledged all of their four chicks, the first recorded incidence of this in Britain (Scottish Wildlife Trust, 2013). A chick raised in 2003 was recorded in Dumfries and Galloway, the county south west of the Scottish Borders, in 2008 (Tweed Valley Ospreys, 2008a). In 2010 a male born on of the main nest at Tweed Valley in 2002 was found to be breeding with an un-ringed female in Perthshire (Tweed Valley Ospreys, 2010a).

In 2007 two Osprey Watch centres were opened by the project (Wild About Britain, 2007), one at Kailzie Gardens and one at Glentress, both near Peebles, with live camera feeds from Osprey nests for public viewing, along with information about other wildlife in the area (Visit Tweed Valley, 2014). The camera link was added in 2004 to a nest on which a pair started breeding in 2002, and images of several nests have been shown online each year since, with a link added to a nest started in 2003 during 2006 (Forestry Commision, 2007). These two main nest sites have been those most closely monitored and viewed by the public since then, along with a third site in 2014 (Tweed Valley Osprey Project, 2014a).

The male breeding on the main nest in 2007 was identified to be a bird born in Aberfoyle in 1997 (Wild About Britain, 2007), and that year he raised three chicks with his un-ringed female, whilst the pair on the second nest produced two chicks (Tweed Valley Ospreys, 2008c).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of breeding pairs</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2008</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2009</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2010</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>2011</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2012</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>2013</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2014</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

In 2010 a female, ringed at one of the eight successful nests in the Scottish Borders in 2007 (Tweed Valley Ospreys, 2008a), was found breeding in Tweed Valley and raised chicks with an unidentified male (Tweed Valley Ospreys, 2008b). A total of seven Osprey chicks were fledged in the Tweed Valley in 2007, to eight pairs, followed by eighteen in 2008 to the same number (BBC, 2008a). A total of 85 chicks were fledged by the Tweed Valley Osprey Project between 1998 and 2010 (Edmonton Journal, 2010). In 2012 the female on the main nest laid a total of four eggs, a repeat of 2005, but one of these did not hatch and again she fledged a total of three chicks (Tweed Valley Ospreys, 2012a). There were nine known breeding pairs in the Tweed Valley that year (ITV, 2013).

For the first time since 2004, in 2014, the main nest failed to fledge chicks, as the returning pair laid three eggs, but shortly afterwards the female disappeared and was presumed dead. In her time at Tweed Valley she had reared a total of 26 chicks (Tweed Valley Osprey Project, 2014b). The eggs did not hatch, but the male was joined a little later in the season by a new female. Meanwhile a camera link was added to a third nest and each of the two live streaming nests produced two chicks (Tweed Valley Osprey Project, 2014a).

**Caerlaverock Osprey Project**

The Caerlaverock Wetland Centre in Dumfriesshire is managed by the WWT and Ospreys have been nesting there since 2009. The Caerlaverock Osprey Project is a partnership between WWT, Forestry...

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1</td>
</tr>
<tr>
<td>2010</td>
<td>3</td>
</tr>
<tr>
<td>2011</td>
<td>2</td>
</tr>
<tr>
<td>2012</td>
<td>0</td>
</tr>
<tr>
<td>2013</td>
<td>2</td>
</tr>
<tr>
<td>2014</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

Figure 5.09: No. of young fledged each year, Caerlaverock (Youdale, 2012) (WWT, 2013) (RSPB, 2014e)

In 2012, the resident male did not return on migration and the female attracted a new mate, laying two eggs. A fight between the new male and an intruding male caused the eggs to be crushed meaning that no hatching occurred that year (WWT, 2012). However during July that year, a male born on the nest in 2010 was seen in Wigtown Bay, on the nest at which his father hatched (Youdale, 2012).
Threave Estate

Threave Estate is a reserve in Dumfries and Galloway, managed by the National Trust for Scotland. It is situated close to the Scottish Border and to other successful Osprey projects in Scotland, which resulted in a strong Osprey presence there for many years (National Trust for Scotland, 2014). In 2007 an artificial Osprey nest was erected, close to the River Dee which runs through the estate, in an attempt to attract migrants (National Trust for Scotland, 2013). In 2008 a male born in Glaslyn in 2006 spent the summer on the nest with an un-ringed female, and though no breeding occurred the pair spent the time bonding. In 2009 the first breeding occurred, as it has done each year since with a successful fledging rate (Glaslyn Wildlife, 2014c).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>2</td>
</tr>
<tr>
<td>2010</td>
<td>3</td>
</tr>
<tr>
<td>2011</td>
<td>2</td>
</tr>
<tr>
<td>2012</td>
<td>2</td>
</tr>
<tr>
<td>2013</td>
<td>2</td>
</tr>
<tr>
<td>2014</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13</strong></td>
</tr>
</tbody>
</table>

*Figure 5.11: No. of young fledged each year, Threave Estate (National Trust for Scotland, 2013) (NTS Dumfries and Galloway Countryside Team, 2014)*

The winter of 2009 also saw the construction of an Osprey public viewing platform and in 2010 one of the 2009 chicks was sighted and photographed in Brittany, France (National Trust for Scotland, 2013). The female did not return in 2012 and the male was joined by a new female who was later confirmed to be a Scottish, Stirlingshire-born chick from 2009 (Glaslyn Wildlife, 2014c).
Wigtown Bay Osprey Project

Ospreys have been breeding in Wigtown Bay in Dumfries and Galloway since 2002, on a nest built in 2001, raising a total of sixteen chicks. They were the first Ospreys in Galloway for over 100 years (Visit Southern Scotland, 2014). The project was taken over by the RSPB in 2011 and is a partnership between Dumfries and Galloway Council, RSPB Scotland, Scottish Natural Heritage and Dumfries and Galloway Constabulary (RSPB, 2011a).

It is speculated that the same female, born in Aberfoyle 1998, has been the mother of all of the fledged young, though her presence was not formally identified until 2004 (RSPB, 2011c), when a CCTV system was set up on the nest (RSPB, 2011d). The male was born at Loch of the Lowes in 1993 (Wigtown Guesthouse, 2011). The CCTV is linked to screens in the County Buildings in Wigtown (RSPB, 2011d).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>1</td>
</tr>
<tr>
<td>2003</td>
<td>1</td>
</tr>
<tr>
<td>2004</td>
<td>2</td>
</tr>
<tr>
<td>2005</td>
<td>2</td>
</tr>
<tr>
<td>2006</td>
<td>1</td>
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<tr>
<td>2007</td>
<td>0</td>
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<tr>
<td>2008</td>
<td>3</td>
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<td>2009</td>
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<tr>
<td>2010</td>
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</tr>
<tr>
<td>2011</td>
<td>2</td>
</tr>
<tr>
<td>2012</td>
<td>0</td>
</tr>
<tr>
<td>2013</td>
<td>0</td>
</tr>
<tr>
<td>2014</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

The original male did not return in 2007 and so no breeding occurred but the female began bonding with a male born in Abernethy Forest in 2003. This pair successfully returned to breed each year between 2008 and 2011 (RSPB, 2011d). A male born on the nest in 2004 was found breeding with an un-ringed female at Caerlaverock in Dumfriesshire in 2009, and successfully raised one chick (Wigtown Guesthouse, 2011). In 2011 the Wigtown pair hatched three eggs, with one chick dying before fledging (BBC, 2011d) and another disappearing shortly after leaving the nest (RSPB, 2011b). There were no Ospreys present at the nest in 2012 and though a new pair was present the following two years and attempted to mate, the female was thought to be too young to breed successfully (RSPB, 2014h).

