NINA Report 583

The reintroduction of the white-tailed eagle to Ireland

Project report 2009

Torgeir Nygård
Duncan Halley
Allan Mee

NINA
Norwegian Institute for Nature Research

TEAMWORK ENTHUSIASM INTEGRITY QUALITY

Cooperation and expertise for a sustainable future

NINA Publications

NINA Report (NINA Rapport)
This is a electronic series beginning in 2005, which replaces the earlier series NINA commissioned reports and NINA project reports. This will be NINA's usual form of reporting completed research, monitoring or review work to clients. In addition, the series will include much of the institute's other reporting, for example from seminars and conferences, results of internal research and review work and literature studies, etc. NINA report may also be issued in a second language where appropriate.

NINA Special Report (NINA Temahefte)
As the name suggests, special reports deal with special subjects. Special reports are produced as required and the series ranges widely: from systematic identification keys to information on important problem areas in society. NINA special reports are usually given a popular scientific form with more weight on illustrations than a NINA report.

NINA Factsheet (NINA Fakta)
Factsheets have as their goal to make NINA's research results quickly and easily accessible to the general public. The are sent to the press, civil society organisations, nature management at all levels, politicians, and other special interests. Fact sheets give a short presentation of some of our most important research themes.

Other publishing
In addition to reporting in NINA's own series, the institute's employees publish a large proportion of their scientific results in international journals, popular science books and magazines.

Norwegian Institute for Nature Research

The reintroduction of the white-tailed eagle to Ireland

Project report 2009

Torgeir Nygård
Duncan Halley
Allan Mee

Nygård, T., Halley, D., & Mee, A. 2010 The reintroduction of the white-tailed eagle to Ireland. Project report 2009 - NINA Report 583. 30 pp.

Trondheim, 19.04.2009

ISSN: 1504-3312
ISBN: 978-82-426-2160-3

AVAILABILITY
Open

PUBLICATION TYPE
Digital document (pdf)

QUALITY CONTROLLED BY
Hans Chr. Pedersen

SIGNATURE OF RESPONSIBLE PERSON
Research director Inga E. Bruteig (sign.)

CLIENT(S)
National Park and Wildlife Service and Golden Eagle Trust, Ireland

CLIENTS' CONTACT PERSON(S)
Allan Mee

COVER PICTURE
Asgeir Østvik and Duncan Halley at a nest with three eagle chicks. Photo: Valerie O'Sullivan

KEY WORDS
White-tailed eagle, reintroduction, Norway, Ireland, survival, mortality

NØKKELORD
Havørn, gjeninnføring, Norge, Irland, overlevelse, dødelighet

KEY WORDS
White-tailed eagle, reintroduction, Norway, Ireland, survival, mortality

NØKKELORD
Havørn, gjeninnføring, Norge, Irland, overlevelse, dødelighet

Abstract

Nygård, T., Halley, D., & Mee, A. 2010 The reintroduction of the white-tailed eagle to Ireland. Project report 2009 - NINA Report 583. 30 pp.

A programme to reintroduce the white tailed eagle *Haliaeetus albicilla* to Ireland, where the species became extinct in the early 20th century, commenced in 2005. The work is managed in Ireland by the Golden Eagle Trust; in Norway collection activities are organised by NINA and the Norwegian Ornithological Society with the assistance of a team of expert volunteers. The first young birds were collected in Trøndelag, Norway and released in Kerry, Ireland in 2007. Here we report on progress so far, including collection activities in 2009, the third of five planned years of collection and release of young white-tailed eagles.

Active nests were located in April-May and young birds collected from nests 15th-25th June (always leaving at least one chick in the nest). The 55 birds exported 2007-2009 were checked by a veterinarian, weighed and measured, and ringed the day before being flown directly to Kerry by charter aircraft in the end of June. Release from holding cages in Kerry National Park was done in early August – early September. Birds have been regularly monitored thereafter, individual recognition made possible with wing-tags and VHF or GPS transmitters.

Survival in Ireland has been good, 9 of 15 birds released in 2007, 18 out of 20 released in 2008, and 19 of 20 birds released in 2009 being known or assumed alive as of January 2010 (46 of 55 total). Survival rate for the first year is on average 0.85, and for later years 0.90. These rates are similar to wild populations in Norway and other countries, and higher than in the earlier and successful Scottish west coast reintroduction.

The survival rate would have been excellent (higher than any known wild population) but for illegal poisoning (5 cases) and to a lesser extent shooting (1), certainly the cause of death in 6 of the 9 casualties. Illegal killing was also the probable cause of death in a 7th (where the transmitter was recovered in a river, having been removed from the bird), and possibly in the two remaining cases where the cause of death was undeterminable.

Poisoning is clearly the main threat to reintroduced white-tailed eagles, as for other raptors, in Ireland. Poisoning of meat under regulations which should make killing of raptors impossible, but which are evidently often ignored, is still permitted though illegal almost everywhere else in Europe. Since non-meat baits are effective for this purpose we strongly recommend the banning of all meat baits in Ireland for conservation and animal welfare reasons.

The project is planned to continue in 2010 and 2011, when a total of 95 birds will have been released to the wild in Ireland during the course of the project.

Torgeir Nygård, Norwegian Institute for Nature Research, NO-7485 Trondheim, Norway
Torgeir.nygard@nina.no
Duncan Halley, Norwegian Institute for Nature Research, NO-7485 Trondheim, Norway
Allan Mee, Direen, Black Valley, Beaufort, Co. Kerry, Ireland

Sammendrag

Nygård, T., Halley, D., & Mee, A. 2010 Gjeninnføring av havørna til Irland. Prosjektrapport 2009. - NINA Rapport 583. 30 s.

Havørn ble utrydda fra Irland tidlig i det 20. århundre, og i 2005 starta et program for å gjeninnføre arten. I Irland blir arbeidet styrt av "The Golde Eagle Trust", og i Norge er innsamlingen organisert av NINA i samarbeid med Norsk ornitologisk forening, med hjelp av ekspertisen til lokale kjentmenn. De første reirungene av havørn ble innsamla i Trøndelag i 2007, og sluppet ut i Kerry i Irland i 2007. Vi summerer her opp resultatene så langt, inklusive arbeidet i 2009, som er det tredje av de fem planlagte årene med innsamling og slipp.

Aktive reir ble lokalisert I april-mai, og reirungen ble samla inn I I tidsrommet 15. - 25. juni fra reir med to eller tre unger, slik at det alltid var igjen minst én unge i reiret. I alt 15 unger ble samla inn I 2007, og 20 hvert år I 2008 og 2009. Fuglene ble sjekka av veterinær, målt og veid samt ringmerka dagen før de ble fløyet til Kerry med charterfly i slutten av juni. Slippet fra burene i Kerry nasjonalpark skjedde tidlig i august – tidlig i september. Fuglen blir overvåka regelmessig, og individgjenkjennelse er mulig pga. vingemerker og radio/satellittsendere.

Overlevelsen har vært god; 9 av 15 fugler sluppet i 2007, 18 av 20 sluppet i 2008 og 19 av 20 fugler sluppet i 2009 er påvist eller antatt i live pr januar 2010 (46 av 55 totalt). Overlevelsesraten for det første leveåret er i gjennomsnitt 0,85, og for andre og tredje året 0,9. Dette er like høyt som i en normal vill populasjon, og høyere enn i den tidligere og vellykkede skotske gjeninnføringen.

Overlevelsesraten ville ha vært eksepsjonelt høy hvis det ikke hadde vært for ulovlig bruk av gift (5 dødstilfeller) og ulovlig skyting (1 tilfelle). Sannsynlig var det ulovligheter også bak et annet tilfelle, hvor kun senderen ble funnet i ei elv. I de to siste tilfellene var det ikke mulig å fastslå dødsårsaken.

