REINTRODUCTION OF THE OSPREY

(*Pandion haliaetus*)

IN PORTUGAL

Annual Report 2013

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SPONSOR

EDP - Energias de Portugal, S.A.

PARTNERS AND SUPPORTS

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Finnish Osprey Foundation

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EDIA - Empresa de Desenvolvimento e Infra-estruturas do Alqueva, S.A.

TAP – Transportes Aéreos Portugueses

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RIAS – Centro de Recuperação e Investigação de Animais Selvagens

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Município de Reguengos de Monsaraz

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Summary

The Osprey (Pandion haliaetus) reintroduction project started in 2011 in the Alqueva dam. It aims at establishing a viable founder population in the area, which ultimately may help out the re-colonization of the maritime coast, the species historical breeding range in Portugal, where it went extinct as a breeder at the turn of the present century.

In 2013, 12 half-grown nestlings, 6 from Sweden and 6 from Finland, were translocated to a hacking tower at the shore of the Alqueva dam, within the Roncão estate owned by Casa de Bragança Foundation, where they completed growth. As fledglings, they were released 23 and 24 days later, after being equipped with VHF radiotags.

After release, the fledglings stayed c.24 days around in the release area, with increasingly longer movements until final dispersal and the onset of migration.

The birds were primarily fed on exotic fish species from the dam: c.79 kg of fish was supplied to the juveniles while in the tower (mainly Pike-perch *Sander lucioperca* and Barb *Barbus* spp., and c.185 kg of the same species after release.

We had one serious health problem (details in the clinical report and its annexes, not translated): Inside the hacking facility, the osprey P26 got one leg stuck between the nest wooden frame and nest material damaging the metatarsus extensor tendon while spinning to try freeing itself, with subsequent clinical complications. The episode occurred at 4 a.m. and was later viewed on the CCTV. After 16 days at the RIAS Rehabilitation Centre, and due to being irrecoverable, the bird was euthanized. No other relevant incidents occurred with the birds caged or after their release.

1. Introduction

The project aims at the reintroduction of the Osprey (*Pandion haliaetus*) in Portugal as a breeder. It is an initiative of CIBIO (Research Centre in Biodiversity and Genetic Resources) with the funding of EDP Energias de Portugal, and the institutional collaboration of ICNF (Institute of Nature Conservation and Forests). Ultimately, the project seeks the re-establishment of the osprey in its historical range along the Portuguese coastline, from where it disappeared as a breeder at the beginning of the 21st century. The project integrates the international efforts for the recovery of the Osprey in the Mediterranean region, where its populations are presently small and endangered.

The project is intended to have a stepwise development, of which the present initial phase aims at founding a viable breeding population in the Alqueva dam, an area with favourable ecological conditions. With that purpose, during the period 2011-2015, 10-12 nestlings will be translocated annually from Sweden and Finland to hacking facilities at the Alqueva dam, near Monte do Roncanito within Roncão estate. The project strictly follows the national, international and donating countries' pertinent legislation.

The project was set on in 2011 and the present report briefly describes its development during 2013, the third year of translocation, adaptation and release of osprey juveniles in the Alqueva dam.

2. Preparatory tasks

In the 2011 report, preparatory procedures are described in detail namely how the initial release area was selected, what methods were followed and the infrastructures used. Hence, in the present report we only refer to relevant technical aspects, namely changes introduced.

2.1 Supply of nestlings

Translocation agreements

The agreements established in 2011 with the authorities of the donor countries were maintained in 2013. These pertain to the annual provision of 5-10 nestlings until 2015 in the case of Finland, and up to 10 nestlings per year until 2013 in the case of Sweden. In 2013, the number of nestlings translocated was 6 from Finland and 6 from Sweden. In 2014 a new application will be made to the Swedish authorities seeking the renewal of the agreement for two more years until the end of the project in 2015.

2.2. Infrastructures

Hacking tower

In addition to the means used to reduce temperature inside the hacking tower already in use in previous years, in 2013 we added a shading panel to the left wall to decrease direct sunlight within the adjoining pen during the afternoon (**Fig. 1**).

Figure 1. Shading panel to reduce sunlight incidence indicated by the arrow. Photo Denis Landenbergue.

Nests inside the pens were built with broom branches (*Retama sphaerocarpa*), and lined with reedmace stems and leaves (*Typha* sp.) and terrestrial lichens. Due to the reservoir very

high water level in 2013, the water milfoil *Myriophyllum* sp. used in 2012 was not available. Moreover, its use as nest lining showed up to be inappropriate because the birds ingested it with food. In 2013 we also saw that reedmace lining involves some risk for the birds during the first days as their feet can get easily entangled in the leaves' fibres. Accordingly, its use in 2014 will be reconsidered. Conversely, lichens do seem a good lining material and they are easy to collect.

Video monitoring

The video monitoring of the nestling behaviour inside the pens by colour and infra-red CCTV that can be viewed at the field base was maintained in 2013, as also the direct monitoring through the one-way mirrors of the tower back wall.

Floating fish cage

In 2013, the permanent supply of fresh fish for feeding the ospreys was primarily obtained by daily fishing at the dam. The floating fish cage was used to maintain an emergency live fish stock but in lower quantity than in previous years, when it was the main source of food.

Feeders

There were no technical changes in the feeders, the same used in 2011. Yet, fish was only placed on the three feeders closer to the hacking tower, as those were the only ones used by the birds.

Artificial perches

There were no changes in the number and position of the existing artificial perches. However, in September we were surprised by the felling of the dry holm oaks (*Quercus rotundifolia*) along the shore, including those supporting the attached artificial perches. Therefore, these perches will have to be re-erected farther inland in 2014 before the hacking season and likely more artificial perches will be needed to compensate for the loss of the shoreline dead oaks.