**Wales**

There are three Osprey projects in Wales and several other successful breeding’s besides. Each has produced chicks which have built upon the Welsh Osprey population.

**Glaslyn Osprey Project**

The Glaslyn Ospreys Project is run near Porthmadog in Gwynedd, North Wales. Started in 2004 by the RSPB, who were then managing the sites in the local area, the project has now been handed over to the community run organisation Glaslyn Wildlife (Glaslyn Wildlife, 2014d). During the years 2001 to 2003 several Ospreys were spotted over summering in the Glaslyn valley, including a pair briefly during the latter summer. On May 19th 2004 a pair was found to be nesting on a naturally built nest not far from sighting points from previous years. This was the first recorded successful breeding in Wales since the Ospreys’ re-colonisation of Scotland, though initially the number of chicks was unknown. The male was one of the original birds translocated to Rutland whilst the female was un-ringed.

![Figure 5.14: No. of young fledged each year, Wigtown Bay (Wigtown Guesthouse, 2011) (Portpartrick, 2011) (Sharons’s Kitchen, 2010) (RSPB, 2011c) (RSPB, 2012) (RSPB, 2013a) (RSPB, 2014h)](image-url)
The RSPB put in protection measures including a 24 hour on site surveillance of the nest, and the several senior officials from other Welsh reserves were brought in to aid the management of security and public interest. To prevent disturbance of the pair by the public, a fenced viewing area was constructed at a suitable distance from the tree. Unfortunately, on June 30th a violent storm caused the nest to collapse and the two chicks were killed falling 80 feet to the ground. The pair began to rebuild their nest and though did net attempt to breed again that year. Despite this the public viewing remained open and attracted 9500 visitors in the eight weeks it was open (Glaslyn Wildlife, 2014c).

Before the pair returned the following year, the tree holding the nest was climbed by RSPB staff, who removed the rotten branched which had supported the nest and put up a strengthened nesting platform. On this was placed an artificial nest which had been constructed with the help of children from local schools. A CCTV camera was also attached to the nest so that the birds could be observed more closely, by both visitors and staff. The male from the previous year returned in the spring and bred successfully with a different un-ringed female (Glaslyn Wildlife, 2014c). Visitor numbers reached over 75,000 that year, with the Osprey pair watched on the live link to the visitor centre and through binoculars from the viewing area (Buarthau, 2014). The same pair has returned every year since raising a total of 26 chicks as of 2014 (Glaslyn Wildlife, 2014d).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of eggs laid</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>2005</td>
<td>3</td>
<td>2</td>
</tr>
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<td>2006</td>
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<td>2007</td>
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<td>2</td>
</tr>
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<td>2014</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>32</strong></td>
<td><strong>26</strong></td>
</tr>
</tbody>
</table>

*Figure 5.15: No. of eggs laid and young fledged each year, Glaslyn*(Glaslyn Wildlife, 2014c) *(Glaslyn Wildlife, 2014a)*
Figure 5.16: No. of eggs laid and young fledged each year, Glaslyn (Glaslyn Wildlife, 2014c) (Glaslyn Wildlife, 2014a)

The first 2010 chick, hatched on May 9th, was confirmed to be the earliest ever recorded in the UK (Glaslyn Wildlife, 2014c).

Many of these chicks have since been observed at other sites within Europe. In 2008 a 2006 Glaslyn born male was found present on the nest at Threave Estate, Scotland, and bred there the six consecutive years following. This was the first recorded Glaslyn born chick to have returned to Britain (Glaslyn Wildlife, 2014c). A 2007 Glaslyn male was sighted at Blagdon Lake, Somerset in early 2013 and shortly afterwards proceeded to Kielder Forest where he has bred on the first nest since 2012. A second Glaslyn male from 2005 has also been identified as one of the Ospreys on the second nest at Kielder since 2011. One of the 2011 chicks of this male was photographed in North Yorkshire, also in 2013, being the first grandchild of the Glaslyn pair to be seen returning to the UK (Glaslyn Wildlife, 2014c). A male Glaslyn born chick from 2011 was observed and photographed on migration later the same year near Zurich, Switzerland. In July 2012 a 2009 Glaslyn female landed on the nest at Loch of the Lowes, seen for the first time since fledging her natal nest (Glaslyn Wildlife, 2014c).

Between the dates of 2005 and 2013 a total of 300,000 members of the public visited the site (Glaslyn Wildlife, 2014d). A viewing screen was built to ensure fewer disturbances and additionally a visitor centre at Pont Croesor near Porthmadog (RSPB, 2014c). Further improvements were made to the nest in 2007 and an additional two cameras were added to the nest to allow better observations. Several alterations have since been made to the site and facilities, to allow better access and ease of public use (Buarthau, 2014). In 2013 the management of the project was handed over to Glaslyn Wildlife who worked during 2014 to improve the viewing facilities, to re-open them fully in the breeding season of 2015 (Glaslyn Wildlife, 2014b).
Welshpool

The first successful fledging of Welsh Ospreys occurred at a site near Welshpool in Mid-Wales in 2004, the same year as the first Glaslyn breeding. A single chick was raised by an original 1997 translocated Rutland male and a 2001 female from Perthshire (Dyfi Osprey Project, 2012g).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
</tr>
</tbody>
</table>

Figure 5.17: No. of young fledged each year, Welshpool (Dyfi Osprey Project, 2012g)

Dyfi Osprey Project

Montgomeryshire Wildlife Trust provided 24 hour protection of the site (Dyfi Osprey Project, 2012g). The female did not return the following year (Dyfi Osprey Project, 2012g) and no breeding occurred then or since (BBC, 2005).

In 2004 it was seen that a satellite tagged female from Scotland passed through the Dyfi estuary on her first winter migration (Dyfi Osprey Project, 2012g). In 2007 an artificial nest was constructed by volunteers at the Montgomeryshire Wildlife Trust and erected on an area of wetland close to the river. This nest has been occupied by at least one Osprey every year since (Dyfi Osprey Project, 2012g): one male and one female each taking interest in 2008 though at separate times in the breeding season (Dyfi Osprey Project, 2012a). The male returned in 2009; his identity was unknown, but was speculated to be the chick from the Welshpool nest in 2004, and after some debate about his sex he was named Monty by the Trust volunteers (Dyfi Osprey Project, 2012h). He has returned to the nest every year since (Dyfi Osprey Project, 2014). Monty was joined on the nest by a second male, named Scraggly (Dyfi Osprey Project, 2012h), in both 2009 and 2010 when they each failed to attract a mate, which caused much dispute over genders (Dyfi Osprey Project, 2012a). In 2009 an ash tree perch was constructed a short distance from the nest and a live camera link was installed (BBC, 2014e).