Bruk av gift i utlagt kjøtt er den største trusselen for de gjeninnførte ørnene i Irland. Under streng overholdelse av gjeldende regelverk i Irland skulle forgiftning av ørn være umulig. Utlegging av gift i åte er forbudt nesten overalt ellers i Europa. Siden alternativer finnes, vil vi sterkt oppfordre til at kjøtt som åte i bekjempelse av kråkefugler og rev i Irland forbys både av dyreetiske og naturvernmessige årsaker.

Prosjektet er planlagt å videreføres i 2010 og 2011, med totalt 95 ungfugler sluppet ut i naturen i Irland under prosjektets varighet.

Torgeir Nygård, Norsk institutt for naturforskning, 7485 Trondheim
Torgeir.nygard@nina.no
Duncan Halley, Norsk institutt for naturforskning, 7485 Trondheim
Allan Mee, Direen, Black Valley, Beaufort, Co. Kerry, Ireland

Contents

Foreword

Birds of prey have their natural place in nature, and in the parts of the world where they have been driven to extinction by persecution or poisoning, the nature appears impoverished. A growing awareness of the importance of biodiversity and the role of birds of prey, has led to several reintroduction programmes in various parts of the world. The extermination of the golden eagle and the white-tailed eagle in Ireland happened a century ago. The nature conservation authorities and NGOs in Ireland wanted to remedy this situation, and took an initiative toward the Directorate for Nature Management, the Norwegian Ornithological Society, and Norwegian Institute for Nature Research in Norway in 2005, asking for help to reintroduce the white-tailed eagle. The operation has run successfully, but some very unfortunate deaths due to poisoning have occurred. Despite of the problems with illegal use of poisoned bait in Ireland, we are confident that the project will be successful, but we strongly encourage the Irish authorities to bring these practices under control, in line with most other European counties. The project would not have been possible without the enthusiastic help and support of local ornithologists and police authorities in Norway, who have been of invaluable help with logistics and transport. These were Bertil Nyheim, Vikna and Nærøy , Steinar Garstad, Vikna and Nærøy , Frithjof Pedersen, Røyrvik police office, Nils Roger Duna, Namsos police office, Ole Martin Dahle, Flatanger , Livar Ramvik, Snillfjord, Martin Pearson, Hitra and Frøya, Asgeir Østvik, Hitra and Frøya, Inge Dahlø, Hitra and Frøya police office, Tom Roger Østerås, Stjørdal, responsible for care of collected eagles in Norway, Per Engum, Stjørdal and Finn Berntsen, NINA, veterinarians. Aud and Arne Moksnes, Stjørdal, have generously put their barn to the disposal as a temporary and safe residence of the young eagles prior to shipment. The Norwegian ambassador to Ireland, Øyvind Nordsletten, has taken personal interest in the project and visited the release area in Killarney in April 2009.

Trondheim, 19.04.2010. Torgeir Nygård

1 Introduction

Many of the countries in the western world have lost much of their biodiversity as a consequence of human changes to or destruction of natural habitats or as a result of extermination campaigns. Ireland has lost much of its natural bird fauna in this way – among others, Great auk *Pinguinus impennis*, bittern *Botaurus stellaris*, red kite Milvus milvus, white-tailed eagle *Haliaeetus albicilla* , golden eagle *Aquila chrysaetos*, marsh harrier *Circus aeruginosus*, osprey *Pandion hailaetus*, crane *Grus grus*, and great spotted woodpecker *Dendrocopus major* (D'Arcy 1999). Reintroduction programmes managed by the Golden Eagle Trust are now underway for white-tailed eagle, golden eagle, and red kite. The white-tailed eagle has, along with the golden eagle, been extinct for c. 100 years in Ireland. An evaluation of County Kerry, SW Ireland, with participation from the Golden Eagle Trust, Irish nature protection authorities, the Norwegian Ornithological Society, and NINA in 2005 concluded that the area ought to be well suited for white-tailed eagles, given its considerable populations of ducks, geese, seabirds, fish, and deer and sheep carrion; and a mountainous landscape with good availability of suitable nesting trees (Halley et al. 2006). Experience from the Scottish reintroduction programme gave reasons to believe that the environmental conditions were at least as favorable in Ireland as in Scotland. With permission from Norwegian and Irish authorities, 15 nestling white-tailed eagles were collected in Trøndelag and released in Ireland in 2007. The same procedure was followed in 2008, when 20 nestlings were exported to Ireland (Nygård & Halley 2008, Nygård & Halley 2009); and 2009 (a further 20 nestlings). All birds were released from holding pens in Killarney National Park. A further transfer of 20 birds in 2010 and 20 more in 2011 is planned. First breeding is to be expected in 2011 or 2012.

2 Collection procedures

Mapping of active white-tailed eagle nests was carried out in April-May in Sør- and Nord Trøndelag provinces, Norway. Some territories were visited more than once. Boats were used to visit sites in Frøya, Vikna, Nærøy and Flatanger, while the rest were investigated on foot. Collection of nestlings was made in a coordinated operation from 18th-25th June 2009. The nestlings were kept in an indoor enclosure by Tom Roger Østerås, Stjørdal, in a barn owned by Arne Moksnes. Biometry and marking were carried out on 26th June. The birds were exported to Ireland by charter aircraft on 27th June. After a five hour flight to Kerry airport, they were immediately transported to prepared cages in Killarney National Park. Release of the young was carried out in early-August -mid September by lowering the cage fronts at night, allowing the birds to fly out at will the next morning without human contact. All released birds in Ireland have been regularly monitored by Allan Mee and local ornithologist.

3 Results

3.1 Nest monitoring

Initial inventory rounds on Hitra and Frøya and around Trondheimsfjord were not very promising. Very few pairs were breeding in Trondheimsfjord in particular, and no broods of two nestlings were found west of Inderøy. This suggested that we would be dependent on a good breeding season in Vikna and Nærøy.

In 2009, the collection in Vikna, Nærøy and Leka took place first, and appeared to be a satisfactory breeding season there; 9 nestlings were collected on 18th-19th June 2009, one of which died immediately on arrival at the holding pens (see below). On Hitra and Frøya breeding effort was below 2008 levels, and a boat was used to check the situation on the archipelago of skerries which lie off the main islands. This was successful in locating additional two-chick broods and in all 9 chicks were collected from Hitra and Frøya.

In addition, one young bird was collected from Snillfjord, one from Trondheimsfjord, and one from Flatanger. A summary of the nestlings collected in 2007-2009 is given in Table 1. Birds collected in 2009 were released in Killarney National Park in the period 7th August- 18th September.

We have prepared a database containing 460 white-tailed eagle nest sites in Trøndelag , divided into 346 apparent territories (some pairs have more than one nest). One hundred and eighty four nests in 145 territories were visited in 2009, see Figure 1. As can be seen from the figure, most nests checked were in outer coastal areas, mainly Hitra, Frøya, Flatanger and Vikna, but a significant number around Trondheimsfjord were also checked.

