REINTRODUCTION OF THE WHITE-TAILED SEA EAGLE TO SCOTLAND

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INTRODUCTION

The White-tailed Sea Eagle (*Haliaeetus albicilla*) is considered the fourth largest eagle in the world. It is closely related to the Bald Eagle and occupies the same ecological niche, but in Eurasia. It is distributed in northern Europe and northern Asia, with the largest population in Europe found along the coast of Norway. Small resident populations also occur in southwestern Greenland and western Iceland. Population estimates in 2008 stood at only 9,000–11,000 pairs. They are mostly resident, only but the northern most birds such as the eastern Scandinavian and Siberian population migrate south in winter and birds from eastern Russia occasionally migrate into Alaska.

Often referred to as a flying "barn door", it measures 66–94 cm in length with a 1.78–2.45 m wingspan, the largest of any eagle. Females typically weigh 4–6.9 kg, are slightly larger than males, which weigh 3.1–5.4 kg. Adults are mainly greyish-brown except for the slightly paler head and neck, blackish flight feathers, and distinctive white tail. Beak and legs are yellow. Some individuals have been found to live over 25 years.

In Scotland the white-tailed sea eagle was driven to extinction by human persecution from fishermen, gamekeepers and shepherds, with the last native bird being shot on Shetland in 1918. In Shetland fishermen believed that as soon as a sea eagle appeared fish would rise to the surface, belly up and this led to some fishermen using eagle fat smeared on their bait, to increase their catch. Current and ongoing threats to sea eagles across their range include bioaccumulation of contaminants such as PCB, heavy metals - in particular lead, trauma from wind turbines, electrocution, and ongoing illegal persecution (Helander et al., 2002, Helander et al., 2009, Kenntner et al., 2001,Kim et al., 1999, Krone et al., 2006, Muller et al., 2007, Oliver et al., 2004, Olsson et al., 2000).

REINTRODUCTION

The white-tailed sea eagle was re-introduced into Scotland between 1975 and 1985 using donor stock from Norway. Over this period 82 captive–bred Norwegian eaglets were released on the Isle of Rhum (Love and Ball 1979). In 1996, a comprehensive overview of the viability of the population, using data up to 1992, reported that, while the population was slowly growing, there was up to a 60% chance that without further supplementation the eagles would again go extinct within 100 years, and recommended a 2nd phase release of 60 more birds (Green et al., 1996). 58 more eaglets were therefore released in the West between 1993 and 1998. The first territory was occupied by a Scottish-bred bird in 1995. In 1998 birds from the second re-introduction phase also started to enter the breeding population and from then on the population has shown a sustained increase. Breeding success in the Scottish population has increased over time as the average age and experience of individuals in the population have increased, and success tends to be higher where one or both adults are wild-bred. Current levels of breeding success remain low compared with some other populations in Europe, but similar to those in Norway where weather conditions and food availability are likely to be most similar (Evans et al., 2009). Elsewhere in Europe, studies of microsatellite and

mitochondrial DNA in White-tailed Eagles have shown that the recovering European population has retained appreciable amounts of genetic diversity, implying a low risk of inbreeding depression, which is always a serious concern in species with low population density (Hailer et al., 2006). In 2000 the 100th wild chick fledged in the re-established population in the east, and by 2012 the number of territories exceeded 65.

With west coast populations established, reintroduction efforts have more recently been focussed on re-establishing an east coast population. Between 2007-2012, RSPB Scotland, Scottish Natural Heritage and Forestry Commission Scotland, with additional financial support from Heritage Lottery Fund (HLF) and Fife and Rural Tayside LEADER Programme, have reintroduced a total of 85 eagles to Scotland's east coast. The Royal (Dick) School of Veterinary Studies' Exotic Animal and Wildlife Service Vet have been the veterinary partners since the reintroduction project began in 2007, working to provide veterinary assistance to the programme and help fulfil IUCN guidelines for reintroductions (updated version IUCN 2012). These birds are wing-tagged (with the exception of the 2008 cohort which were colour-ringed) and also fitted with 5 year VHF radios to help project staff to track them. They have been ranging far and wide up and down the east coast and occasionally over to the west. Pair bonding and territory formation has been happening in the east, but in fact the first successful breeding attempt of an east coast white-tailed eagle took place on Mull, with a 2007 female paired up with a 2007 male from Mull. In August 2013 the first chick fledged in the wild in the east, hatched earlier this summer to a pair released in 2009 which nested in a Forestry Commission Scotland wood in Fife. This chick marks a huge milestone in the partnership to restore white-tailed sea eagles to their former range in the south and east of Scotland.

Methods

This study was conducted from 2007- 2012 as part of the East Scotland Sea Eagle re-introduction project. Every year in June, 6-8 week old nestlings were collected from Norway and transported by air in commercial plastic pet carriers to Fife, Scotland. Birds were placed on oral marbofloxacin 40mg once daily and oral itraconazole 50-80mg once daily from time of capture until one week post-capture to prevent the development of stress-related disease following the death of one bird in 2009 due to aspergillosis.