Finally in 2011 Monty was joined by a female born at Rutland Water in 2008 and they bred successfully raising three chicks, the first time Ospreys had bred on the Dyfi estuary for over 400 years. The female was given the name Nora (Dyfi Osprey Project, 2012h) and her father was an original translocated Rutland chick (Dyfi Osprey Project, 2013a). That year the nest was visited by at least eleven intruder Ospreys attempting to take over the site. In the late breeding season the Montgomeryshire Wildlife Trust were approached by the BBC to satellite tag the three chicks for the upcoming series of Autumnwatch so that their migrations could be shown. This was the first time all the chicks from one nest had been tagged. Two of the trackers were funded by the BBC and the third by the Trust, each weighing 30g and fitted by Roy Dennis, the only person in Britain licenced to fit satellite tags to Ospreys (Dyfi Osprey Project, 2012b).
Both Monty and Nora returned in 2012 but severe storms meant that just one of their three chicks survived (Dyfi Osprey Project, 2012c). In 2013 however Nora did not return and a new female born in 2010 arrived. Named Glesni, she was also Rutland born of a translocated father though at a different nest and was biologically Nora’s niece (Dyfi Osprey Project, 2013a). Glesni and Monty have been the breeding pair at Dyfi since, successfully raising four chicks by 2014 (Dyfi Osprey Project, 2013b) (Dyfi Osprey Project, 2014).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>3</td>
</tr>
<tr>
<td>2012</td>
<td>1</td>
</tr>
<tr>
<td>2013</td>
<td>2</td>
</tr>
<tr>
<td>2014</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>8</strong></td>
</tr>
</tbody>
</table>

Figure 5.18: No. of young fledged each year, Dyfi (Glaslyn Wildlife, 2014c) (Dyfi Osprey Project, 2013b) (Dyfi Osprey Project, 2014)

Figure 5.19: No. of young fledged each year, Dyfi (Glaslyn Wildlife, 2014c) (Dyfi Osprey Project, 2013b) (Dyfi Osprey Project, 2014)

A total of 31,000 members of the public visited Dyfi during the breeding season of 2013 (BBC, 2014d), and over 1.7 million people logged on to watch the live stream from the nest cameras (BBC, 2014e). In 2014 a £1.4 million viewing observatory was opened on the wetland, constructed a safe distance from the nest. Largely funded by grants from the Heritage Lottery Fund and the European Regional Development Fund (BBC, 2013b), this new building has three viewing levels to allow closer observation of the birds without disturbance. It aimed to engage the public with not just the Ospreys but all of the species in the wetland ecosystem (BBC, 2014d).
Roy Dennis said in 2011 that he believed there is the potential to have “ten pairs of Ospreys [breeding] on the Dyfi estuary”, suggesting that this project can be expanded greatly in future years (Dyfi Osprey Project, 2012b).

**Snowdonia**

There are a number of other artificial nests in Wales which aim to encourage breeding Ospreys to re-colonise new areas. Friends of the Ospreys is conservation group, set up in 2004 under the guidance of Roy Dennis who believed that more Welsh projects were required to support the pair at Glaslyn. They began building artificial nests within 10 km of the initial site in 2005, the first nest being occupied by a male just two weeks later. These nests were aimed not only to encourage new Ospreys to breed in Wales, increasing the genetic variety of the Welsh population, but also to provide breeding sites for offspring of the Glaslyn pair (Friends of the Ospreys, 2014a). By 2012 a total of ten nests had been constructed (BBC, 2012a) and that year a breeding occurred between a pair of un-ringed Ospreys, producing one chick (Glaslyn Wildlife, 2014c). They have bred there each year since producing a total of six young (Friends of the Ospreys, 2014b). A second pair occupied another of the nests the same summer but did not breed, and three other nests had individual visits (BBC, 2012a).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>1</td>
</tr>
<tr>
<td>2013</td>
<td>2</td>
</tr>
<tr>
<td>2014</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
</tr>
</tbody>
</table>

*Figure 5.20: No. young fledged each year, Snowdonia (Glaslyn Wildlife, 2014c) (Friends of the Ospreys, 2014b)*

![Graph](image)
A Rutland born female from 2010 was found at another of the nests in 2013 with a male, who left before breeding could occur (Friends of the Ospreys, 2013). The following year she returned and found a second mate but too late in the season to breed (Friends of the Ospreys, 2014b).

By 2014 a total of 14 nests had been constructed by the project, four of these having been occupied, though only one pair breeding (Friends of the Ospreys, 2014a). The group planned to construct a further six nests in North and Mid-Wales after 2014 (Friends of the Ospreys, 2014b).

Powys

The final successful breeding record in Wales in 2014 came from a new un-ringed pair in Powys, Mid-Wales, on an artificial nest at a Welsh Government Woodland Estate site, successfully raising two chicks. Two other young Ospreys attempted to compete with the pair for the nest, but were unsuccessful (BBC, 2014f).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>

Figure 5.22: No. of young fledged each year, Mid-Welsh site (BBC, 2014f)

This brought the total number of chicks fledged in Wales in 2014 to ten, the greatest number to date (Friends of the Ospreys, 2014b).

England

As of 2014 there are four successful Osprey Projects in England, besides Rutland Water, all of which are on sites managed by the Forestry Commission, the Wildlife Trusts or Natural England (Kielder Ospreys, 2014b).

Lake District Osprey Project

The Lake District Osprey Project is based at Bassenthwaite in the Lake District, Cumbria and is managed by the RSPB and Forestry Commission in partnership with the Lake District National Park Authority (Natural Economy Northwest, 2008). The first attempts to attract Ospreys to breed at Bassenthwaite occurred in the 1990’s when the Forestry Commission erected several artificial nests, and in 2000 a pair unsuccessfully bred on one of the nests. Later that year the Osprey Project was founded to ensure protection for the birds, should they return in the future (North West Evening Mail, 2007). In 2001, the same year as the first successful breeding at Rutland Water, the pair returned and raised the first Osprey chick in the Lake District for 150 years. Ospreys have returned to breed here each year since (BBC, 2014b).
<table>
<thead>
<tr>
<th>Year</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>1</td>
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<tr>
<td>2002</td>
<td>2</td>
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<td>2003</td>
<td>1</td>
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<td>2004</td>
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<td>2012</td>
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<tr>
<td>2013</td>
<td>2</td>
</tr>
<tr>
<td>2014</td>
<td>2</td>
</tr>
</tbody>
</table>

**Total** 28


The female from the original pair did not return in 2007 and the male was joined by a new female (Natural Economy Northwest, 2008). The next year they moved to a new artificial nest which had been erected nearby in an attempt to encourage more pairs to breed (RSPB, 2008b). They bred here for a
further two years then moved for a second time, in 2011, on this occasion building a new nest (BBC, 2011a). In 2012 the male did not return for the first time since 2001 (Visit Cumbria, 2012).

In 2012 the project’s new and only breeding pair were at an artificial nest near Keswick, south of Bassenthwaite, where a single chick was raised (BBC, 2012d). The male of this nest was himself born at the original nest at Bassenthwaite in 2007 and the female was un-ringed, though believed to be returned from the previous year, when a nest was built with a different male, but fell from its tree and was replaced by an artificial nest later in the season (BBC, 2012e).

This pair did not breed the next year and so another pair, this time both un-ringed, arrived and became the only breeding Ospreys at Bassenthwaite. However the female was kicked off the nest before laying by another female born in Inverness-shire in 2009 (Osprey Watch, 2013a), and she successfully bred with the male, raising two chicks (Lakestay, 2014). They returned the next year and, again, fledged two young (BBC, 2014b). That year there were four known Osprey pairs in the Lake District (Lakestay, 2014).

The chicks have all been satellite tagged each year since 2009 (BBC, 2009a) (Bird Guides, 2010) (BBC, 2012c) (Osprey Watch, 2013b), excluding 2011 as the nest could not be accessed due to poor weather (Bird Forum, 2011), and in 2014 only one of the two chicks was tagged as the second was suffering from illness and was not large enough to support the transmitter (Bird Forum, 2014a).

The Whinlatter Visitor Centre on Forestry Commission land became the base of the project and in 2003 was redeveloped at a cost of £500,000. Further artificial nests have been constructed in the area as the project has grown, in addition to a second, natural viewing area at Dodd Wood (Natural Economy Northwest, 2008). The first live streaming from the nest occurred in 2009, funded by Natural England, when the images were shown to the public online and at the visitor centre (BBC, 2009c). In 2008 an Osprey Bus Service was introduced, funded by the Heritage Lottery Fund, dedicated to transporting visitors between sites and reducing the traffic in the area (Natural Economy Northwest, 2008). It has now stopped running due to lack of funding (Bird Forum, 2014b).