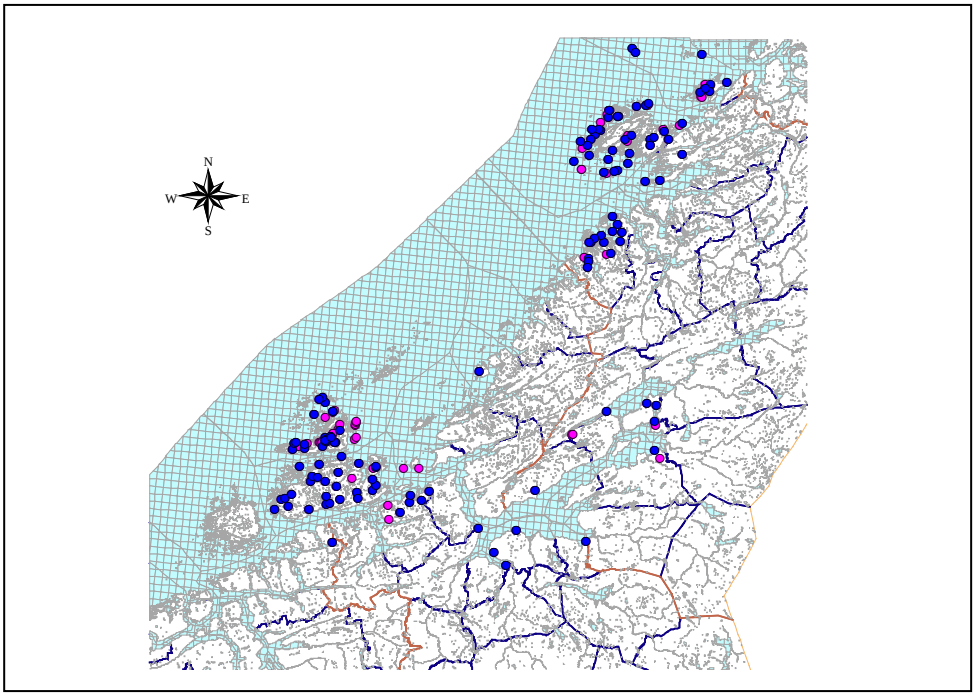

Figure 1. *Nest localities monitored in Trøndelag in 2009, in all 184. Blue indicates apparently occupied sites, purple apparently unoccupied sites.*

Table 1 shows the distribution of monitored nests and territories in each kommune (municipality), the number of nestlings in total, and the number of nestlings collected in 2009. The number of occupied territories has a certain error margin, as it is sometimes difficult to be sure of the status of a given territory. If the nest contents can be seen directly, as a rule breeding can be confirmed or discounted. Otherwise, an estimate is made based on whether the adults are present near the nest, which usually indicates breeding. Mistakes will result in a margin of error for estimates of breeding success and reproduction, which are calculated with respect to occupied territories. Figure 1 shows the distribution of apparently occupied and unoccupied territories. In some cases the division into territories is an estimate, based on the proximity of nests to each other, but each year additional information makes the territory boundaries clearer. Seventy percent of the territories were apparently occupied, but this is probably a conservative estimate, especially on Frøya, where nests occur very close together in the inland part of the island. In addition, this is a dynamic system and territory boundaries can change over time.

***Table 1**. The distribution of surveyed nests and territories in Trøndelag 2009, number of presumed occupied territories, number of chicks produced and collected, by commune (municipality). The numbers in parentheses include the eaglet that died.*

4 Municipality *5 Kommune*	*6* Surveyed	Surveyed territories *Undersøkte territorier*	Presuned occupied territories *Antatt okk. territorier*	Fraction of territories occupied *Andelen okkuperte territorier*	Occ terr. w repr. verified *Okk. terr. m repr. verif.* .	Number of chicks *Antall unger*	Reproductive rate *Reproduksjonsrate*	Breeding success *Hekkesuksess*	Collected *Innsamlet*
Flatanger	16	15	13	0.87	8	7	0.88	0.50	1
Frøya	52	29	19	0.65	19	18	0.95	0.58	7(8)
Hitra	29	28	26	0.93	26	14	0.54	0.42	2
Inderøy	4	3	3	1	3	4	1.33	1.00	1
Leka	13	11	8	0.72	8	4	0.50	0.38	1
Leksvik	1	1	1	1	1	0	0.00	0.00	0
Levanger	2	2	1	0.5	1	1	1.00	1.00	0
Malvik	1	1	1	1	1	0	0.00	0.00	0
Mosvik	3	2	1	0.5	1	0	0.00	0.00	0
Nærøy	5	5	5	1	5	3	0.60	0.40	1
Orkdal	1	1	1	1	1	0	0.00	0.00	0
Skaun	1	1	1	1	1	0	0.00	0.00	0
Snillfjord	8	8	6	0.75	6	5	0.83	0.50	1
Trondheim	2	2	2	1	2	0	0.00	0.00	0
Vikna	43	36	28	0.78	28	23	0.82	0.57	6(7)
Ørland	2	2	0	0	0	0	0.00	0.00	0
Åfjord	1	1	1	1	1	2	2.00	01.00	0
Total	184	148	117	0.79	112	81	0.72	0.49	20(22)

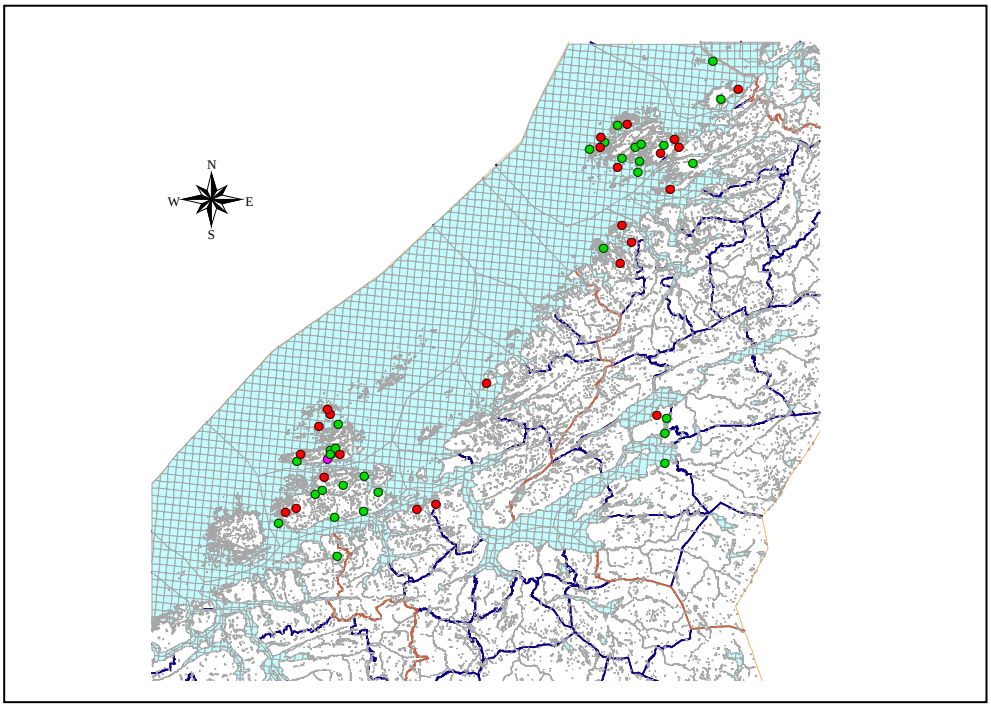

Figure 2. *Territories with successful breeding* In 2009. Green circles = 1 chick, red circles = 2 chicks, purple circle = 3 chicks.

As collection permission was limited to nests with 2 chicks or more, it was thus important to obtain an overview of these at an early stage. Numbers of empty, one-chick, two-chick and 3-chick nests are shown in Figure 2. Nests where one chick died in the course of the breeding season are given as 1-chick broods.

Table 2. The frequency distribution of nest contents at last nest visit in the study area in 2009.

Commune (municipality) *Kommune*	0	1 juvenile *1 unge*	2 juveniles *2 unger*	3 juveniles *3 unger*	No. of chicks produced – *Antall unger produsert*
Flatanger	4	1	3	0	7
Frøya	8	5	5	1	18
Hitra	15	8	3	0	14
Inderøy	0	2	1	0	4
Leka	5	2	1	0	6
Leksvik	1	0	0	0	0
Levanger	0	1	1	0	1
Malvik	1	0	0	0	0
Mosvik	1	0	0	0	0
Nærøy	3	1	1	0	3
Orkdal	1	0	0	0	0
Skaun	1	0	0	0	0
Snillfjord	3	1	2	0	5
Trondheim	2	0	0	0	0
Vikna	12	9	7	0	12
Åfjord	0	0	1	0	1
Total	57	30	24	1	81

The reproductive rate in the investigated population as a whole, per occupied territory with known breeding success, was estimated as 0.72 chicks fledged/pair on average. This was considerably lower than in 2007 or 2008 (0.99 and 0.96, respectively). The proportion of successful breeding pairs compared to the estimated total number of pairs in the study population as a whole was 0.49.