All birds had a full clinical examination performed on arrival in Fife and any clinical abnormalities were noted. Body condition score (using a scale of 1-5; 1 = emaciated, 5 = obese) and feather condition (using a scale of 0-3; 1 = poor, 3 = good) were also recorded. All birds were weighed with a hanging spring balance scale. Blood samples were collected from the cutaneous ulnar (brachial) vein with the birds cast in dorsal recumbency. Approximately 9 ml of blood was collected in a 10 ml plastic syringe (Becton Dickinson S.A., S Augustin del Guadalix, Madrid, Spain) attached to a 23 gauge 1" needle (Monoject, Kendall Healthcare, Mansfield, Massachusetts, USA). Field measurements of blood glucose were performed with an AlphaTRAK®™ blood glucose monitor (Abbott Laboratories, Queenborough, Kent, ME11 5EL, UK). Three blood smears were made using a slide on slide technique. One ml of blood was transferred to an EDTA anticoagulant tube (Teklab Ltd, 9 Dorothy Terrace, Sacriston, County Durham, DH7 6LG, UK) for DNA sexing whilst an additional 1 ml EDTA tube was filled and submitted for haematological analysis. A 1ml tube containing lithium heparin (Taklab, Durham, UK) as an anticoagulant was filled and used for blood lead analysis. The remaining sample was transferred to a 6 ml lithium heparin tube (Becton Dickinson S.A., S Augustin del Guadalix, Madrid, Spain) and submitted for biochemical analyses and any remaining plasma was stored.

Faecal samples were collected from the floor of the travel containers where available and were submitted for parasitology and bacterial and fungal culture.

In addition, all eagles were sampled again for haematology, biochemistry in August of every year from 2009 onwards. This second sampling was opportunistic as it coincided with the pre-release attachment of radiotracking transmitters to the birds. Sampling methodologies were the same as on arrival.

Results

Over the six year period 86 nestling birds (43 male, 43 female) were sampled. **Table 1** provides a summary of the haematological, biochemical and bodyweight data analysed so far from June samplings. No blood parasites were detected.

Faecal parasitology revealed mainly fluke eggs and in one case, a large number of syngamid eggs present. Faecal culture revealed *Fusobacterium* spp, clostridia, and yeasts, none of which were considered clinically significant.

22/86 birds have been found dead / died (tracking of all birds continues). Causes of death were:

- Electrocution / collision with power lines (11)
- Collision with train (5)
- Persecution (1)
- Fractured leg (1)
- Enteritis and wing tip oedema (1)
- Aspergillosis (1) – this is the only bird which died in captivity pre-introduction

Causes of death could not be established in the other cases as the bodies were too decomposed.

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Table 1. Summary data from 86 White-tailed sea eagle pre-release health checks

	MEAN	SD	MIN	MAX	Number
Hb	10.3271	1.07054	5.8	13.8	85
PCV lab	28.4625	5.20251	0.31	40	85
PCV Field	30.2118	4.95718	17	47	85
RBC	2.42718	0.79906	1.21	5.07	85
MCV	124.658	21.8466	73	163.3	85
MCHC	36.1553	3.12031	28.5	41.3	85
MCH	45.2282	8.94521	23.5	56.6	85
WBC	16.9663	7.23813	7.2	40	86
Het	10.8148	6.00509	2.08	33.43	86
Het	63.0141	12.7464	28	84	71
Lymph	3.74988	1.91522	0.23	9.9	86
Lymph	21.0423	11.6269	3	50	71
Eosin	1.34267	0.96772	0.23	5.03	86
Eosin	8.98592	5.7706	1	35	71
Mono	0.69093	0.54008	0	2.87	86
Mono	4.50704	3.40535	0	17	71
Azur	0	0	0	0	86
Azuro	0	0	0	0	71
Baso	0.33244	0.35399	0	2	86
Baso	2.25352	1.83395	0	8	71
Throm	31.5679	28.5897	3	253	81
Fibrinogen	8.47824	60.3171	0.91	558	85
TPP col	33.2616	4.06411	23.8	46.1	86
TPP ref (field)	38.0941	9.60484	12	62	85
Alb	14.5279	1.25508	10.8	17.5	86
Glob	18.7256	3.2322	13	30.6	86
Urea	0.77324	0.51768	0	3.6	71
Gluc FIELD	14.8602	3.23023	9.5	20.9	83
Gluc LAB	14.3299	0.98808	12.33	17.44	71
Chol	6.75028	1.43398	3.76	10.09	71
Ca	2.71384	0.13372	2.38	2.97	86
AST	220.337	52.6003	126	414	86
CK	1299.86	316.241	463	2598	86
Uric Acid	346.465	126.572	195	745	86
LDH	727.256	154.714	387	1189	86
Sodium	153.678	2.76039	147.7	159.8	71
Potassium	3.13535	0.58433	1.34	4.26	71
Na/K ratio	51.6437	15.0793	35.8	119.3	71
Blood lead umol/L	0.1987	0.25177	0.01	1.3	69
Bodyweight	3.87052	0.69895	2.26	5.6	77