Artificial nest platforms

No more artificial platforms were placed in 2013, though we foresee to increase their number in 2014.

3. Reintroduction

In this chapter we shortly describe the methods used in the translocation of the osprey nestlings from the donor countries to Portugal, as well as during their residence in the hacking tower and period of dependence until dispersal. For a more detailed description read the 2011 Annual Report, Chapter 4.

3.1. Nestling collecting and transportation

Collecting

As in previous years, both in Finland and Sweden, the nests from which the nestlings were to be taken were previously selected by or under the supervision of Pertti Saurola and Björn Helander, respectively. In both countries nestlings aged about 5.5 and 6 weeks were collected. (**Figs. 2** and **3**).

Figure 2. Björn Helander collecting a juvenile in Sweden. Photo João Ferreira.

Figure 3. Pertti Saurola weighing a nestling in Finland. Photo Andreia Dias.

After collecting, a solution of Vitamin A and Selenium was injected in the nestlings (**Fig. 4**) to reduce the chances of the deleterious effects of manipulation (capture myopathy). They were kept and fed in animal rescue centres until transportation to Portugal in plastic travel boxes.

Figure 4. Injecting the Vit A/Selenium solution in the young taken from nests. Photo Markku Alanko.

All birds were ringed with official metallic rings of the donor countries on the left leg and with green PVC colour rings with white inscriptions on the right leg. The codes are the letter "P" (for Portugal) aligned horizontally followed by 2 vertical digits (**Fig. 5**).

Figure 5 - Juhani Koivu and Harri Koskinen colour-ringing the ospreys in Finland. Photo Andreia Dias.

Veterinarian certification

Veterinarian certification was done according to the requirements of DGAV, Direcção-Geral de Alimentação e Veterinária (*Directorate-General of Food and Veterinary*).

Figure 6. Clinical examination of the ospreys by Kirsi Henttu, veterinarian officer. Photo Andreia Dias.

In both countries, ospreys were checked by a veterinarian officer who issued a health certificate of the juveniles, certifying that no bird showed any clinical evidence of contagious infectious disease (**Fig. 6**).

Transportation

The osprey nestlings were transported by direct flights from Helsinki and Stockholm. The time schedule was organized in a way that the nestlings could arrive at Lisbon's airport at the end of the day, in order to avoid the summer daytime high temperatures. In 2013, birds arrived from Sweden and Finland in the same day and shortly after each other.

Upon arrival, the nestlings were submitted to clinical inspection by the project veterinarians (Pedro Melo and Margarida Melo) at the airport cargo customs (Posto de Inspecção Fronteiriço de Carga, PIF) for evaluation of their general health condition. Samples of blood and faeces were collected for further laboratorial analysis. Blood samples were also used for sexing the nestlings at the CIBIO's Molecular Testing Centre (CTM). All birds were in good health condition and were rehydrated and fed with 4-5 small 8-10g fishes each (Sprat, Sprattus sprattus, Clupeidae) offered by the Lisbon Oceanarium as in previous years (**Fig. 7**). The only exception was one bird that had a nearly detached claw due to a small incident during its collection in Sweden. The bird was treated accordingly.

Figure 7. Feeding/rehydrating the ospreys by João Ferreira and the volunteer André Carrilho, after the clinical examination at the Posto de Inspecção Fronteiriço de Carga (PIF), Lisbon's airport. Photo Pedro Melo.

The translocated nestlings (**Table 1**) were then carried by car to the hacking tower in Roncão (Alqueva dam). Car travel to the hacking place was done at night, when the young are quieter and temperatures lower. All steps were accompanied by a project technician.

Table 1 – Young ospreys translocated to Portugal in 2013
(ring numbers, sex, origin, collecting and arrival dates).

Rings				Dates	
PVC	**Metallic**	**Sex**	**Origin**	**Collection**	**Arrival**
P24	9285596	♂	Sweden	15/07	17/07
P25	92A05801	♀	Sweden	15/07	17/07
P26	92A05806	♀	Sweden	15/07	17/07
P28	92A05813	♀	Sweden	15/07	17/07
P29	9285598	♀	Sweden	15/07	17/07
P33	92A05821	♀	Sweden	15/07	17/07
P51	M65545	♀	Finland	15/07	17/07
P52	M65512	♂	Finland	15/07	17/07
P53	M65516	♀	Finland	15/07	17/07
P54	M65540	♂	Finland	15/07	17/07
P55	M64293	♂	Finland	15/07	17/07
P56	M65555	♂	Finland	15/07	17/07

3.2. Pre-release stage

The juveniles were distributed by the 4 compartments of the hacking tower according to size and age inferred by plumage development, joining together birds of closer age. With the exception of P26 of c. 6.5 weeks, all the remaining individuals were of close age (c. 5.5 – 6 weeks). They were distributed in 3 birds per pen, in accordance with their weight and apparent age. In pen #1 we placed 2 males and 1 female, in pen #2 only males, and in pens 3 and 4 only females (**Table 2**).

Table 2 – Distribution scheme of the ospreys by the hacking tower compartments after their weight and estimated age.

Cage	PVC	Sex	Weight at collecting
1	P24	♂	1480
1	P55	♂	1570
1	P29	♀	1600
2	P52	♂	1300
2	P56	♂	1300
2	P54	♂	1380
3	P33	♀	1560
3	P25	♀	1640
3	P26	♀	1830
4	P28	♀	1590
4	P51	♀	1620
4	P53	♀	1630

After being placed within the tower (around 00:30) the birds remained quiet and lying down. Three of them ate for the first time on the following day (18/07) and the others one day later (19/07). During the first meals small conflicts occurred until hierarchies were established. In general, mostly peaceful behaviour patterns were recorded and only occasionally were conflicts seen in defence of food or the keeping of hierarchies.