Table 3: Brood size and reproductive rate of sea eagles in the study area in 2007-2009.

	2007		*2008*		*2009*	
	Number *Antall*	Chicks *Unger*	Number *Antall*	Chicks *Unger*	Number *Antall*	Chicks *Unger*
Monitored territories *Undersøkte territorier*	107		128		144	
Occupied territories *Okkuperte territorier*	70		91		114	
Occupied terr. with known breeding result *Okkuperte terr. med kjent hekkeresulat*	66		90		112	
Number of chicks *Antall unger*	0 22	0	32	0	57	0
	1 23	23	31	31	30	30
	2 21	42	26	52	24	48
	3 0	0	1	3	1	3
Average brood size[1] *Gj.sn. kullstørrelse*		1.48		1.48		1.47
Total no. of chicks *Totalt ant. unger*		65		86		81
Reproductive rate[2] *Reproduksjonsrate*		*0.985*		*0.956*		*0.723*
Repr. rate per monitored territory. *Repr. rate pr undersøkte territorium*		*0.607*		*0.672*		*0.563*

[1]Based on nests which hatched at least one chick – *Basert på reir som fikk fram minst en unge.*
[2]Based on the number of young divided by the number of territories with known breeding success. – *Basert på antallet unger dividert på antallet territorier med kjent hekkeresultat.*

In 2007 every fifth territory checked (to be exact 1 in 5.1) had two or more chicks. In 2008 the proportion was slightly higher (1 in 4.9); in 2009 only every sixth territory checked had 2 or more chicks (1 in 6.0).

The reproductive rate on the outer coast was 0.74 chicks/occupied territory with known result. This was in contrast to previous years, where rates were higher. The sex ratio of immatures in Ireland was fairly male-biased after the 2008 season, so in 2009 a successful attempt was made to correct this by collecting predominantly females (see Table 3).

The average brood size for the pairs which hatched chicks was almost constant at c. 1.5 every year (Table 3).

As in earlier years, the communes of Frøya, Hitra, and Vikna held the majority of territories, and the success or failure of collection stands or falls on what happens there. On the coast north of Trondheimsfjord, in Nærøy, there is greater potential than the results show; but as earlier we have prioritised the areas where fieldwork can be most effective, using a boat to visit nests in the Vikna skerry archipelago. Flatanger also has many nests, but many are on cliffs and difficult to reach. Productivity in Trondheimsfjord was very low in 2009; the cause of this is unknown.

From 2007-2009, 63 localities where eggs were laid were visited more than once and contents recorded. In 12 of these (19 %) a reduction in clutch/brood size was noted. In 9 cases (14 %), one egg/chick was lost, in 3 two chicks/eggs. In four cases (6 %) one hatched chick was lost.

6.1 Collection

Before collection commenced, local police, local government, and landowners were informed. The project was also covered in advance in the media, both locally and nationally, which ensured that the local population were informed of the project. A coordinated collection plan from nests containing 2 or 3 chicks was developed from the information obtained from monitoring.
The bulk of chicks were collected by three field teams, one for Hitra/Frøya/Snillfjord (Pearson/Ramvik/Østvik/Dahlø/Halley/Mee), one for Trondheimsfjorden (Nygård/Halley/Mee), and one for Nærøy/Vikna/Leka (Nyheim/Garstad/Pedersen).

In 2009, seven young were collected from Vikna commune, one from Leka, one from Nærøy, one from Snillfjord, eight from Frøya and two from Hitra. Two died before export to Ireland (one from Frøya and one from Vikna, see below). The sex ratio of exported birds was 13 females and 7 males, based on biometric measures. This bias was intentional, in order to correct a bias in favour of males which had developed as a result both of earlier collections and post-release mortality in Ireland.

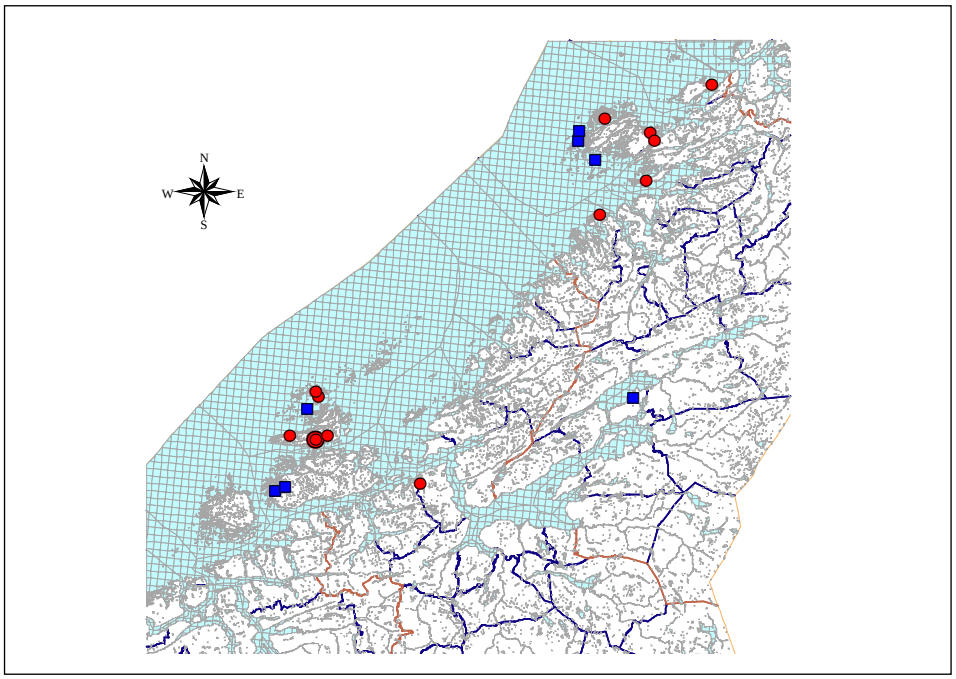

Figure 3. *Site of collection for white-tailed eagle chicks from nests with twins in 2009. Blue squares = males, red circles = females, double circle = 2 females.*

The birds were transported in dog travelling kennels (Varikennel), which are approved for use in aircraft, to Tom Roger Østerås' holding facility in Arne and Aud Moksnes' barn in Stjørdal, only ca 5 km from the airport. The age of the chicks was estimated, ranging from 7 to 11 weeks old. The number and sex of the chicks by year is given in Table 4.

Table 4. *The number and sex of the chicks collected by year*

Year/*År*	Sex/*Kjønn*		
	Females/*Hunner*	Males/*Hanner*	Total
2007	7	8	15
2008	8	12	20
2009	13	7	20
Total	28	27	55

While in the holding pens, chicks were primarily fed on salmon and other fish. They sat on artificial nests made of lichen and heather and made no attempt to jump out. Most chicks were weighed and measured on arrival and the day before departure, though the last arrivals were only weighed and measured the day before departure, at the same time as ringing. All gained weight well while in the holding pens (Fig. 4). Finn Berntsen, veterinarian at NINA, checked all eagle chicks the day before departure, and certified that they were healthy. An overview of the markings is given in Table 5.

