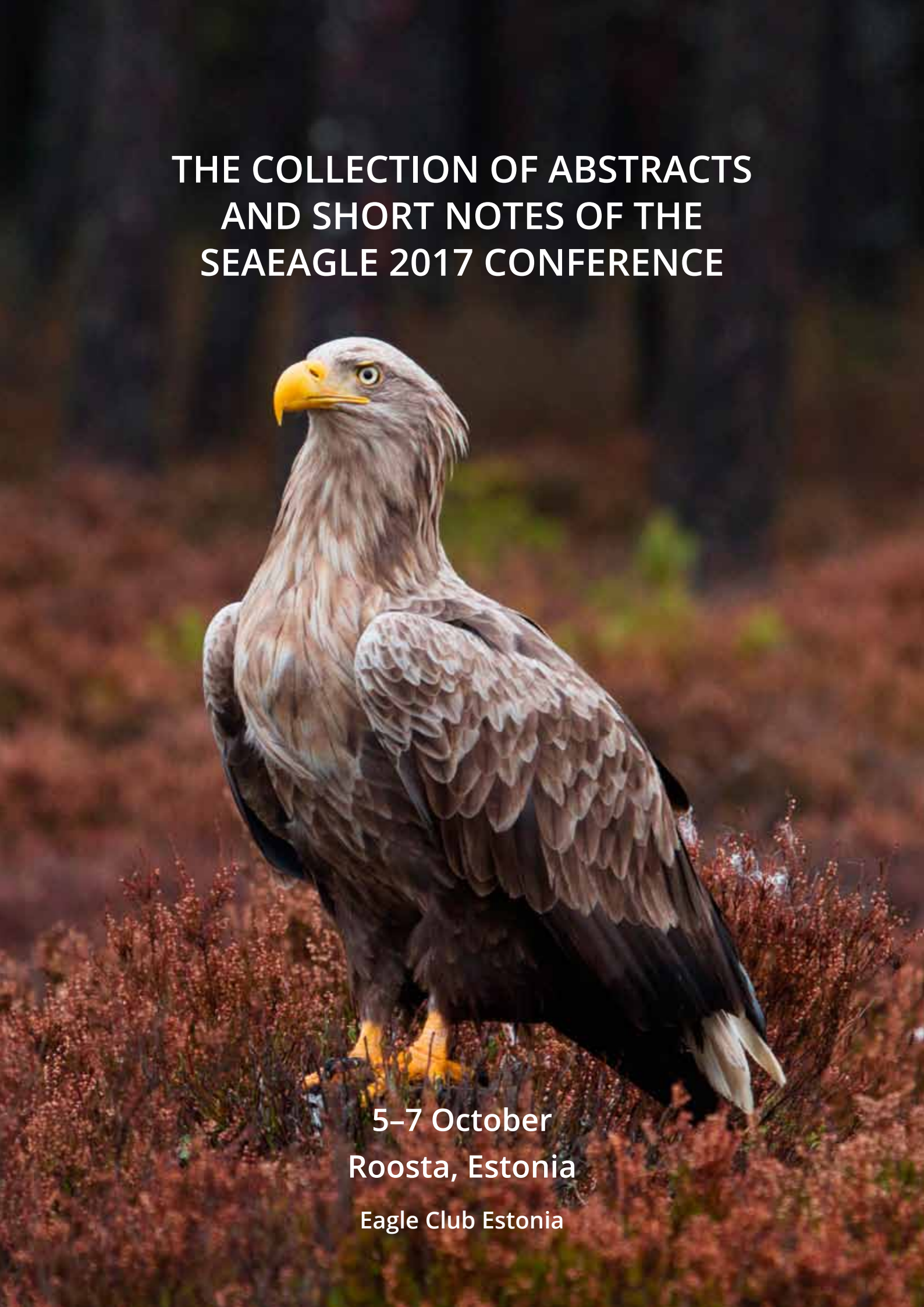
THE COLLECTION OF ABSTRACTS AND SHORT NOTES OF THE SEAEAGLE 2017 CONFERENCE



5–7 October

Roosta, Estonia

Eagle Club Estonia

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PROGRAMME

Thursday 5th of October: Full conference day

7:30 - 9:00 Breakfast

Start	End	Duration	Topic	Presenter
9:00	9:15	0:15	Opening words from organizers	Organizing team
9:15	9:30	0:15	Opening address from Estonian Environmental Board	Leelo Kukk
Session 1: Conservation and reintroduction (Moderator Pertti Saurola)				
9:30	9:50	0:20	Adoption and development of conservation measures of White-tailed Eagle nesting sites in Serbia	Ištvan Ham & Marko Tucakov
9:50	10:10	0:20	Challenges of preserving a small and isolated White-tailed Eagle population	Kristinn Haukur Skarpédinsson
10:10	10:30	0:20	The reintroduction of the White-tailed Eagle to Ireland	Torgeir Nygård & Allan Mee
10:30	11:20	0:50	**Plenary presentation**: From threatened to prospering – sixty years with the White-tailed Eagle in Sweden	Björn Helander
11:20	11:50	0:30	**Biological break**	
Session 2: Anthropogenic threats (Moderator Madis Leivits)				
11:50	12:10	0:20	Trends in contaminant levels and effects on reproductive performance in Swedish White-tailed Eagles	Peter Hellström
12:10	12:30	0:20	Human - caused mortality of White-tailed Eagle and its effects to breeding population in Serbia	Ištvan Ham & Marko Tucakov
12:30	12:50	0:20	Ethical considerations of lead impacts to White-tailed Eagle and other wildlife	Madis Leivits
12:50	14:00	1:10	**Lunch**	
14:00	14:30	0:30	**Poster session**	
14:30	15:20	0:50	**Plenary presentation:** Lead poisoning in White-tailed Eagles – Causes, consequences and lessons learned	Oliver Krone
15:20	15:40	0:20	Wildlife management of the control group of Steller's sea eagles inhabiting the area of increased anthropogenic impact of the oil and gas complex (*in Russian with English translation*)	Vladimir Masterov & Micheal Romanov

15:40	16:00	0:20	Rescue and veterinarian care of White-tailed Eagles in Hungary	Endre Sós
16:00	16:20	0:20	Outbreak of highly pathogenic avian influenza in Finnish white-tailed eagles	Marja Isomursu *et. al.*
16:20	16:40	0:20	Scottish White-tailed Eagles: Where are we now?	Andrew Stevenson
16:40	17:10	0:30	**Biological break**	
Session 3: ***Interactions with other species (Moderator Janis Kuze)***				
17:10	17:30	0:20	Interactions with livestock and delivery of the White-tailed Eagle management Scheme in Scotland.	Rhian Evans