The project has brought many benefits to its local community. It has created seasonal jobs: in 2007 nine workers were employed alongside 90 volunteers, all involved in engaging with the pubic and protecting the nest by providing 24 hour surveillance. In 2007, the Lake District saw 100,000 visitors during Osprey season (Natural Economy Northwest, 2008). It is estimated that £420,000 of the £1.68 million spent by these visitors was directly attributable the Ospreys (Dickie, et al., 2006), supporting the equivalent of 34 jobs over four months. Visitors are not charged to enter the site, however they are encouraged to make donations which help to fund the project alongside car park fees and sales at the visitor centre shop (Natural Economy Northwest, 2008).

**Kielder Osprey Project**

The Kielder Osprey Project is based at Kielder Water and Forest Park in North England, and is a partnership between Northumberland Wildlife Trust, Kielder Water & Forest Park Development Trust and the Forestry Commission (Kielder Ospreys, 2014a). Kielder Water is Europe’s largest man-made lake (BBC, 2009b). Migrating Ospreys were seen at Kielder for many years before a pair attempted to breed in 2008, on a naturally built nest which fell from its tree before eggs could be laid.
Later that year an artificial nest platform was constructed on site (Kielder Ospreys, 2014d) and the first Osprey breeding in Kielder for 200 years occurred (BBC, 2009b).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of breeding pairs</th>
<th>No. of eggs laid</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2010</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2011</td>
<td>2</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>2012</td>
<td>2</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>2013</td>
<td>2</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>2014</td>
<td>3</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td><strong>11</strong></td>
<td><strong>31</strong></td>
<td><strong>24</strong></td>
</tr>
</tbody>
</table>

Figure 5.25: No. of breeding pairs, eggs laid and young fledged each year, Kielder (Kielder Ospreys, 2014d) (Kielder Ospreys, 2014c)

Since 2009 breeding has occurred every year and in late summer of 2010 another osprey was spotted on the nest, stopping on migration (Kielder Ospreys, 2014d). This prompted a second artificial nest to be built later that year (Glaslyn Wildlife, 2014c) and in 2011 a second pair began breeding (Kielder Ospreys, 2014d). In 2013 it was confirmed that both of the breeding males were Glaslyn born chicks from 2005 and 2007 (Glaslyn Wildlife, 2014c) and were in fact brothers (Visit Kielder, 2014). That year a camera was also placed on the second nest to allow monitoring and there was also seen to be some competition between females for breeding on the first nest. In 2014 a third nest was found, this time naturally built and the pair fledged two chicks (Kielder Ospreys, 2014d). In 2013, a female born in 2010 on the first Kielder nest, had a failed breeding attempt in Cumbria and returned the next year to successfully fledge two chicks (Kielder Ospreys, 2014b).
Foulshaw Moss

Foulshaw Moss is a large peatbog in South Cumbria, managed by the Cumbria Wildlife Trust (Cumbria Wildlife Trust, 2014c). In 2013 a female Osprey born on the first nest at Kielder in 2010 attempted to breed with an un-ringed male (Kielder Ospreys, 2014b) on an artificial nest placed in a tree at the centre of the bog (Cumbria Wildlife Trust, 2014b). They were unsuccessful, but the female returned in 2014 with a 2008 male from Bassenthwaite, and they successfully raised 2 chicks (Cumbria Wildlife Trust, 2014d), the first known grandchildren of Kielder Ospreys (Kielder Ospreys, 2014b).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
</tr>
</tbody>
</table>

Figure 5.27: No. of young fledged each year, Foulshaw Moss (Cumbria Wildlife Trust, 2014d)

The Foulshaw Moss nest has several cameras on the nest, the nesting tree and the bog itself, providing a surveillance system to protect and monitor the Ospreys. There are also boardwalks and a raised viewing platform for visitor use, both at an appropriate distance from the nest site (Cumbria Wildlife Trust, 2014a).

Roudsea Wood and Mosses

Roudsea Wood and Mosses is a National Nature Reserve in South Cumbria, managed by Natural England, comprising largely of woodland and peatland (GOV, 2014a). In 2013 a pair of un-ringed Ospreys built a nest on an electricity pylon close to the reserve, but did not attempt to breed. That winter the nest was blown down during storms and so Electricity North West funded the construction of a nesting platform on a Scots pine tree on the reserve. The pair returned and successfully bred in 2014 (GOV, 2014b).

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of young fledged</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
</tr>
</tbody>
</table>

Figure 5.28: No. of young fledged each year, Roudsea Wood and Mosses National Nature Reserve (GOV, 2014b)

Plans were made in 2014 for the installation of a webcam and public viewing facilities in 2015 (GOV, 2014b).

Future Prospects

There are a number of further organisations in England making efforts to encourage Osprey re-colonisation.

The Derbyshire Wildlife Trust set up the Trent Valley Osprey Project in 2011 and have since erected thirteen osprey platforms in Derbyshire, Nottinghamshire and Staffordshire. Breeding has yet to occur, but the project aims to attract migrants returning to Scotland and Rutland Water (Derbyshire Wildlife Trust, 2014).

The RSPB based at Arne, in Dorset, in 2010 erected three artificial nests in trees on reserve land and two at other sites in Poole Harbour. Plastic, life-sized model Ospreys were placed into two of these nests, in the hope they will convince the birds that there is an existing population and encourage them to breed (BBC, 2010).
6. Evaluation

Each of the projects described in this report is evidence of a success in the re-colonisation of the European Osprey to Britain. Though some may have been more effective than others, each of these seventeen efforts has allowed the successful breeding and fledging of Ospreys in Britain in the past 60 years. And in those 60 years, the population has grown from a single pair to over 200 pairs throughout Scotland, England and Wales.

In a study conducted by the RSPB in 2008, it was reported that the estimated UK Osprey population was 162 pairs (Figure 6.1). This number has since increased as further pairs have been discovered breeding throughout Britain (Riley, 2012), with Roy Dennis estimating that "there are now well over 250 pairs, possibly 270 in the UK" in 2012 (BBC, 2012b). The RSPB report additionally stated that the population percentage change between 1988-1992 and 1998-2002 was estimated to be a 128% increase (Figure 6.1). And the trend does not appear to be slowing.

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</thead>
<tbody>
<tr>
<td>Minimum European breeding population estimate – pairs (2003)</td>
<td>7600</td>
</tr>
</tbody>
</table>

Figure 6.1: Osprey Population Estimate, UK (RSPB, 2008a)

So which of the projects in this report have contributed most greatly to this increase?

Though the Osprey projects at Loch Garten and Loch of the Lowes in Scotland have seen varying results in their time, particularly in recent years, they are arguably still the most successful of those in Britain. They remain the pioneers of the conservation efforts to encourage and assist re-colonisation and have likely contributed more than most of the other existing projects combined to the growth of the Osprey population. And they continue strongly today: still sustaining breeding pairs; still producing more young, adding to the growing population; still attracting and educating the visitors upon whom their work so heavily depends; still promoting the objective that there is yet more that can be done on our part. And it is thanks to these projects that others have been possible, raising the chicks who have returned to re-colonise other areas all over the country.