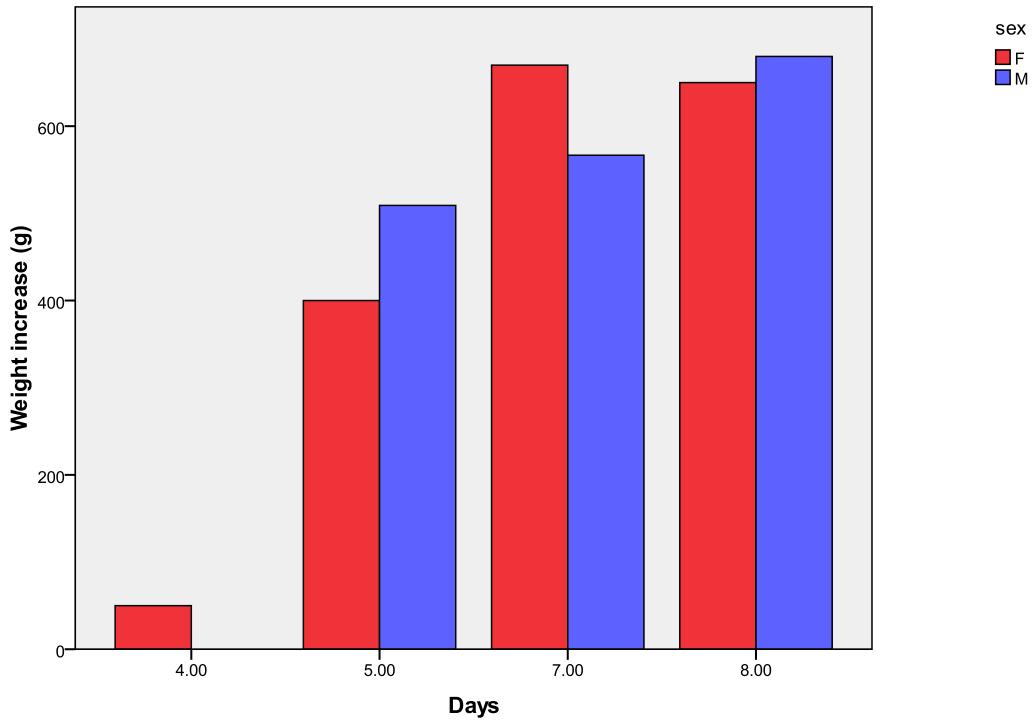

Figure 4*. Weight increase of chicks (grammes per day) while in captivity Stjørdal. There were no appreciable sex differences.*

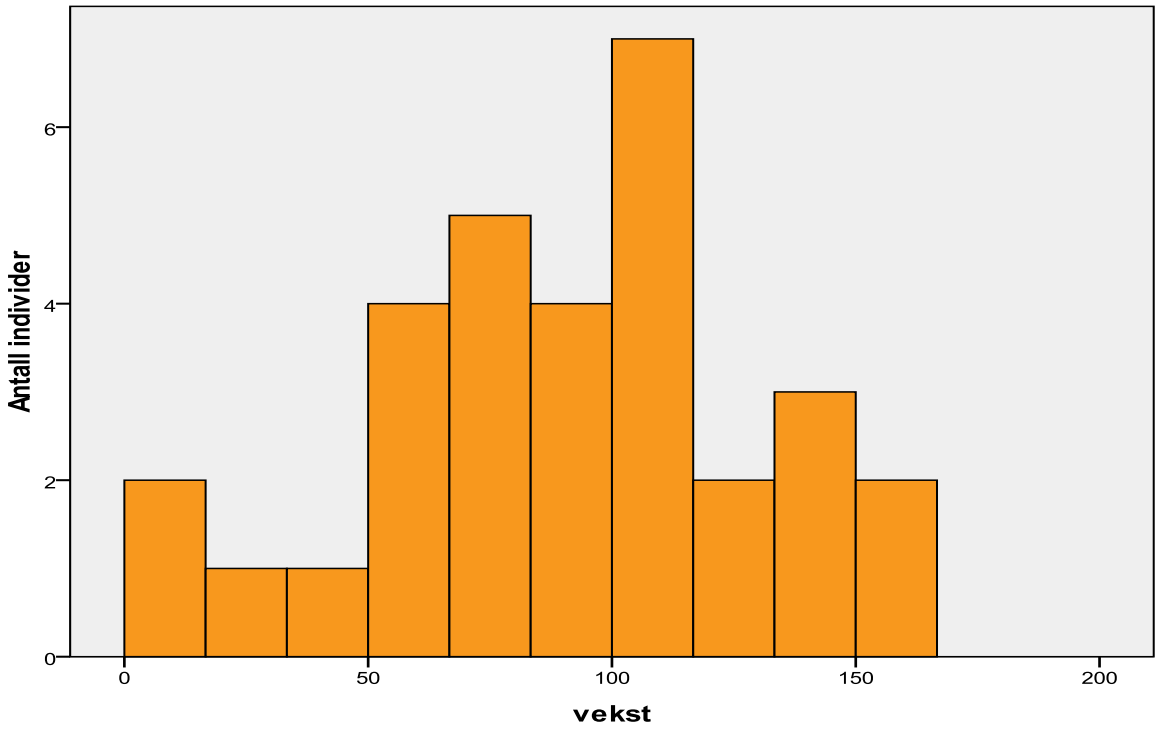

Figure 5. *Daily weight increase in white-tailed eagle chicks (n = 31) while in temporary captivity in Stjørdal before export to Ireland.*

Picture: Tom Roger Østerås holding one of the chicks while Allan Mee is fits the ring. Veterinarian Finn Berntsen in the background. Photo: T. Nygård

***Table 5**. Chicks collected 2007-2009, their sex, ring number, origin and tags.*

BTO ring	Tag ID *Merke*	Norw. Id *Norsk nr*	Region *Område*	Sex (F=female, M=male) *Kjønn*	Transmitter *Sender*	Release date *Slipp-dato*	Dead *Død*
2007							
ZZ1651	/	1	Vikna	F	VHF,T	29-8-07	
ZZ1652	-	2	Vikna	M	VHF,B	29-8-07	Mar 12, 2009
ZZ1653	0	3	Vikna	M	VHF,B	16-8-07	Feb. 2009[1]
ZZ1654	2	4	Leka	M	VHF,T	16-8-07	
ZZ1655	3	5	Vikna	F	Satellite	16-8-07	Nov. 6, 2007
ZZ1656	9	6	Vikna	M	VHF,B	16-8-07	
ZZ1657	4	7	Snillfjord	F	VHF,B	16-8-07	Feb 19, 2008
ZZ1658	X	8	Flatanger	F	VHF,T	29-8-07	
ZZ1659	Triangle	9	Flatanger	F	VHF,B	29-8-07	Feb 27, 2008
ZZ1660	|	10	Frøya	F	VHF,T	29-8-07	
ZZ1661	5	11	Frøya	M	VHF,B	16-8-07	Feb 18, 2008
ZZ1662	1	12	Frøya	M	VHF,B	16-8-07	
ZZ1663	6	13	Frøya	M	VHF,T	16-8-07	
ZZ1664	7	14	Frøya	F	VHF,B	16-8-07	
ZZ1665	8	15	Hitra	M	VHF,T	16-8-07	
2008							
ZZ1666	▲	1	Vikna	M	VHF	18-9-08	
ZZ1667	A	2	Leka	M	VHF	07-8-08	
ZZ1668	K	3	Vikna	M	VHF	14-8-08	
ZZ1669	C	4	Næroy	M	VHF	07-8-08	Apr 30, 2009
ZZ1670	N	5	Leka	F	VHF	14-8-08	
ZZ1671	V	6	Hitra	M	VHF	07-8-08	
ZZ1672	Y	7	Frøya	M	VHF	07-8-08	
ZZ1673	L	8	Frøya	M	Satellite, GPS solar	14-8-08	
ZZ1674	T	9	Hitra	F	VHF	14-8-08	
ZZ1675	H	10	Hitra	M	VHF	07-8-08	
ZZ1676	J	11	Frøya	M	VHF	07-8-08	
ZZ1677	:	17	Snillfjord	F	VHF	14-8-08	
ZZ1678	=	18	Snillfjord	F	VHF	25-8-08	
ZZ1679	!	19	Trondheim	M	VHF	04-9-08	
ZZ1680	U	20	Inderøy	F	VHF	14-8-08	
ZZ1681	?	12	Hitra	M	VHF	25-9-08	