We followed he development of motion skills and coordination such as food apprehension with feet and beak. Gradually, the birds began to stand up often instead of solely sitting on their tarsus as before. Plumage and musculature developed until they began flapping around in the enclosure. At that time they were considered to be ready for release.

The birds were handled the least possible. Therefore, weight was only occasionally recorded, e.g. when birds were ringed or radiotagged, or when examined by the veterinarian. However, extra weighing was automatically recorded by the perch-scale (see ahead). In 2013 no heavy weight loss was observed as in previous years. In general, the birds either slightly lose, maintained or slightly increased weight (**Table 3**).

Table 3 – Evolution of individual weight from collecting to interim clinical examination and radiotagging dates. (* died)

	Weight (g)		
	Collecting 15 July	**Veterinarian examination 30 July**	**Radiotagging 06 August**
P24	1480	1350	1320
P25	1640	1670	1650
P26	1830	*	*
P28	1590	1600	1690
P29	1600	1610	1620
P33	1560	1650	1525
P51	1620	1640	1600
P52	1300	1450	1390
P53	1630	1600	1650
P54	1380	1220	1290
P55	1570	1400	1320
P56	1300	1230	1250

Feeding

In the hacking tower, fish was provided three times a day (7:00 – 9:00; 12:00 – 14:00 and 18:00-20:00) in order to be always available. Fish was previously eviscerated and the central spine removed, and then cut in small pieces (c. 1.5 cm). Differently from previous years, as the scales of the main fish species used (pikeperch) were small and allowed the slicing of fish without removing them, they were also supplied for a higher calcium provision. Fish livers were also provided as a source of Vitamin D. Food delivered was first weighed to record the quantities supplied and roughly evaluate consumption.

Food administration scheme was in general the same as in 2012. Still, as in the present year the young could feed by themselves since the beginning, though it was difficult for them reaching the food thrown onto the cage floor (as happened in previous years), we decided to deliver the fish directly onto the nests with the help of the “spoon” we improvised in 2012.

Seemingly related to this new way of food delivery we watched a higher feeding rate inside the tower, and this was likely the reason of a better weight performance in 2013. In 2014,

some changes in the food delivery procedure will be made in a way to avoid the use of the spoon, since it caused disturbance. Food not consumed was regularly removed from the cages before the next meal, trying to avoid visual contact of the birds with the staff. Female calls were broadcasted also in 2013 before and during food delivery as a presumed stimulus for a higher food intake. Still, as in 2012, it didn't become clear whether this procedure effectively stimulates feeding.

About 346 kg of fish were caught in the dam throughout the whole hacking period – 17 July up to 16 September. We identified, whenever possible to species level, measured and weighed all fishes caught in order to record the species and sizes of the fish available in the dam. This will allow having an idea of the prey availability in the reservoir (**Table 4**).

Table 4 – Fish species caught in the Alqueva reservoir to feed the osprey young, their numbers and biometry. [(1)] Probable *Barbus microcephalus*, *B. steindachneri* and respective hybrids (+ *Luciobarbus comizo* ?), [(2)] including individuals of the *auratus*, *carassius* and intermediate morphotypes.

Species	Biometry	Mean	SD	Max	Min	N
Pikeperch *Sander lucioperca*	Lenght (cm)	43,3	5,6	69,7	27,2	322
	Weight (g)	651,1	332,4	2363	44,3	
Barb *Barbus* spp. [(1)]	Lenght (cm)	47,4	4,6	59,0	39,2	108
	Weight (g)	1125,9	423	2768	159	
Largemouth bass *Micropterus salmoides*	Lenght (cm)	26,7	3,2	32,9	13	69
	Weight (g)	320,4	102	618	23	
Goldfish *Carassius* spp., including hybrids with carp [(2)]	Lenght (cm)	22	6,3	42,3	13,4	39
	Weight (g)	222,4	287,2	1296	46	
Carp *Cyprinus carpio*	Lenght (cm)	41	15,7	71,2	24,3	16
	Weight (g)	1243,8	1158,6	4090	187	
Catfish *Ameiurus melas*	Lenght (cm)	21	8,9	26,3	5,6	4
	Weight (g)	272	16,2	298	257	
Pumpkinseed *Lepomis gibbosus*	Lenght (cm)	12,8	5,2	20	7,8	3
	Weight (g)	104,3	58,9	168	26	
Common bleak *Alburnus alburnus*	Lenght (cm)	18				1
	Weight (g)	53				

During the pre-release stage we supplied a total of 79.3 kg of fish, corresponding to 21.2 kg in average in the cages 1, 2 and 4 and to 15.6 kg in the cage 3 as it contained only 2 birds because P26 was removed due to injury. In average, we provided 309 g/bird/day during the 23 to 24 days of stay in the tower.

In 2013, there were no notable changes in consumption between the three daily meals, the birds as a rule consuming all the food supplied. Apparently, the reason for this may be the placing of the food on the nest in the beginning of the period as described above, instead of throwing it to the cage floor through the feeding sleeve as used before. This avoided forcing the nestlings to descend from the nest and walk to reach the food, to which apparently they resisted. After the first 10 days, larger fish pieces and entire parts of the carcass started to be delivered.

During the pre-release stage (70 meals provided) the birds were fed with reservoir fishes of the following species in decreasing order (in % of the number of meals): pikeperch (84.3), barb (51.4), bass (18.6) and goldfish (4.3). Additionally, we supplied supermarket marine fish in 10 meals – jack mackerel (*Trachurus* sp.) in 6 meals (4 days), sardine (*Sardina pilchardus*) in 4 meals (2 days) and mackerel (*Scomber* sp.) in 1 meal together with sardine. In each meal one or more species were provisioned.