17:30	17:50	0:20	White-tailed Eagle impacts on livestock	Alv Ottar Folkestad
17:50	18:10	0:20	Impact of growing White-tailed Eagle population on declining Black Stork population in Latvia	Maris Strazds *et. al.*
18:10	18:30	0:20	Does mesopredator Lesser Spotted Eagle suffers breeding costs in a high-density area of the White-tailed Eagle?	Deivis Dementavičius & Rimgaudas Treinys
18:30	18:50	0:20	Effects of White-tailed Eagles on breeding cormorants	Thomas Bregnballe *et. al.*
18:50	19:10	0:20	Does the White-tailed Eagle predation present a sharp conservation dilemma?	Rimgaudas Treinys & Deivis Dementavičius
19:30	23:00		**Social dinner**	

Friday 6th of October: Full conference day

7:00 - 8:30 Breakfast

Start	End	Duration	Topic	Presenter
Session 4: ***Education (Moderator Urmas Tartes)***				
8:30	8:50	0:20	Raising public awareness of White-tailed Eagles in Scotland	Alison MacLennan & David Sexton
8:50	9:40	0:50	**Plenary presentation**: Use of the Bald eagle (*Haliaeetus leucocepalus*) in educational programs	Jeffrey Meshach
9:40	10:00	0:20	Web-GIS "Faunistics" as an instrument of crowdsourcing collection of information about the White-tailed Eagle (*in Russian with English translation*)	Elvira Nikolenko
10:00	10:20	0:20	Webcams as a tool in opening of new perspectives	Urmas Sellis & Janis Kuze
10:20	10:40	0:20	Forum Impact on Popular Education in Nature Conservation	Irene Mannadiar & Beate Wasner

10:40	11:00	0:20	Logging the life of White-tailed Eagles – detailed description of White-tailed eagle breeding behaviour based on live web cameras in Estonia	Triin Leetmaa
11:00	11:30	**0:30**	**Biological break**	

Session 5:
Telemetry studies (Moderator Urmas Sellis)

11:30	12:00	0:30	**Plenary presentation**: Movements of sub-adult White-tailed Eagles tracked by satellites 2009-2017	Pertti Saurola
12:00	12:20	0:20	Movements of adult White-tailed Eagles in Russia (*in Russian with English translation*)	Vassili Pchelintsev
12:20	12:40	0:20	White-tailed Eagle on the Rybinsk reservoir: abundance, ecology, migration and wintering sites (*in Russian with English translation*)	Miroslav Babushkin *et. al.*
12:40	13:50	1:10	**Lunch**	
13:50	14:20	0:30	**Poster session**	
14:20	14:40	0:20	Spatial ecology of White-tailed Eagle in North-Eastern Poland	Paweł Mirski
14:40	15:00	0:20	Temporary nests built by the tagged newly territorial adult White-tailed Eagle	Janis Kuze