ZZ1682	●	13	Hitra	F	VHF	14-8-08	
ZZ1683	D	14	Hitra	F	VHF	07-8-08	Apr 30, 2009
ZZ1684	E	15	Frøya	F	Satellite, GPS battery	07-8-08	
ZZ1685	Z	16	Frøya	M	VHF	14-8-08	
2009							
ZZ1693	II	1	Vikna	F	VHF	07-8-09	Oct 17, 2009
ZZ1695	*	2	Vikna	M	Satellite, GPS solar	07-8-09	
ZZ1694	◊	3	Vikna	F	VHF	13-8-09	
ZZ1692	☐	4	Vikna	M	VHF	13-8-09	
ZZ1691	☐	5	Vikna	M	VHF	13-8-09	
ZZ1697	-	6	Vikna	F	VHF	07-8-09	
ZZ1696	Ξ	7	Nærøy	F	VHF	07-8-09	
ZZ1700	F	8	Leka	F	Satellite, GPS solar	07-8-09	
ZZ1699	¯	9	Frøya	M	VHF	13-8-09	
ZZ1698	|	10	Frøya	F	VHF	07-8-09	
ZZ1641	#	11	Frøya	F	VHF	07-8-09	
ZZ1646	C	12	Frøya	F	VHF	18-9-09	
ZZ1689	>	13	Frøya	F	VHF	13-8-09	
ZZ1690	%	14	Frøya	F	VHF	07-8-09	
ZZ1687	D	15	Snillfjord	F	VHF	04-9-09	
ZZ1644	<	16	Hitra	F	VHF	13-8-09	
ZZ1642	¯	17	Hitra	M	VHF	07-8-09	
ZZ1645	$	18	Frøya	F	VHF	13-8-09	
ZZ1686	÷	19	Flatanger	F	VHF	13-8-09	
ZZ1643	D	20	Inderøy	M	VHF	13-8-09	

[1]Only transmitter recovered* T = tail-mounted tag, B = back-mounted tag, VHF = very high frequency

Transport from Norway to Ireland was carried out using a Swedish charter plane on June 27th and proceeded without difficulties. The birds were flown directly from Trondheim to Kerry airport, and driven from there c. 15km to the release cages in Killarney National Park. They are monitored on a continuing basis by Allan Mee and colleagues.

6.2 Mortality in Norway

For the first time in the project there were mortalities in the course of collection in 2009. The first, a chick from Vikna collected on 18th June, appeared sick on arrival at the holding facility on 19th June. It had bloody excrement, and had convulsions and died within 30 minutes. A postmortem examination was carried out at the Veterinary Institute in Trondheim, which concluded the cause of death to be fibrinous hemorragic enteritis of the back part of the small intestine and the entire large intestine, the reason for which was unclear. The illness appears to have been contracted before the bird was collected.

The second casualty was put down by veterinarian Per Engum in Stjørdal after it was discovered that one leg was broken. The bird was collected in Frøya and the injury discovered a short time after arrival on Hitra. It was unclear whether the injury occurred in the nest before collection, or in the carrying cage. Photos taken at the nest can be interpreted as showing the leg was already broken then, but on further analysis we consider it most likely that the injury occurred on Hitra while the cage containing the bird was temporarily placed in a garage with other cages containing other chicks. At one point a loud commotion was heard from this cage; one likely interpretation is that the bird gripped the bars of the cage door with its foot and was panicked by loud and unfamiliar noises so that it twisted its leg, causing the break. The floor of the cage was covered only with grass and was relatively slippery. In future years care should be taken to provide a firmer base layer, and to avoid noise near the cages.

The first casualty was not preventable, while the other could probably have been avoided and measures will be taken in future to prevent similar circumstances from arising..

6.3 Mortality in Ireland

WHITE-TAILED EAGLE MORTALITY 2007-2009

TAG NO: 3 SEX: FEMALE BTO RING NO: ZZ1655 NOR ID: 5-07
ORIGIN: VIKNA, NORWAY. COLLECTED 10 JUNE 2007
RELEASED: KILLARNEY NATIONAL PARK, CO. KERRY, 16 AUGUST 2007
RECOVERED DEAD: 6 NOVEMBER 2007
SITE: KILLARNEY NP, CO. KERRY LAT-LONG: 52° 1'16.06"N, 9°35'22.29"W
POISON IDENTIFIED: ALPHACHLORALOSE

On 6 November 2007 the body of female #3 was recovered after a search of a mountain area in Killarney National Park using satellite GPS data. The site was at V908867 on the east side of Tomies Mountain, 7km SW of Killarney, Co. Kerry. The carcass was an exceptionally good weight (6.5kg) with GPS data and body condition indicating death some days previously. A post-mortem examination was carried out that day at the Regional Veterinary Laboratory, Dept. of Agriculture, Fisheries and Food, Cork. Samples were sent for toxicology analysis to Cork Institute of Technology where tests revealed traces of Alphachloralose (a narcotic or 'stupefying bait'). Poisoning was considered to be the cause of death.

TAG NO: 5 SEX: MALE BTO RING NO: ZZ1661 NOR ID:11-07
ORIGIN: FRØYA, NORWAY. COLLECTED 16 JUNE 07
RELEASED: KILLARNEY NATIONAL PARK, CO. KERRY, 16 AUGUST 2007
RECOVERED DEAD: 18 FEB 2008
SITE: GLENCAR, CO. KERRY LAT-LONG: 51°57'22.42"N, 9°46'39.05"W
POISON IDENTIFIED: NITROXINIL, ALPHACHLORALOSE

On 18 February 2008 the body of male #5 was recovered in the Brida Valley, Glencar, Co. Kerry, using radio telemetry to locate the dead bird. The site was at V782797, 0.5klm E of Loch na Maoile on the S side of the Brida Valley. The carcass was in good condition, unscavenged, and no obvious decomposition suggesting the bird died within 1-3 days previously. Weight at recovery was 4kg. A post-mortem examination was carried out on 19 February (along with female 4 below) at the Regional Veterinary Laboratory, Dept. of Agriculture, Fisheries and Food, Cork. Samples were sent for toxicology analysis to the State Laboratory, Back Weston, Celbridge, County Kildare, where tests

revealed high concentrations of Nitroxinil (drug used to control liver fluke in sheep and cattle) and Alphachloralose. Poisoning was confirmed to be the cause of death.

TAG NO: 4 SEX: FEMALE BTO: ZZ1657 NOR ID: 7-07
ORIGIN: SNILLFJORD, NORWAY. COLLECTED 14 JUNE 2007
RELEASED: KILLARNEY NATIONAL PARK, CO. KERRY, 16 AUGUST 2007
RECOVERED DEAD: 19 FEB 2008
SITE: GLENCAR, CO. KERRY LAT-LONG: 51°57'48.24"N, 9°46'33.95"W
POISON IDENTIFIED: NITROXINIL, ALPHACHLORALOSE

On 18 February 2007 female #4 was recovered in the Brida Valley, Glencar, Co. Kerry, using radio telemetry to locate the dead bird. The site was at V779804, 0.8klm NE of Loch na Maoile on the S side of the Brida Valley. The carcass was in good condition, unscavenged, and no obvious decomposition suggesting the bird died within 1-3 days previously. Weight at recovery was 6.5kg. Female 4 was located 0.8klm from male 5 recovered the previous day. A post-mortem examination was carried out on 19 February (along with male 5) at the Regional Veterinary Laboratory, Dept. of Agriculture, Fisheries and Food, Cork. Samples were sent for toxicology analysis to the State Laboratory, Back Weston, Celbridge, County Kildare, where tests revealed high concentrations of Nitroxinil (drug used to control liver fluke in sheep and cattle) and Alphachloralose. Poisoning was confirmed to be the cause of death.