The feeding behaviour of the juveniles within the tower was watched through the one-way mirrors and CCTV. We paid special attention to the food quantities ingested and interactions between the individuals. As far as possible, we tried to provide fish carcasses along with the fish portions to allow birds to later recognise the shape of the prey.

3.3. Release and first flights

Like in previous years, at the age of c.9 weeks ospreys were fully feathered and considered ready for flying out. The day before release the front cage panels were slightly opened for an easier and less disturbing full opening at dawn. The project technicians discreetly followed at the distance the birds leaving pens and the first flights.

The ospreys were released in two following days, freeing the females first as in previous years we have seen that they tend to be more relaxed and keep in the vicinity of the tower. This way we expected them to be a factor of attraction for the generally more restless males, in order to try reducing the risk of their premature dispersal (**Table 5**).

Table 5. Osprey fledglings releasing scheme in 2013: cages only with females in the first day (9th August) and cages with majority of males in the second day, and individual radio frequencies.

Cage #	PVC	Sex	Release date	# days in tower	VHF
3	P25	♀	09/08	23	151. 1230
3	P33	♀	09/08	23	151.5255
4	P28	♀	09/08	23	151.1916
4	P51	♀	09/08	23	151. 0626
4	P53	♀	09/08	23	151. 1723
1	P24	♂	10/08	24	151. 4120
1	P29	♀	10/08	24	151. 2338
1	P55	♂	10/08	24	151. 1532
2	P52	♂	10/08	24	151. 0843
2	P54	♂	10/08	24	151. 2124
2	P56	♂	10/08	24	151. 3713

This experiment however was made possible because in 2013 the animals of similar sizes and ages kept in separate cages were in general of different sex but cannot be repeated if age and size do not allow for the segregation of sexes.

In the days preceding the opening of the panel we supplied a larger quantity of fish on the feeders closer to the tower allowing the ospreys to visually recognise them as feeding sites. After the release day, food was provided twice a day (early afternoon and after sunset).

Perch-scale and camera trap

The perch-scale set on in 2012 was submitted to technical rectification aiming at the resolution of problems formerly encountered. For the ring identification of the ospreys weighed the same camera trap as used in 2012 (ScoutGuard SG570-6M) was placed nearby but relocated in a more favourable site in between the two feeders more often used (**Fig**. **8**).

Figure 8. Two ospreys at the perch-scale. Camera trap photo.

Despite the scale worked well when previously tested with a falconry Harris hawk (*Parabuteo unicinctus*) it didn't function properly with the released ospreys. In fact, during the 4 days after the first recorded weight (14 July, 4th day after second release) there are no photos matching the 19 registered weights. Then, after 2 matching weights/photos, again the lack of correspondence happened with the next 11 weights and only in the 22 August weights corresponding to photos started more regularly to occur. The problem may be due to a shorter stay of the birds on the scale than the time-lapse needed for the camera to react (currently defined as 5 seconds, to allow for the scale stabilization) and may be solved by shortening the camera time-lapse.

The opposite shortcoming appeared from the 22nd onwards as there were no corresponding weights to 22 (46.8%) of the 47 camera shots recorded. Only 7-8 of the 11 ospreys released were conveniently photographed to allow reading the colour-rings, although only in 7 occasions in an undoubtedly way. And only 5 different birds were simultaneously weighed and photographed. In the end, definite matching between photos and weights is only valid for 4 different birds: P28, 25 Aug., 1810g; P33, 07 Sep., 1925g; P51, 06 Sep., 2035g; and P53, 25 Aug., 1830g (**Table 6**).

Table 6. Weight sequences of the individuals of which simultaneous reliable perch-scale data and photo identification were obtained.

Osprey	Radiotagging 06/08 (g)	Perch-scale weights (g)		
	Weight	Weight	Period length (days)	Increment
P28	1690	1810	19	120
P33	1525	1925	32	400
P51	1600	2035	31	435
P53	1650	1830	19	180

In face of the very low rate of valid weighing, the perch-scale will have to be submitted to a new technical revision of its working specifications, as well as the camera trap, which has also to be relocated to improve the number of valid readings.

Radiotracking

All birds were equipped with backpack VHF radiotags (Biotrack TW-3 10-28 weighing 15.5-16g, with activity sensor and 3.5 months lifespan). The tags were previously tested and we followed all procedures recommended by the manufacturer. The birds were tagged during the night by Víctor García Matarranz, a specialist from the Spanish Ministry of the Environment, 3-4 days before being released. In order to assure the tags would remain fixed in position on the back of the birds, they were previously glued to a small flat base made on purpose. Tags were deployed and at the age of 8.5 - 9 weeks.

Figure 9. Project volunteer Sara Oliveira searching the radiotag frequencies. Photo Carla Cabrita.

As in previous years there was one premature dispersal event of a male (P56), which stopped being observed and radio detected in the afternoon of the 4th day after its release. This individual readily showed a tendency to travel far from the release area, until radio contact was lost. Both the unsuccessful thorough search carried out and the bird behaviour since the beginning, suggest that premature dispersal was the most likely cause of its disappearance. The release scheme followed in 2013, letting the females free in first place, may have contributed to less events of premature dispersal in males (3 in 2012), of which impaired survival probability is expectable.

Control of predation

As an attempt to deter predation of fledglings by foxes (*Vulpes vulpes*) (2 ospreys predated in 2011 after having been released) we used synthetic odour that mimics fox territorial scent marking (Scoot Fox Repellent, ©Foxolutions) to simulate territorial occupation. The higher risk areas such as around the hacking tower and areas most often used for ground landing by the ospreys were repeatedly sprayed (**Fig. 10**).

Figure 10. Spraying the soil with commercial fox repellent to try decreasing the risk of predation upon osprey fledglings. Photo Carla Cabrita.