One such area is the Scottish borders, where the Tweed Valley Osprey project fledged 85 chicks between 1998 and 2010. Between 2007 and 2014 a total of 34 chicks fledged from the main public nest sites, no less than three each year, with two breeding pairs present five years out of eight and three pairs in 2014 (Figure 5.07 and 5.08). A number of these young are known to have returned to the area to breed themselves, whilst others have been recorded elsewhere in Scotland. In 2012 there were nine known breeding pairs in the Tweed Valley, almost double the five pairs in 2006 (Figure 5.05 and 5.06). The method of management here seems to have proved extremely successful; in particular, the use of video links shown at centres at different sites to the nest which result in zero disturbances to the birds, has undoubtedly had a positive effect on the fledging rates at this project. Had public viewing facilities been provided at these sites, it is possible that any resulting disturbance could disrupt breeding or nest activity, for example leading to decreased frequency of feedings within a given time frame, reducing the overall chances of survival and healthy fledging of all the chicks in a nest. This may be a contributing factor to the failures of other projects which allow greater public access close to nest sites.
The Rutland Osprey Project was initially unsuccessful in attracting passing Scottish migrants to breed in England: an unsurprising outcome given their common behavioural traits. However since the translocations from Scotland, and the first breeding in 2001, the project has been incredibly successful. A total of 87 chicks were successfully fledged between 2001 and 2014, and in 2014 there were five breeding pairs present (Figure 4.1 and 4.2).

The population at Rutland did not develop over time in the same way as it would naturally, allowing a more rapid increase. In natural circumstances, a single pioneering pair may colonise an area. They may then produce around two or three chicks, which (assuming they survive to fledging) may then successfully migrate and spend a few years in Africa before returning to breed themselves. Of those which survive, it will most likely be the males which return to the same area to breed, which is only half of the chicks. Assuming they are then able to attract a mate, they may then produce young themselves and the population will increase slowly but exponentially until the limit of birds which can be sustained in an area is reached. This process can take many decades. At Rutland however, though initially no pairs were breeding, the population still began with a four chicks migrating on the first year of translocations (only 50% of the chicks taken, but still a greater number than the average fledged from a single, natural nest). This repeated the following five years and again in 2005, though this time a with a much higher ‘survival to migration’ rate of 97%. This high percentage can largely be accredited to the fact that the translocated chicks were provided with much greater monitoring and protection than those at natural or artificial nests would receive. Ultimately, this increased the likelihood of good health upon fledging and therefore their chances of survival on migration, and return. This meant that after several years of translocations, there was a high probability that a larger-than-average number of chicks would be returning to breed. The initial stages still took time as the chicks would return usually three to five years after fledging. The high proportion of males translocated during the early stages, to accommodate for natal philopatry, proved a problem in the early stages of the project, as many males were returning but failing to find a mate (during 2004 a total of six translocated males were present but not breeding). Fortunately this problem was solved by a final translocation of largely female chicks in 2005, and since this time there have been increases in breeding pair numbers, though not necessarily as a direct result. The gender ratios, and results demonstrated here, are factors which should be carefully considered when and if any future translocations should occur in Britain or abroad, as unfortunately several years of breeding opportunities may have been missed.

A 22% return rate to Britain by 2006, of the original 64 chicks translocated, gives fourteen Ospreys surviving to return. Yet the highest number of breeding pairs at Rutland during any one year between 2001 and 2006 was two pairs (four birds). So (assuming that all of the breeding birds are returned translocated chicks) even of the birds which returned, around only 29% (four in fourteen) of them bred at the site of their rearing. That is just 6% of the birds originally translocated. After 2006 however the number of breeding pairs increased to five by 2010, and remained so each year up to 2014, excluding 2012 in which four pairs bred (Figure 4.1 and 4.2). By 2012 a 16% return rate was seen by Rutland translocated chicks to their natal site. Eight chicks born at Rutland before 2014 have returned to breed in that time, equating to 9% of those fledged in that time. Perhaps more notably, Rutland Ospreys, both hatched and translocated, have also been found breeding at three of the five successful Osprey projects in Wales. Both of the first Welsh breeding pairs in 2004 were ones in which the male was a translocated Rutland chick. In addition, the two females who have breed at Dyfi were Rutland chicks, each born to translocated fathers in 2008 and 2010.
In the same year as first breeding at Rutland Water, the Lake District Osprey Project also saw the successful fledging of a single chick. It has since produced at least one chick each year, though with no more than one pair successfully breeding at any time. Between the years of 2006 and 2009 the then nesting pairs were consistent and highly successful in producing and fledging three chicks each year (Figure 5.23 and 5.24). The average number of young fledged each year during the projects time is two chicks, an encouraging figure given that there has not been a large supporting population in the area (apply pressure to the project should the nesting pair fail to breed or return), and that there have been several different breeding pairs in this time and fledging rates are often low for new pairs. Several of the Ospreys born at Bassenthwaite are known to have returned to Britain, one of which being the male which bred at the project in 2012, who himself was born in 2007 at the then breeding nest. They have also been a part of re-colonising other parts of Cumbria, as a chick born in 2008, again male, bred at Foulshaw Moss 2014, a year in which there were four known pairs in the Lake District.

It is surprising that, in its long time, the Lake District Osprey Project has failed to encourage further pairs to breed in the Bassenthwaite area, allowing a larger, more stable population to be established. It is possible that a lack of facilities to support them, or high levels of disturbance (the Lake District being a popular tourist destination), may be preventing such development. If the project wishes to expand, these factors must be addressed and carefully considered.

Kielder Osprey Project is another English project which, despite being a recent re-colonisation, has seen extremely successful results since the first breeding in 2009, seeing a steady increase in breeding pairs to three in 2014. Between 2009 and 2014 a total of twenty four chicks were fledged, which is 77% of the eggs laid in this time (roughly four in five). In only the projects sixth year, 2014, the Kielder Ospreys fledged a total of eight chicks, amounting to one third of all chicks fledged since the projects commencement (Figure 5.25 and 5.26). There has been an increase displayed at Kielder for all of the variables for which data has been analysed in this report, particularly in the number of eggs laid at the project each year, and the strong correlation between this and the number of breeding pairs is easily identified in the graphical illustration (Figure 5.26). Though only six years in the running, Kielder has seen chicks returning to Britain and a female born on the nest in 2010 was observed in Cumbria in 2013 before breeding at Foulshaw Moss 2014, with the male from the Lake District at the aforementioned nest. This presents encouraging prospects for the return of future Kielder chicks (in addition to those who have already fledged but have yet not come of breeding age) in both increasing the Kielder population and re-colonising other areas of Britain. With such a high probability of the Kielder population increasing, it will be important for the project to ensure it provides nest platforms at suitable locations to accommodate for such eventualities.

As the only long-running project in Wales, Glaslyn Osprey Project is vital to the stability and growth of the Welsh population. Its greatest success is its status as the pioneering Welsh Osprey project, though more notably, its consistency of the breeding pair which has returned each year between 2004 and 2014 is of enormous importance. In ten years the pair have produced 26 chicks, successfully fledging 81% of their eggs. Though the first year of breeding failed to fledge any young, there has not been a year since when less than three eggs have been laid or less than two chicks have been fledged. In the most recent years, between 2008 and 2014, there has been just one year in seven when a chick has not fledged (Figure 5.14 and 5.15). Not only does this display an increase in success of the pair over time (with only a small, and largely inconsequential, decline on one occasion), it also demonstrates consistent management. Whilst the positivity in this method can be seen in the results it has produced,
it may have limited the expansion of the population at Glaslyn (with all efforts focused on protecting the breeding pair, less work is done towards encouraging other pairs to breed). Similarly to the Lake District Osprey Project, it is surprising that the population of this long running project has failed to expand (placing pressures on the resident pair), and should this growth be desired it, would appear that new approaches are required. With the handover of the project to new management in 2014, it will be interesting to see if there are any impacts of new methods on the success of the pair and if new efforts are made to encourage new pairs to colonise the local area.