TAG NO: ▲ SEX: FEMALE BTO RING NO: ZZ1659 NOR ID: 9-07
ORIGIN: FLATANGER, NORWAY. COLLECTED 16 JUNE 2007
RELEASED: KILLARNEY NATIONAL PARK, CO. KERRY, 29 AUGUST 2007
RECOVERED DEAD: 27 FEB 2008
SITE: GLENCAR, CO. KERRY LAT-LONG: 51°57'5.60"N, 9°47'9.44"W
POISON IDENTIFIED: NITROXINIL, ALPHACHLORALOSE

On 27 May 2008 the body of female ▲ was recovered on steep hillside in the Brida Valley, Glencar, Co. Kerry, using radio telemetry to locate the dead bird. The site was at V773791, 0.5klm SW of Loch na Maoile on the S side of the Brida Valley. The carcass was in good condition, unscavenged, and no obvious decomposition suggesting the bird died within 1-3 days previously. Weight at recovery was 6.1kg. A post-mortem examination was carried out on 28 May at the Regional Veterinary Laboratory, Dept. of Agriculture, Fisheries and Food, Cork. Samples were sent for toxicology analysis to the State Laboratory, Back Weston, Celbridge, County Kildare, where tests revealed high concentrations of Nitroxinil (drug used to control liver fluke in sheep and cattle) and Alphachloralose. Poisoning was confirmed to be the cause of death.

TAG NO: ▬ SEX: MALE BTO RING NO: ZZ1652 NOR ID: 2-07
ORIGIN: VIKNA, NORWAY. COLLECTED 10 JUNE 2007
RELEASED: KILLARNEY NATIONAL PARK, CO. KERRY, 29 AUGUST 2007
RECOVERED DEAD: 12 MARCH 2009
SITE: BEAUFORT, CO. KERRY LAT-LONG: 52° 3'51.24"N, 9°35'35.72"W
POISON IDENTIFIED: CARBOFURAN

On 12 March 2009 male ▬ was recovered on the shore of Lough Leane near Killarney, Co. Kerry, using radio telemetry to locate the dead bird. The site was at V905912, 2.5klm ESE of Beaufort village. The carcass was in good condition, located under tall pine trees 30m from the lake shore (used occasionally as a roost site). Weight at recovery was 5kg. A post-mortem examination was carried out that day at the Regional Veterinary Laboratory, Dept. of Agriculture, Fisheries and Food, Cork. Samples were sent for toxicology analysis to the State Laboratory, Back Weston, Cel-

bridge, County Kildare, and the SASA (Science and Advice for Scottish Agriculture) laboratory, Roddinglaw Road, Edinburgh, Scotland. Tests at SASA revealed high concentrations of Carbofuran (Carbamate poison used to control crop insects). Poisoning was confirmed to be the cause of death.

TAG NO: D SEX: FEMALE BTO RING NO: ZZ1683 NOR ID: 14-08
ORIGIN: HITRA, NORWAY. COLLECTED 14 JUNE 2008
RELEASED: KILLARNEY NATIONAL PARK, CO. KERRY, 7 AUGUST 2008
RECOVERED DEAD: 30 APRIL 2009
SITE: LOUGH CURRANE, CO. KERRY LAT-LONG: 51°50'34.58"N, 10° 5'24.30"W
POISON IDENTIFIED: NEGATIVE FOR POISONS. RESULTS PENDING FOR LEAD TOXICOSIS

On 30 April 2009 female D was recovered at Commanes, near Lough Currane, Waterville, Co. Kerry, using radio telemetry to locate the dead bird. The site was at V561678, 1.2klm E of Lough Currane. The carcass was in good condition with some decomposition evident at post-mortem. Weight at recovery was 3.6kg and the crop was empty. A post-mortem examination was carried out next day at the Regional Veterinary Laboratory, Dept. of Agriculture, Fisheries and Food, Cork. Samples were sent for toxicology analysis to the State Laboratory, Back Weston, Celbridge, County Kildare, and the SASA (Science and Advice for Scottish Agriculture) laboratory, Roddinglaw Road, Edinburgh, Scotland. Negative results for poisons including Carbamate and organochlorine pesticides, rodenticides. Results are pending for lead.

TAG NO: C SEX: MALE BTO RING NO: ZZ1669 NOR ID: 4-08
ORIGIN: NÆRØY, NORWAY. COLLECTED 14 JUNE 2008
RELEASED: KILLARNEY NATIONAL PARK, CO. KERRY, 7 AUGUST 2008
RECOVERED DEAD: 30 APRIL 2009
SITE: OUGHTIV, CO. KERRY LAT-LONG: 51°52'0.34"N, 10° 4'35.64"W
POISON IDENTIFIED: NEGATIVE FOR POISONS. RESULTS PENDING FOR LEAD TOXICOSIS

On 30 April 2009 male C was recovered at Oughtiv, near Lough Currane, Waterville, Co. Kerry, using radio telemetry to locate the dead bird. The site was at V570703, 3.6klm NE of Lough Currane. The carcass was in good condition with some decomposition evident at post-mortem. Weight at recovery was 4.7kg and the crop was empty. A post-mortem examination was carried out next day at the Regional Veterinary Laboratory, Dept. of Agriculture, Fisheries and Food, Cork. Samples were sent for toxicology analysis to the State Laboratory, Back Weston, Celbridge, County Kildare, and the SASA (Science and Advice for Scottish Agriculture) laboratory, Roddinglaw Road, Edinburgh, Scotland. Negative results for poisons including Carbamate and organochlorine pesticides, rodenticides. Results are pending for lead.

TAG NO: II SEX: FEMALE BTO RING ZZ1693, NOR ID 1-09
ORIGIN: VIKNA, NORWAY. COLLECTED 18 JUNE 2009.
RELEASED KILLARNEY NATIONAL PARK 7 AUGUST 2009
RECOVERED DEAD 17 OCTOBER 2009
SITE: LOCH NEAGH, NORTHERN IRELAND, 54°33'46.13"N, 6°18'33.22"W
PRESUMABLY SHOT, TRANSMITTER RECOVERED WITH HOLES INDICATING SHOTGUN

She was last reported definitely alive on 12 Oct near Portmore Lough RSPB reserve near the SE corner of Lough Neagh in Northern Ireland although anecdotal evidence suggests she was alive on the morning of 17 Oct when she was found dead by some kayakers. All the evidence points to shooting as the transmitter had two small perfectly round holes consistent with pellets from a shotgun. The area is heavily shot over for duck in winter and we found several corpses of gulls and cormorants in the area.

So far this is the first evidence of shooting of any eagle species in Ireland although Lorcan O'Toole suspects that one or more of his birds may have been shot and two Red Kites released in Wicklow have been shot. As it is outside the Republic the law is somewhat different. The police have a Wildlife Liason Officer who we are working with along with the Partnership for Action against Wildlife Crime (PAW).

Tag no: 0 SEX: MALE BTO RING ZZ1653, NOR ID 2-07
ORIGIN: VIKNA, NORWAY, COLLECTED 10 JULY 2007.
RELEASED KILLARNEY NATIONAL PARK 16 AUGUST 2007
TRANSMITTER RECOVERED FEBRUARY 2009
SITE: IN A STREAM S OF KILLARNEY.
PRESUMABLY KILLED, TRANSMITTER RIBBONS SHOWED NO SIGN OF WEAR

Figure 6. *One of the young sea-eagles found poisoned during the winter of 2008.*

The mortality in Ireland is shown in Table 6, and the causes of death in Table 7.

***Table 6**. Mortality and survival of White-tailed Eagles in Ireland by January 2010.*

År *Year*	*Collected* *Innsamlet*	*Found or presumed dead** *Funnet eller antatt døde*	*No. Alive pr January 2010* *Antall i live pr januar 2010*
2007	15	6	9
2008	20	2	18
2009	20	1	19
Total	55	9	46

**Transmitter found under circumstances indicating death of bird*

***Table 7**. Causes of death in Ireland – Dødsårsaker I Irland*

	2007	2008	2009	Total
Poisoned /Forgiftet	1	3	1	5
Shot /Skutt			1	1
Unknown /Ukjent			2	2
Transmitter found in river /Sender funnet i elv		1		1
Total	1	4	4	9

6.4 Survival in Ireland

Despite five confirmed cases of poisoning (up to February 2010), survival must be considered to have been good, and is shown graphically in Figure 7. Survival is estimated using the Kaplan-Meiers method in SPSS v.17.0. Survival for the first year is on average 0.85, and for later years 0.90 (Table 8). The corresponding results for the reintroduction in Scotland was 0.73 and 0.73 for chicks translocated fom Norway and released; and 0.82 and 0.82 for young hatched in the wild in Scotland (Evans et al. 2009). A study of radio-tagged immatures in Norway found a cumulative survival rate of about 0.9 in the first two years of life

(Nygård et al. 2000).