We also made a fladry barrier (flags hanging from a rope) inspired on those once used in Eastern and Northern Europe to hunt wolves and later in North America as a deterrent of wolf access to cattle areas (Musiani et al 2003) as an experiment to prevent foxes from entering the release area. Yet, the method showed to be ineffective as after some time foxes resumed crossing the fladry, possibly because it was too rudimental. An improved version however, such as an electrified fladry barrier may prove effective and is under consideration for 2014.

Veterinary monitoring

We granted regular veterinarian support to all translocated juveniles, including an in-situ interim clinical check-up before the release of the birds, involving the collecting of new blood samples for hemogram determination and screening of pathogenic agents. We maintained the partnership with the Évora University Veterinary Hospital established in 2011 for emergency clinical procedures that lie beyond those possible to execute in the field. As well, a partnership agreement was established with the RIAS Wildlife Rehabilitation Centre at Ria Formosa (Olhão, South Portugal) aiming at providing admission for prolonged treatment.

Summary of individual relevant clinical events

P29 – Upon arrival at Lisbon's airport a lesion in one of the left foot digits was observed that involved nearly detachment of the claw. The injury was treated and although it later showed good cicatrisation this didn't prevent detachment of the claw, although without serious consequences (details in the VetNatura veterinarian report, not translated).

P26 – After an abnormal posture of the left limb observed inside the hacking tower, this osprey was evacuated to Évora's Veterinarian Hospital on the 23th July where a luxation of the left tibiotarsus-tarsometatarsal joint was diagnosed. The bird was transferred to the RIAS Rehabilitation Centre and was submitted to chirurgic intervention. At this time, a rupture of the long digit tendon extensor was detected. This lesion would cause permanent disablement, so the bird had to be euthanized (details in the veterinarian reports, not translated).

In account of the secondary osteodistrophy observed in two of the birds in 2012 indicating possible calcium phosphorus imbalance (Ca/P), we collected in 2013 blood for determination of Ca, P and parathormone levels. Results showed abnormally high levels of P, possibly indicating impairment of Ca and P metabolism (details in the Vetnatura veterinarian report, not translated).

Considering that this P in excess might originate from being in excess in diet we decided to carry out an analysis of the biochemical composition of the fish species used as food. Thus, several individuals of pikeperch, barb, carp, goldfish and bass were collected for analysis by SPAROS, our collaborator in this study, and is currently underway. Analytical procedures include a classical proximal composition determination (lipids, protein, total ashes and energy), as well as aminoacid and fatty acid profiles, and mineral characterization including P, Ca, Zn, Mg and Cu.

3.4. Dependence stage

This phase runs from release up to dispersal/migration. The behaviour and movements of the juveniles were followed by sight and radiotracking and we recorded data on flight and feeding behaviours, use of the area, and intraspecific and interspecific interactions.

Food delivery after release

In 2013, the time schedule followed in food provisioning was identical to the 2012 one, i.e. 1) after sunset (22-24 p.m.) when the technicians are less visible by the birds and their responsiveness is reduced, at the same time assuring that food is available at dawn; 2) at mid-afternoon during the hottest period of the day when the birds are resting out of the tower vicinity, while providing food at the end of the day when the ospreys resume feeding activity. Unconsumed food remains were removed at this time.

Like when all birds were still inside the tower, the fish species supplied on the feeders came mainly from the reservoir (**Table 4**, p. 15). Food quantities supplied on the feeders decreased after the ospreys' needs, and according to the number of birds present and how the area was being gradually abandoned (**Fig. 11**).

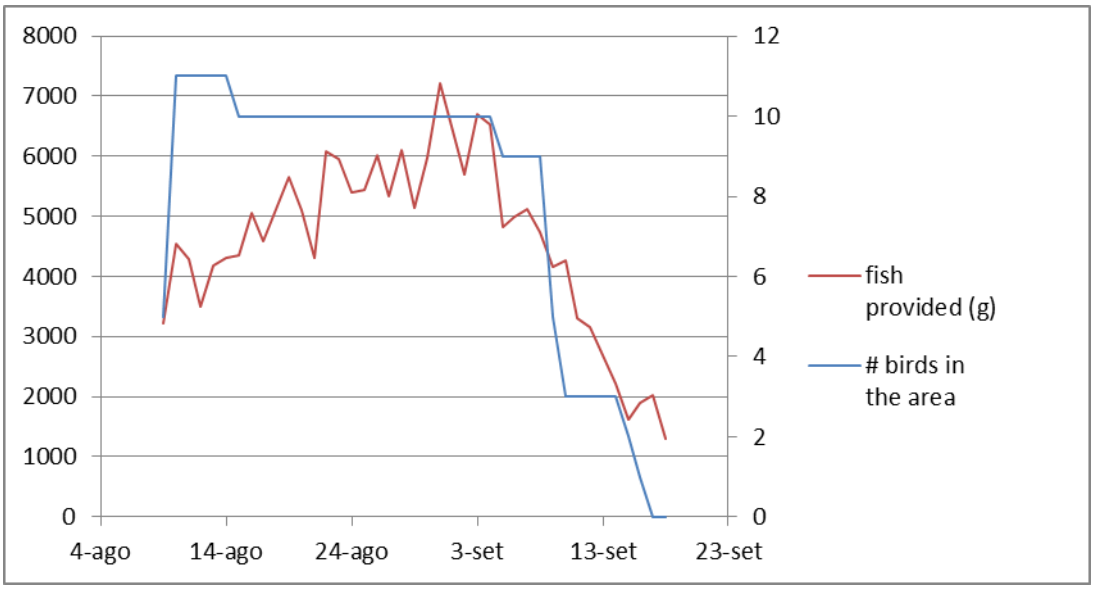

Figure 11. Adjustment between the fish quantities provided and the number of ospreys present in the area.