Of the young fledged at Glaslyn there has been a high return rate to Britain. In 2013 both breeding males at Kielder were identified to be born at Glaslyn in 2005 and 2007, and the male at Threave Estate was born at Glaslyn in 2006. Several other young have been reported as present on migration in Somerset, Perthshire and Zurich, Switzerland. It is interesting that though many of the Glaslyn chicks have returned to Britain, none have yet returned to successfully breed close to their natal site.

Despite these many successes across Britain, particularly in recent years, a huge percentage of the population still resides in Scotland: estimated at 98% in 2008 (Figure 6.2).

<table>
<thead>
<tr>
<th>Breeding Population (pairs)</th>
<th>Year</th>
<th>% of UK population in Scotland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scotland 205–210</td>
<td>2007–2008</td>
<td>98%</td>
</tr>
<tr>
<td>United Kingdom 210–215</td>
<td></td>
<td></td>
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</tbody>
</table>

*Figure 6.2: Population Percentage Estimate, UK (Riley, 2012)*

The Scottish population plays an enormous part in the growth of the Ospreys in Britain. New nests and pairs are still found each year, and encouraging breeding at sites in England and Wales has proved very difficult, demonstrating the population’s reliance on continued work in Scotland. Although the Scottish population does continue to increase however, some projects which have existed for longer appear to show levelling, and in some cases decline, in their successfulness. Loch Garten for example has had several years in more recent times in which competition for the main nest between breeding Ospreys has resulted in no chicks being raised (on many occasions due to eggs being kicked from the nest). This occurred in 2005 and 2007 (Figure 3.1 and 3.2), and was also been observed at other nest sites, including at Aberfoyle in 2009 (Figure 5.03 and 5.04), Caerlaverock (Figure 5.09 and 5.10) and Rutland Water 2014 (Figure 4.1 and 4.2). In 2007 a total of seven eggs were laid at the Loch Garten nest: the first two clutches of two were both kicked out before hatching, and the final three eggs hatched, but the chicks later died before fledging (Imagicat, 2007). If there are sufficient numbers of suitable nests provided for the birds, it would be assumed that such competition should not be a problem. This may imply that Loch Garten does not have the facilities to support its population; a possibility that should not be overlooked, as ospreys are particularly selective in their breeding sites and nesting materials. It is therefore possible that not enough artificial nests are being erected at suitable sites. Perhaps, on the contrary, plenty of nests are provided, however not enough work is yet put into their structure and design to make them suitably appealing to breeding pairs. Or perhaps the population has reached its capacity. Natal philopatry, which in this species is incredibly high, is also likely to play a large part in their reluctance to explore new nests and areas, which undoubtedly results in high levels of competition at well-established nests. There is yet much to understand about the behaviour of these birds, and further study may be required before we can begin to aid their recovery more efficiently. Since 2007 however the number of chicks raised at the Loch Garten nest each year has risen to average three chicks per year between 2008 and 2014 (Figure 3.4 and 3.5), which shows promising signs that this problem is not often long-term. It is also possible that management, such as
the construction of new, alternative nests, would have had an influence in tackling this problem, but there is no record of such intervention.

Though the breeding female at Loch of the Lowes has had many years of successful breeding, in recent years the hatching and fledging rate of here offspring has shown signs of decrease, particularly since 2010 (Figure 5.01 and 5.02). It does not appear that her practice of raising or providing for the young is flawed (on only two occasions between 2007 and 2014 has a chick hatched and not survived to fledge), and she has consistently laid three eggs (or on occasion more) each year. However of the twenty-five eggs laid in this time, only eleven have hatched, just 44%. Her average overall fledging rate over her breeding years is 65%. In a consistent bird this value would usually be less than the hatching rate (as a chick fledging is dependent upon it first hatching), showing that an average of 44% is a decrease from previous years. If we observe solely the data previous to 2007, the average fledging rate increases to 79%, showing a decrease of 14% since 2007, again displaying the recent decline in hatching rate. It is thought that as the female has aged her fertility has decreased, as would be expected. Of the five un-hatched eggs collected for analysis in 2013 and 2014, only two were found to be fertile, partly explaining the low number of hatchings during these years (though the reason for the fertile eggs not hatching is unclear). This is not a problem which management or human intervention can fix, but it should be ensured that the Osprey population in the surrounding Perthshire area remains stable, so that the failure at this nest to produce young, which could otherwise return to breed here, does not threaten the overall success of Ospreys at this site or in Scotland as a whole.

Since 2008, the Aberfoyle Osprey Project has had two years in which no chicks have been hatched (Figure 5.03 and 5.04). On the first of these occurrences, during 2009, the un-ringed male disappeared shortly after breeding and the laying of a single egg. When one of pair does not return the other must find new mate with whom they will bond, which takes time, meaning that the chances of successful fledging that year were already dramatically reduced. There were two other males present around the nest that year (both ringed) who duly attempted breeding with the female, whom was still incubating. They fought on and around the nest, with each other and at one point the female, which posed great potential threat to the egg. The female would not receive the first of these males, though accepted fish which he brought her, but attempted mating with the second male. Several days later the female was not sat on the nest as she had been and the egg was found at the base of the nest. It is unknown who kicked the egg out but it was assumed to be the second of the two intruder males. There were some signs of predation but again it cannot be known if this was the cause of the eggs removal or a resulting occurrence. Though after this the Ospreys remained and mating continued, no more eggs were laid that season. A total of five further ringed Ospreys and one un-ringed male were present at that nest during 2009, in addition to the female and two males (Aberfoyle Ospreys, 2009a). A total of nine Ospreys at a single nest implies that there should be further platforms constructed in the vicinity to accommodate these birds. If such structures already exist it should questioned why they are not successful in preventing persistent competition at established nests.

These incidents demonstrate the threats that competition for nests pose to eggs and highlight another reason why population increase in Ospreys is slow. With one clutch and a usual maximum of three chicks fledged per year, combined with the small numbers of breeding pairs present in Britain, failure to breed at just a small number of sites has an enormous effect on both the success of each of these sites in future years, and on the overall population and its rate of increase.
Three of the five other birds present in Aberfoyle in 2009 were identified as chicks hatched at local nests in 2004 and 2005, possibly on their first return from Africa (Aberfoyle Ospreys, 2009d). Strong natal philopatry is once again demonstrated here, indicating that if a project wishes to facilitate a pair of Ospreys, there is then a need for them to be prepared, and appropriately equipped, to provide facilities for any offspring and future generations of the pair, in addition to other birds of the species attracted to the site due to its success.

The second unsuccessful year at Aberfoyle was 2011, when again there was a high number of birds present at the nest (two males and three females); despite the construction of a further three nest platforms in the area (Aberfoyle Ospreys, 2011c). A new un-ringed female joined the male who had kicked the eggs out of the nest the previous year, and three eggs were laid. On this occasion the disturbance level was low, but the female abandoned the nest just before hatching was due. The cause, though unknown, was not thought to be natural and not to be due to disturbance by humans or other Ospreys (Aberfoyle Ospreys, 2011a). Aberfoyle has since been more successful and seven chicks were fledged between 2012 and 2014 (Figure 5.03 and 5.04), though again, each year only one nest has been successful. There may be a possibility that the failure of more than one pair to breed in the area at a time implies that the nest platforms have not been constructed at appropriate locations or far apart enough to allow a suitably sized territory in which each pair may hunt without conflict and sustain a family.