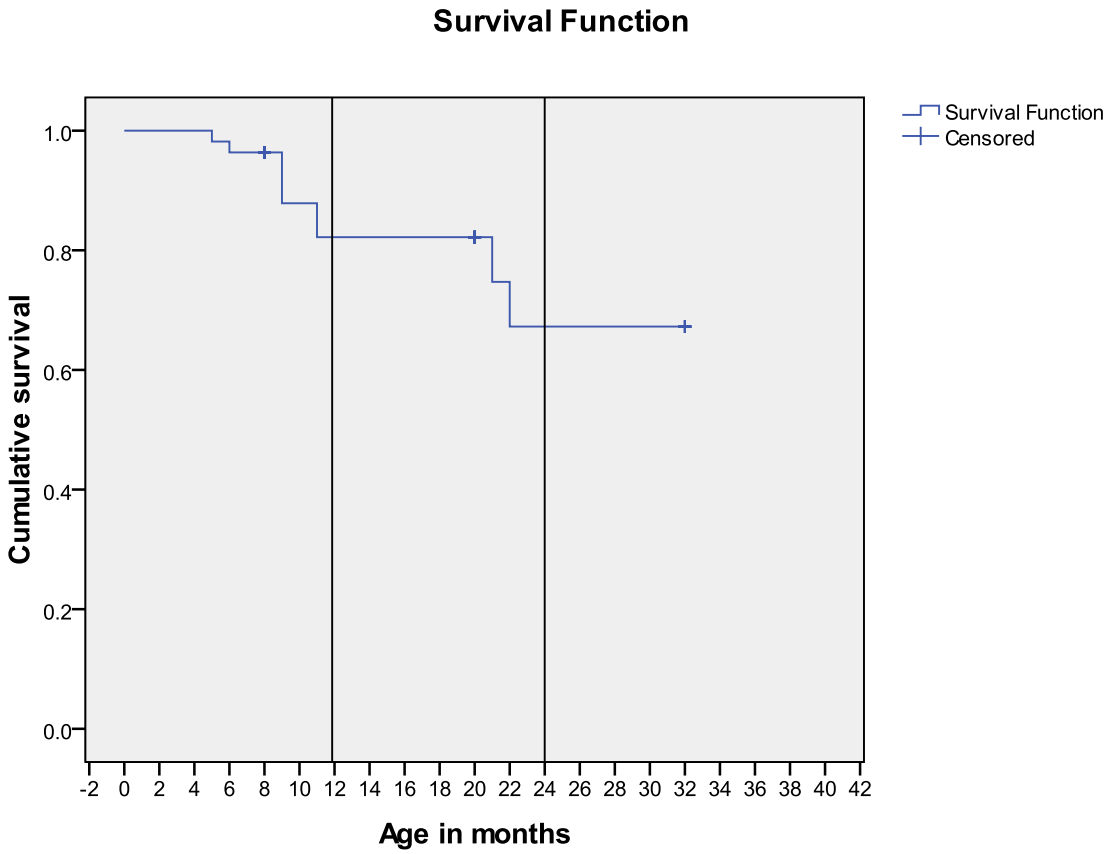

***Figure 7**. Survival as a function of age in the released individuals (n = 55).*

***Table 8**. Survival of introduced juvenile white-tailed eagles in Ireland 2007-9.*

	Number *Antall*	Proportion surviving *Andel overlevende*	Cumulative proportion surviving *Kumulativ andel over-levende*
All /Alle			
First year /*Første år**	55	.85	0.85
Second year /*Andre år**	29	.90	0.76
Third year Tredje år*	9	1.00	0.76
Not poisoned /*Ikke-forgiftede*			
First year /*Første år**	51	0.93	0.93
Second year /*Andre år**	29	0.90	0.83
Third year/ *Tredje år**	9	1.00	0.83

* As of 1. May one year to 1. May next year. – *Fra 1. mai ett år til 1. mai neste år*

6.5 Media

There has been considerable media interest in the project, both locally and nationally, with articles in Norwegian newspapers like Adresseavisen, Stjørdalens blad and Ytringen. Two filmmakers, Gabiel Levy and John Murray from Crossing The Line Films, Ireland, followed the collection with the aim of making a documentary film on the project. Photographer Valerie O'Sullivan, Ireland, reported on the collection operation for Irish newspapers.

An Irish film team followed us during the collection process, and is planning to produce a documentary on the project (see picture below).

Picture: Gabriel Levy (left) and JohnMurray, Crossing the Line Films, in Flatanger

The project has also been profiled in Irish media, such as the Irish Times, as shown below.

***Figure 8**. Cover of the Irish Times Magazine, 18th July 2009*

Picture: Just before departure from Værnes to Ireland. Tom Roger Østerås (left) is supervising the operation. The carrier is operated by NextJet . Foto, Torgeir Nygård

7 Further work

The goal for 2010 and 2011 is to collect 20 more chicks each year. We will then have collected for reintroduction 95 individuals. The good survival rates compared to the successful Scottish reintroduction project , despite incidences of poisoning give good grounds to hope a self-sustaining breeding population will become established in Ireland in succeeding years as a result of this programme.

8 Acknowledgements

We are very grateful to the police service in Vikna and Nærøy for free use of their police boat during the collection period. Aud and Arne Moksnes put their barn at our disposal for temporary holding of the white-tailed eagle chicks prior to export. Aud served food and refreshments during, and Arne conjured up some of his famous homebrew after the marking and biometrics session under the tree in their courtyard, for which we are very grateful!

9 References

D'Arcy, G. 1999. Ireland's lost birds. - Four Courts Press, Dublin.

Evans, R. J., Wilson, J. D., Amar, A., Douse, A., MacLennan, A., Ratcliffe, N. & Whitfield, D. P. 2009. Growth and demography of a reintroduced population of white-tailed eagles *Haliaeetus albicilla*. - Ibis 151: 244-254.

Halley, D. J., Nygård, T. & Folkestad, A. O. 2006. An evaluation of the proposed sea eagle *Haliaeetus albicilla* reintroduction area in Ireland: 1-20.

Love, J. A. 1983. The return of the Sea Eagle. - Cambridge University Press, Cambridge.

Nygård, T., Kenward, R. & Einvik, K. 2000. Radio telemetry studies of dispersal and survival in juvenile White-tailed Sea Eagles *Haliaeetus albicilla* in Norway. - I Chancellor, R. D. & Meyburg, B.-U., red. Raptors at risk. World Working Group of Birds of Prey/Hancock House. s. 487-497.

Nygård, T. & Halley, D. 2008. Gjeninnføring av havørn til Irland. Prosjektrapport 2007 -NINA Minirapport 212: 11.

Nygård, T. & Halley, D. 2009. Gjeninnføring av havørna til Irland. Prosjektrapport 2008. - NINA Minirapport (258): - Norsk institutt for naturforskning, Trondheim. 16 s.

Adult White-tailed Eagle in flight - Adult havørn i flukt. Photo: Torgeir Nygård

NINA Report 583
ISSN: 1504-3312
ISBN: 978-82-426-2-160-3

Norwegian Institute for Nature Research
NINA head office
Postal address: P.O.Box 5685, NO-7485 Trondheim, NORWAY
Visiting address: Tungasletta 2, NO-7047 Trondheim, NORWAY
Phone: + 47 73 80 14 00
Fax: + 47 73 80 14 01
Organisation number: NO 950 037 687 MVA

www.nina.no

Graphic design: NINA
Cover photos: Per Jordhøy, Børre Dervo, Knut Kringstad, Tycho Anker-Nilssen