In total, we supplied c. 185 kg of fish from release to final dispersal, corresponding to 83 meals provided in 42 days (08 July – 18 September) and to 2289.7 ± 764.5 g/meals, or 4540.8 ± 1442.5 g/day in average. Taking into account only the period from the day of premature dispersal of P56 (4th day after release, see "Dispersal and migration") until the first day of dispersal of the remaining ospreys, whilst 10 birds were regularly feeding (15 Aug – 04 Sep; 20 days), we supplied 281.2g/bird/meal or 561.4g/bird/day.

During the dependence stage the birds were fed with the following species, by decreasing order of frequency (in % of the number of meals); pikeperch (77.9), barb (68.8), bass (24.7), carp (10.4) and goldfish (9.1). Additionally, we delivered catfish and pumpkinseed in two and one meal respectively. We also supplied supermarket marine fish in 8 meals – jack mackerel in 7 meals (3 days), and sardine and mackerel in one meal each. Each meal was made up of one or more species of fish. As prior to release, pikeperch was largely predominant in diet.

Feeding patterns do not differ from those observed in previous years, with feeding activity concentrated in the two first hours after dawn and the two last hours before sunset.

Spatial use of the area

After release, the ospreys were followed by radiotracking and direct observation. Comparing with previous years the fledglings showed a better flight control and apparently better physical fitness since the beginning. This may be linked with the better intake rates observed within the tower probably due to the change introduced in the food delivery strategy by placing the food directly onto the nests.

There were no changes in the areas used for resting and overnight roosting. As formerly, the areas preferred were the bays adjacent to the tower, visually less exposed whilst the artificial perches were again the most often used as perching sites. Landing in the ground went on being mostly linked with feeding, and drinking and bathing that regularly follow feeding (**Fig. 12**).

Figure 12. Osprey bathing near the perch-scale. Camera trap photo.

Intra- and interspecific interactions

During the whole post-release period, the juveniles showed the usual semi-gregarious behaviour often vocalizing, and common using of the feeders (up to 6 at the same time, several times, in one single feeder) and the artificial perches, with no interaction other than vocal.

In 2013 interspecific interactions seen were with crested grebe (*Podiceps cristatus*), black kite (*Milvus migrans*), grey heron (*Ardea cinerea*) and gulls (*Larus* sp.), and above all with white stork (*Ciconia ciconia*). Of the 38 events recorded, 1 was with grebes, 2 with kites, 3 with herons, 5 with gulls and the remaining 27 with storks. With the exception of the herons with which interactions were restricted to mutual persecutions and with grebes with which it consisted in an apparent capture attempt by an osprey, the other conflicts involved food disputes. Agonistic interactions with the resident storks were not observed in previous years but were preponderant in 2013 involving frequent piracy attempts by the stork, either causing ospreys to fly away or aggressive responses in defence of food.

Disturbance

In 2013, only three slight disturbance events were observed associated with brief presence of fishermen boats, while no disturbance occurred by fishermen approaching from the land side as the estate was closed to the public. A long-lasting stopover of a touristic boat was recorded in the vicinity of the release area but without causing disturbance. In short, human direct disturbance events during both pre-release and post-release seemed irrelevant.

3.5. Dispersal and migration

We defined the date of final dispersal and likely migration of each individual from its definitive visual absence and lack of radio signal. Except for P56 that dispersed prematurely, birds dispersed 31.4 ± 3.8 (25-38) days after release (**Table 8**). Other than P56, from which there was a last distant radio signal at 17 p.m., dispersal occurred always after a last contact at the morning monitoring, i.e. the bird was not detected either visually or by radio in the afternoon of that day.

Table 8 – Dates of first flight and dispersal of ospreys in 2013.

Osprey	Sex	1st flight	Dispersal	# days from 1st flight to dispersal
P56	♂	10/08	15/08	5
P52	♂	10/08	04/09	25
P29	♀	10/08	08/09	29
P51	♀	09/08	08/09	30
P54	♂	10/08	08/09	29
P55	♂	10/08	08/09	29
P25	♀	09/08	09/09	31
P28	♀	09/08	09/09	31
P33	♀	09/08	14/09	36
P24	♂	10/08	15/09	36
P53	♀	09/08	16/09	38

Last simultaneous records of all transmitters were obtained on the 3rd September, 24 days after the second release date. Between the 8th and the 16th September birds gradually left

the area and by the 16th all ospreys were absent from the area with no later radio contact. The female P53 was the last osprey to leave, 38 days after being released. As in previous years but in a less evident way, ospreys tended to leave on the same day.

4. Project improvements

Minimizing risks of fox predation

In 2014 we will repeat the preventive use of fox repellents in critical areas, although local conditions do not make easy the confirmation of its effectiveness. We also will check the technical and financial viability of an electrified fladry barrier (http://www.peopleandcarnivores.org/services/agriculture/temporary-fences/fladry).

Minimizing risks of accidents within the tower

The analysis of the CCTV video images has shown that the tendon lesion of P26 within the tower that led to its irrecoverableness was due to the introduction on the injured limb between the nest wooden frame and its filling material. Seemingly, the lesion was caused by the bird attempts to free the leg. The similar injury of P07 in 2011 could have had the same cause. Therefore, in order to reduce the risk of this kind of accidents, a ramp will be attached to the inside border of the frame to try eliminating the sharp boundary between the frame and the nest material.

Enlargement of the hacking tower

In the 2012 report we advanced the possibility of augmenting the tower with a new compartment in order to reduce the number of animals per pen and/or to allow for an extra pen where problematic individuals in need could be isolated. Yet, due to difficulties linked with the continuity of the project in the same location (see “project constraints” below) this enlargement was postponed. As the continuity of the project in the same location is now foreseen, we will reanalyse that possibility as soon as the situation becomes definitively clarified.