Another of the Scottish projects which has seen decreases in success is Wigtown Bay. Having initially shown promising increase there have been several years in which breeding has not occurred (Figure 5.13 and 5.14). In 2007 the previous breeding male did not return from winter migration, and the female spent the season bonding with another male and no breeding was attempted. Then, in 2012 neither of the pair returned and no other Ospreys were present in the area. The pair who took up residence in 2013 and 2014 failed to breed successfully on both occasions for unknown reasons, speculated to be the female’s immaturity. There has been no competition at the nest, a positive in the lack of disturbance, but worrying in that it demonstrates an absence of other individuals in the area. Failure to instigate a wider population in the surrounding area has resulted in the failure to sustain a stable Osprey presence in Wigtown. Should the pair which has been resident since 2013 return in later years, it would be advised that further work is done to encourage other pairs to nest locally to allowing a supportive population to be formed, preventing the repeated occurrence of these events, which delay the expansion of the species.

The single successful breeding at Welshpool, though the first fledging in Wales for over a century, was ineffective in contributing to further growth in the Welsh population (Figure 5.17). The female from the 2004 pair did not return the following year, and with an almost non-existent local population, the male unsurprisingly failed to find a new mate. It is unlikely any amount of management could have helped this situation at that time, however now that there have been many other breeding successes in Wales it may be viable to encourage Ospreys to return to Welshpool, as the probability of attracting migrating birds has increased alongside the population and the breadth of its distribution.

For the many projects studied in this report, which are still in their early days, it is difficult to assess their successfulness, though each holds promising future prospects.

The two most recent Scottish locations studied in this report are Caerlaverock and Threave Estate. Caerlaverock, on the first hand, has had varying results over its six years, showing initially promising
increases in its first two years, then a decrease for two more and a return to average in the latter two (Figure 5.09 and 5.10). In 2012, in the year which the male did not return, two other birds fought over a place on the nest and crushed the eggs in the process. This was a one off occurrence and disturbance by other Ospreys has not since been a problem. The average number of young fledged each year at the nest is two chicks, and the total over the six years is ten. A male born on the nest in 2010 returned to Scotland in 2012, just two years after fledging, and was seen on the nest in Wigtown Bay, showing promising signs that the project could in the near future aid the growth of the British breeding population. On the other hand Threave Estate, which has seen breeding for the same number of years as Caerlaverock, has shown a fairly constant success in its fledging numbers. Two chicks have been produced five years out of six, and three chicks fledged in 2010, making a total of thirteen over six years: a very successful number. Neither of these two locations have seen new pairs colonising the local area, which is not an unrealistic goal after six years of success, but this may partly be due to a lack of facilities as the projects are still in early stages and must be certain further pairs can be supported before efforts are made to encourage them.

The Dyfi Osprey project in Wales has only seen breeding in the four years between 2011 and 2014 (though several males were present in years previous to this), yet in that time eight chicks have been fledged by one male with two separate females, an average of two chicks each year (Figure 5.18 and 5.19). In the first year three chicks were raised, which is remarkable considering at least eleven intruder Ospreys visited the nest during the course of the year, posing an enormous threat to the eggs and chicks. With such high numbers it is remarkable that breeding in the Dyfi Valley did not occur sooner and that other pairs have not yet colonised the surrounding area, however it is encouraging, should the project wish to expand its population in the coming years, as the probability of attracting breeding Ospreys would be high.

The ten nesting platforms constructed in Snowdonia by the group Friends of the Ospreys have so far attracted one pair to breed, which have raised at total of six chicks over the course of three years (Figure 2.20 and 5.21). The number of chicks they have produced per clutch has increased each year, demonstrating a positive progression within the pair, a sign that they may continue to successfully raise more chicks in the future, who may potentially return to Wales (or the rest of Britain) to breed. Finally there are three locations in Britain which only saw Ospreys breeding for first time in 2014. The first, at Powys in Mid-Wales, produced two chicks on an artificial nest (Figure 5.22). Several nest platforms have been erected on this land by the Welsh government to attract Ospreys to breed (BBC, 2014f), and their recent use is an encouraging indicator of the increasing dispersion of the species across Wales. This breeding brought the total number of chicks fledged in Wales in 2014 to ten, the greatest figure so far, and four more than the previous year. The other two sites, both in Cumbria, each also produced two chicks on artificial nest platforms. The Roudsea Wood and Mosses Osprey pair were both un-ringed, but the Foulshaw Moss pair consisted of a male born in Bassenthwaite, Cumbria, and female from Kielder, in neighbouring Northumberland, a sign that the work here is attracting local birds to return and new pairs to colonise.

On many occasions the construction of artificial nest has been vital in increasing the rate at which areas are re-colonised. Particularly in projects in England and Wales, the re-colonisation of new areas has, on the majority of occasions, been a result of the construction of nesting platforms, which have then attracted migrating birds to stop off and breed. This has more often still been the method by
which further pairs are attracted to areas and populations are established. In many cases this allows processes of advancement, which if performed naturally could take decades, in just a few years. For example, natural nests which have fallen from their supports have been replaced with artificial nests at Glaslyn, Kielder, Bassenthwaite and Roudsea Wood and Mosses: work without which the pairs may not have returned to breed the following year or beyond, which in places could mean the loss of a population.

Large amounts of work goes into the protection of know breeding sites. Sensitive information such as location of nests is often withheld to reduce risks of disturbance or illegal activity which may prevent or disrupt breeding. At sites where the nest location is public or could potentially be found, 24 hour surveillance is usually provided. With the threat of egg collectors and other persecution still a very real problem, and as Ospreys are extremely sensitive to disruption, such protection is vital in ensuring the success of these projects. Public engagement aims to educate and inform visitors whilst providing greater environmental appreciation to a wider audience. It is from these people that much of the funding, for both these and other conservation projects, is gained. Conservation charities are therefore heavily reliant upon their public audience and many use blogs and social media in attempt to keep interested parties informed.

With the visitors that the projects bring come benefits within the local area. In a report in 2008 it was estimated that the 29,000 people which visit nine Osprey sites in the UK each year bring £3.5 million to local economies (Natural Economy Northwest, 2008), and as more projects have seen mounting successes, it is likely that these figures will have since increased. As a result new seasonal jobs have been funded, businesses in local communities have been able to flourish and areas have been put on the map as tourist locations. In addition, these areas are provided with new environmental protection, and awareness for corresponding topics grows both locally and beyond.

Satellite tracking has been and will continue be a key tool in understanding the lives of these birds, alongside ringing, which has allowed identifications to be made and the spread of Ospreys throughout Britain, and indeed Worldwide, to be monitored. The location and cause of death of several Ospreys from different British projects, which would otherwise have remained a mystery, have been discovered thanks to satellite tags attached to the birds. Tracking has allowed us to witness a part of their life cycle which we in Britain do not ordinarily get to observe – their wintering period in Africa – and to study how this time is spent. In addition it provides data on flight paths across Britain as the birds return on migration, helping to select potential locations at which new nest platforms should erected, to stand the best chance of attracting Ospreys to stop off and breed in more southerly counties as they migrate north. The British projects which have so far employed satellite tracking are: Rutland, Bassenthwaite, Dyfi, Loch Garten, Loch of the Lowes, Aberfoyle, Tweed Valley and Kielder.