Easing up the access to food

As we have seen that placing the food directly onto the nest markedly improved its acceptance by the young and consequently food intake and physical fitness, we will study a technical solution to go ahead with this procedure during the first weeks but avoiding stressing the juveniles. One such possible solution could be adapting a sleeve to the openings that exist in the back panels.

Technical revision of the perch-scale – camera trap system

Having acknowledged the malfunction of the simultaneous weighing and identification of the birds at the perch-scale, the system functioning will be reviewed in order to improve its efficiency.

Control of the calcium and phosphorus levels

We intend to go on in 2014 with the administration of Ca and VitD3 supplements aiming at the prevention of pathologic osteodistrophy events as those occurred with P12 and P14 in 2012. We also intend to maintain the screening of the Ca/P balance and of the Parathormone (Pthi) levels like it was done in 2013.

In consequence of the necessary decrease of temperature inside the cages, inner light is reduced and this may be a reason for a lower synthesis of VitD3 by the birds. Therefore we will analyse the adequacy and technical viability of compensating this by installing artificial light inside the pens.

5. Notes

Constraints to the project

A) Due to the intensive rains in the winter of 2013, the Alqueva reservoir attained its highest level and this transformed the peninsula where the hacking facilities are located into an island during part of the time the young were kept within the tower. This also left the shore line feeders surrounded by water and half submerged until shortly before the arrival of the

birds (**Fig. 13**). Also, reaching the observation point for visual and radio monitoring, involved water crossing with a small boat several times a day during weeks (**Fig. 14**).

Figure 13. Feeders partially immersed due to the rising of the water level.

Photo Andreia Dias.

Figure 14. Crossing by boat to the monitoring point. Photo Carla Cabrita.

B) In September 2013, a few days after the ospreys dispersed, and without previous notification to the project, almost all dead trees along the dam shoreline in the osprey

release area were chopped and removed, including those supporting the artificial perches (**Fig. 15**). The felling down of the trees was decided by the APA (Portuguese Environment Agency) an official public institution, as a part of the current removal of dead trees all along the reservoir shoreline from the belt between its minimum and maximum water levels.

Figure 15. Remains of the dead holm oaks that supported the artificial perches. Photo Sónia Colaço.

In the release area, the elimination of the holm oaks that held the artificial perches will imply their relocation farther away from the shore in live holm oaks, a situation less favourable for the birds. Probably, it will also involve the setting up of an extra number of perches to compensate for their retreat in relation to the shore.

As for the whole dam, the general removal of the dead oaks may have an important negative impact, as dead trees bordering the shore are the available natural perches for the ospreys, among other species. Their almost complete eradication would degrade the area's quality regarding the project's goal – the establishment of an osprey breeding nucleus. In order to reduce the impact, we met with EDIA technicians and agreed in setting aside from the cut:

1) dead trees in all islands and "peninsulas" (in terms of EDIA's formal definition);
2) those dead trees at the same time lying closer to the shoreline, bigger and with a more open crown, especially in low lying water areas (less deep shores).

The implementation of these measures is under the supervision of EDIA technicians.

C) SAIP, the former concessionaire of the estate where the project is located went insolvent in September 2012 and consequently the estate returned to the ownership and direct administration of the Fundação da Casa de Bragança (Bragança House Foundation). This situation introduced reasonable doubts concerning the project continuity within the estate. Only in December 2013 the Foundation allowed, although still pending for final decision, the permanence of the project in place until its conclusion in 2015. This situation forced to postpone some decisions, namely the tower enlargement and the re-publication of the brochure, and involved the search for alternative localities. Nevertheless, the project transfer is of doubtful technical and financial practicality. Unless the situation is ultimately solved, the project remains in serious risk of having to be suspended.

Observations of alien ospreys, unrelated to the project, in the Alqueva reservoir

The natural occurrence of ospreys in the Alqueva dam strengthens the assumption that the area offers suitable conditions to the establishment of a breeding nucleus. **Table 9** lists the known sightings of ospreys, unrelated to the project, in the dam from April to October 2013 (**Figs. 16-18**). Some individuals were colour-ringed.

Table 9. Observation records of naturally occurring ospreys in Alqueva (April – October de 2013)

	Month	N	Observer	Age	Location
1	April	1	Francisco Pires	Adult	Mourão
2	May	1	João Ferreira & Andreia Dias	?	Campinho
3	May	1	João Ferreira & Andreia Dias	?	Alcarrache
4	June	1	Jorge Safara	?	Ponte Mourão
5	May	2	Carlos Pinho	?	Mte Roncanito
6	August	1	Luís Palma & Andreia Dias	Adult	Alcarrache
7	October	1	Valter Rico	Juvenile	Estrela
8	October	1	Luís Palma	Juvenile	Roncanito
9	October	1	Luís Palma	?	Degebe
10	October	1 (3 times)	Luís Palma	Subadult	Degebe

Figure 16. Osprey observed in Abril 2013 flying above the Mourão castle.

Photo Francisco Pires.

Figure 17. Osprey observed near Campinho in May 2013. Photo Andreia Dias.

Figure 18. Osprey observed near Estrela in October 2013. Photo Valter Rico.

Project impact outside Portugal

In April 2013, Aitor Galarza, the Basque Country osprey reintroduction coordinator visited our project infrastructures and the Alqueva reservoir (**Fig. 19**). The Basque project started in 2013 after this visit and Aitor previously wanted to closely acknowledge how the Portuguese project works and get advice from the project technicians.

Figure 19. Aitor Galarza, coordinator of the Basque Country osprey reintroduction project with João Ferreira (left) e Luís Palma (right). Photo Aitor Galarza.

Also Wendy Strahm and Denis Landenbergue, promoters of the species reintroduction in Switzerland, followed in detail all the daily tasks of the Portuguese project during one week in August (**Fig. 20**).

Figure 20. Wendy Strahm (left) and Denis Landenbergue, promoters of the osprey reintroduction in Switzerland, visiting the Portuguese project. Photo Andreia Dias.

Project news on Finnish press

Maailmalle
Puolentusinaa sääksenpoikaa on Hämeen lahja Portugalille. »4

Haka
Valmentaja-Rantala haluaa välttää pelaaja-Rantalan virheet. »12

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4 PUHEENAIHEET

PUHEISSA

Joko sinun kahvipöydässäsi väännetään näistä aiheista? Ota keskustelutärpit talteen. Kommentoi myös www.valkeakoskensanomat.fi.

1. Valkeakoskelainen jalkapallojoukkue FC Haka on puheenaiheiden kestosuosikki. Pärjääkö Haka. Käykö peleissä paljon vai vähän yleisöä. Onko uusi valmentaja tarpeeksi pätevä. Onko joukkue hyvä mainos kaupungille vai ei. Onko tehty oikeita pelaajavalintoja. Onko joukkuetta tuettu yhteisistä rahoista liikaa vai sopivasti.

2. Valkeakoskella varastetaan polkupyöriä ja mopoja. Joku vie pyörän vain yhdeksi yöksi, kun palaa ravintolasta kotiin ja nakkaa sen sitten minne sattuu. Pyöriä vohkitaan niin päivällä kuin yöllä. Röyhkeimmät ovat vieneet sen melkeinpä omistajan nenän edestä

MIKA SEPPÄNEN

Markku Alanko tarjoili kuoreita Andreia Diasin pitäessä ruokittavia aloillaan.

MIKA SEPPÄNEN

Pertti Saurola ja Andreia Dias kantoivat linnut nopeasti autonperään.

MIKA SEPPÄNEN

Sääksi on korkea jo noin viiden viikon vanhana.

Kuusi sääkseä lähti etelään

Sääksenpoikaset lähtivät uusiin maisemiin

Liisa Ahokas

Markku Alangon lintuhoitolasta Valkeakoskelta lähti keskiviikkona matkaan kuusi noin viisi viikkoa vanhaa sääksenpoikasta Portugaliin elvyttämään maan sääksikantaa. Kanta oli jo lähes sukupuuttoon kuollut ennen kuin lintuja alettiin viedä sinne muun muassa Suomesta ja Ruotsista.

Nyt lähetetyt sääkset on kerätty Pirkanmaan ja Hämeen alueilta ja tämä oli kolmas lähetys. Ensimmäiset viisi poikasta lähtivät kesällä 2011 ja viime vuonna lähti kuusi.

Aikaisemmin sääksiä on viety Espanjaan ja nyt siellä on jo useita pesiviä pariskuntia.

Linnut viedään meren äärelle

Sääksiä oli Portugalista tullut noutamaan biologi, yliopistotukija **Andreia Dias** ja niiden kunnon tarkasti ja lähdön valvoi lintutieteilijä, professori **Pertti Saurola**, joka jäi vuonna 2002 eläkkeelle Helsingin yliopiston Eläinmuseon Rengastustoimiston johtajan virasta. Hän on tutkinut ja johtanut Suomen kalasääskikannan seurantaa vuodesta 1971 lähtien ja toiminut aktiivisesti sääksien satelliittiseurantahankkeessa.

– Portugalissa linnut sijoitetaan meren äärelle, suojelualueelle Alqueva Damissa. Siellä niitä odottaa lintutalo, jossa kukin linnuista asustaa yksin häkissään. Linnut ovat mahdollisimman vähän tekemisissä ihmisten kanssa, jotta ne helpommin leimautuisivat portugalilaisiksi ja ne saataisiin lähtemään omin päin luontoon, kertoi Andreia Dias.

Markku Alanko

Alangon lintuhoitolassa *sääksenpoikaset odottelivat matkaansa rauhallisina välittämättä Andreia Diasin ja Pertti Saurolan läsnäolosta.*

Lintujen elämää häkeissä seurataan videokameroiden avulla ja paikallisessa hoitotiimissä on Diasin lisäksi kolme muuta hoitajaa ja lääkäri.

– Seuraamme miten poikaset pikkuhiljaa alkavat nousta jaloilleen, levittelevät siipiään ja sitten jo kohta ovat valmiita kokeilemaan lentoon lähtöä. Ruokimme niitä ensin pienillä kalanpalasilla, sitten vähän suuremmilla ja lopulta ne saavat kokonaisia kaloja.

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– Ne lähtevät kukin omia aikojaan liikkeelle, mutta pysyttelevät yleensä kuukauden päivät häkkiensä lähettyvillä ja käyvät syömässä meidän niille tuomaa ruokaa. Tällainen menetelmä on todettu hyväksi. Siten nämä linnut palaavat talvehtimisseuduiltaan Afrikasta pesimään nimenomaan sille alueelle, missä ne on vapautettu, kertoi Dias.

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Mika Seppänen

Markku Alanko tarjoili kuoreita Andreia Diasin pitäessä ruokittavia aloillaan.

Hämäläiset sääkset lensivät Portugaliin

EILA SAUKKONEN
Valkeakoski

Ruskeankirjavat sääksenpojat kyyhöttävät avonaisessa laatikossa omakotitalon seinustalla. Vain hengitys tekee niihin vähän liikettä. Vuorollaan yksi porukasta pääsee tutkija **Andreia Diasin** syliin ja lintuhoitolamies **Markku Alangon** syöttämäksi.

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7. References

Musiani M., Mamo C., Boitani L., Callaghan C., Gates, CC. 2003. Wolf Depredation Trends and the Use of Fladry Barriers to Protect Livestock in Western North America. USDA National Wildlife Research Center - Staff Publications. Paper 620.