With the advent of new tracking technologies it is hoped that the migrations of British Ospreys can be better understood and observed, resulting in greater protection at wintering grounds (with co-operation from local African communities) and, hopefully in the future, decreased migration mortality rates, which would have the potential to dramatically increase the rate of re-colonisation. Work in Africa to educate local children in conservation practices has already been put into motion by the Rutland Osprey Project, at five schools in Gambia (Rutland Osprey Project Online, 2013a). Tracking also provides valuable data on migration paths which may contribute to studies looking to determine how birds and other species choose when to migrate and where to, a concept which is not yet fully understood (Scottish Wildlife Trust, 2014b).
7. Conclusion and Recommendations

So why is it that some projects have been more successful than others in encouraging Ospreys to repopulate areas of Britain? Why is it that some projects see continued success for many years whilst others reach limits and begin observing declines? The majority of the time it appears to be largely down to – for want of a better word – luck. Management, facilities, protection and location undoubtedly all play a large part, but the rest lies in the hands of fate. Nature is extremely unpredictable, and there are more factors which affect the success of a project than can be comprehended.

The Ospreys’ re-introduction to Britain has been, though slow, an extremely successful national project. There are many such attempts in conservation which fail to see significant results and others which only maintain small or isolated populations of the organism which they are protecting. That is not to say that charities do a bad job of management: the conservation of species is a very difficult enterprise. Without the work of the range of organisations involved in these projects and the countless individuals who devote their time to them, the expansion of the British Osprey as we have seen it would never have been possible: after all, the annual rate of spread of the Scottish population is just 4 km per year (Rutland Osprey Project Online, 2013a). The population would most likely still be confined to a relatively small area of Scotland, in the most remote sites in the country and little known to the general public, or, with continued persecution, it would have once again dwindled, history would have repeated itself and we would have been an Osprey-less isle once more.

But no, rather, we have seen a very different story. One where, since the first Scottish re-colonisation, the population has grown to cover Scotland and large areas of Northern England and Wales: possibly the greatest milestone reached since the Ospreys return. The translocation efforts were key to this expansion occurring in the timeframe that it has done. This enormous transferal of Ospreys to central England allowed the upsurge of the population, owing to the eruption of new breeding sites and pairs throughout England and Wales. Its success is so great that it has directly led to further Osprey translocation projects in Europe, one in which Scottish Ospreys were translocated to Northern Spain (Rutland Osprey Project Online, 2013a), which as a consequence will undoubtedly aid the British population in the future.

The Ospreys still face many threats to their success, though far less severe than they have been in the past. In 2012 particularly violent storms and wet conditions saw many pairs failing to fledge young at their previous success rates (Friends of the Ospreys, 2012). With such weather conditions becoming more common, this is an unfortunate example of how climate change is affecting British wildlife. Disturbance also remains a possible threat, and whilst nest platforms are constructed at sites selected to minimise such problems, we cannot control where pairs build natural nests. A pair which attempted to nest at Loch Fleet Nature Reserve in Scotland in 2010 failed to breed that year as they constructed their nest too close to a path. This prompted Scottish Natural Heritage to construct a new nest at a quieter location on the reserve, and the pair immediately took up residence upon their return the following year (BBC, 2011b).

Our path on from here is to only to extend the reach of our work further, dwelling on failures only long enough to learn from them and to identify how future improvements can be made. The methods which have seen positive results such as protection of nest sites and, in particular, the construction of artificial nesting platforms should be increased on a national level. More wide scale management
should be implemented in southern England and Wales, as it has been in Dorset and Derbyshire, in order to encourage Ospreys to nest further south. With a wider distribution will come greater stability in the population and eventually we may reach a stage where the species is no longer reliant on humans to continue expansion. Additionally, the breadth of satellite tracking should be increased to smaller scale projects, alongside the ringing already carried out, which should be continued as it is an incredibly useful resource. At Loch of the Lowes ringing is no longer carried out, as in 2004 a chick was found dead shortly after the fitting of the rings. Instead, in 2012 and 2013, the chicks were satellite tagged as it is “more scientifically revealing” and little information of the ringed birds’ whereabouts was being returned (Scottish Wildlife Trust, 2014b). For this to be an equally useful alternative to ringing, it would require all of the chicks to be tagged: as otherwise, should un-ringed chicks return to Britain, it would not be possible to identify them and therefore the success of each British Project could not be assessed validly and the task of determining the most efficient would become more difficult.

All of these factors, of course, depend upon funding and it is therefore essential that promotion of public engagement and knowledge of this work is at the forefront of our future aims.

The work itself: the hours put in by volunteers and the brining together of people for a common purpose, is wonderful, and if continued will aid the recovery of many species to come. The sad fact is that, should Ospreys have remained resident in Britain, at a population level similar to that today of the Common Buzzard (a species which has in the past also suffered declines due to human activity) estimated at 31,000 to 44,000 breeding pairs in 2000 (RSPB, 2014b), they would not be such an appealing attraction. There would be no sites dedicated to their observation and breeding on the scale we have seen here, and I don’t doubt that most people would not bat an eyelid upon seeing one soar overhead. Does a species need to be on the brink of extinction for humans to take an interest?

Yes Osprey re-colonisation has been successful here in Britain, and I believe it will continue to grow from strength to strength; but my worry runs deeper than the subject of success and failure. Not of the solution am I concerned, but of the cause. In the words of Albert Einstein “A clever person solves a problem. A wise person avoids it”. We are doomed to repeat our mistakes, of destruction (both of species and habitat) and of expansion, followed only by the realisation that we cannot sustain the world in which we live in such a way. The case of the Ospreys is, if you like, a metaphor of an ideal world, in which we may correct our mistakes of the past. This should not be seen as a victory; more a fortunate exception. For as the British Osprey population slowly climbs, that of thousands of red status species falls by the day. The State of Nature report produced by a co-operation of conservation organisations across the UK, published in 2013, brought to light data showing that 60% of the 3,148 species of mammals, birds and invertebrates studied (around 1890 species) have declined in numbers in the past 50 years in the UK (State of Nature Report, 2013). And so, for Pandion haliaetus, a bird found on every continent of the world, we are duty bound to ask ourselves: Did we save the right species?

To any advocate of conservation, the answer is obvious. Roy Dennis argues that any “rarity is a failure of conservation” (Rutland Osprey Project Online, 2013a), an idea which implies that the re-colonisation of Ospreys is as valid a cause as any conservation effort. Wildlife journalist Simon Barnes wrote in 2014 “A bird can be ordinary in one place and special in another”, maintaining that “[Ospreys] have a right to be here and we have a right to revel in their presence” (Barnes, 2014). Tim Mackrill,
manager of the Rutland Osprey Project since 2006, emphasises the merits this work, and in his doctoral study of Ospreys in Scotland has shown that if Ospreys are to expand their range in Britain further (at the rates we have observed), they will continue to require a “helping hand” from humans (University of Leicester, 2011), a sure indicator of the importance of the projects in this report.

Fortunately for the Osprey it has appearance on its side, with its menacing but striking aesthetics. However many other endangered species do not have such magnificence to flaunt in the same way, meaning they are not given such exclusive attention. This is evidence of why the promotion of conservation of Ospreys is so important in raising public awareness of rare species as a whole. Mr Mackrill points out that this work has “the potential to attract funding that may not otherwise end up in conservation” (Rutland Osprey Project Online, 2013a), which will be of benefit not only to Ospreys but to the many rare species which are not as well known. Any project which encourages life, and in the process educates and inspires the minds of others, cannot be a negative one.

Our nature as a whole is in worse state than ever before recorded, but the success of the Osprey is a pinnacle of light in a currently dark sea of declining species: a light that perhaps, with the right work, will spread as we become a more conservation-conscious nation. Though Mr Mackrill’s studies suggest that “many areas [in Scotland] are at, or nearing, carrying capacity” for the Osprey, there is “sufficient habitat [across Britain] for the population to increase to six or seven times that” (Rutland Osprey Project Online, 2013a). We are in for an exciting time yet.
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