Session 6:
Population dynamics and studies (Moderator Elvira Nikolenko/Gunnar Sein)

15:00	15:20	0:20	The White-tailed Eagle in Finland - numbers and actions	Torsten Stjernberg & Heikki Lokki
15:20	15:40	0:20	The White-tailed Eagle in Austria: distribution and numbers, productivity and migration	Remo Probst & Christian Pichler
15:40	16:00	0:20	History and modern condition of White-tailed Eagle in Azerbaijan	Elchin Sultanov
16:00	16:20	0:20	The current state of the nesting group of White-tailed Eagle population in the north of Belarus (*in Russian with English translation*)	Vladimir Ivanovski
16:20	16:50	0:30	**Biological break**	
16:50	17:10	0:20	Population's dynamics of the White-tailed Eagle in the Volga delta (*in Russian with English translation*)	Natalia Meshcheryakova & Maxim Perkovsky
17:10	17:30	0:20	Establishing of new breeding groups of the White-tailed Eagle after constructing of water reservoirs in Volga-Kamskiy region in Russia (*in Russian with English translation*)	Rinur Bekmansurov *et. al.*
17:30	17:50	0:20	History of formation and modern state of inland population of White-tailed Eagle on large waterbodies of Russian North-West (*in Russian with English translation*)	Andrei Kuznetsov *et. al.*
17:50	18:10	0:20	The use of camcorder in nesting biology research of White-tailed Eagle (*in Russian with English translation*)	Anvar Ayupov

18:10	18:30	0:20	White-tailed Eagle in Southern Siberia (*in Russian with English translation*)	Igor Karyakin
19:00	22:00		**Dinner, resolutions and closing the conference**	

Saturday 7th of October: Field trip

9:00-13:00	**Fieldtrip in North-Western Estonia: cape of Põõsaspea and Silma Nature Reserve**
13:00-14:00	**Lunch**
14:00-17:00	**Workshop of White-tailed Eagle as HELCOM core indicator - leaded by Peter Hellström**
since 14:00	departure of participants (participants from non-HELCOM countries)
18:00	**Dinner and sauna**

CONTENT

PAST AND PRESENT SITUATION OF THE SEA EAGLE IN ESTONIA

The White-tailed Eagles lived in Estonia thousands of years ago already, evidence of which comes through the recovery of their bones near the old humans settlements at the waterbodies. In any case, the Sea Eagle has been valued symbol decorating the coat of arms of the county of Läänemaa (where also Roosta, the conference place is situated) and the town of Kuressaare in Saaremaa.

In the mid-19th century, the Sea Eagle was treated as a not rare bird in the mainland and as a common one in Saaremaa. In the first part of 20th century the population decreased and the authoritative ornithologists Mihkel Härms and Eerik Kumari estimated only 10 pairs in 1930s and 1950s. From 1945 to 1965, nesting and other observations were registered at up to 30 sites, while the breeding population probably consisted of 20 pairs at least. Between 1965 and 1975 only 10 to 15 pairs were known, productivity decreased sharply (not a single successful nesting in 1968, 1971, 1975). In 1960s and 1970s Tiit Randla and Fred Jüssi worked with Sea Eagle in Estonia. Since 1980 we are noticing a slight increase in breeding success. In the beginning of the 1990s our population consists of 40 pairs already. The increase of the population is probably mainly due to increased research in the field, but also to better productivity. The eagles consistently repopulated almost all their former habitats and nestsites.

Regular exchange of information on the status of eagles of Estonia began within the framework of the Northern European White-tailed Eagle Project in 1975. Beginning from 1984 efforts have been made to colour-ring all the young. The keyperson in this framework was the project leader Björn Helander. In the Estonian fieldwork the leader was Einar Tammur and afterwards it was taken over by Urmas Sellis, Veljo Volke and Renno Nellis. Starting from the end of the 1980s we have also dense cooperation in the field of investigations with finnish ornitholgists (Pertti Saurola, Torsten Stjernberg, Juhani Koivusaari, Ismo Nuuja, Risto Palokangas) as well as Latvians (Juris Lipsbergs), Russians (Sergei Ganusevits), Polish (Tadeus Mizera), Germans (Günter Oehme).

Nowadays the White-tailed Eagle, the bird which had already become a rare national monument, has become a common inhabitant of our coastal landscapes. The number of breeding pairs in Estonia has increased more than ten-fold – we have nearly 300 pairs and the wintering population is at least 1000 individuals. Spotting Sea Eagles in the airspace around the coastal towns and around islands has become an every-day occasion. In summer they are gathering in the shallow fish-rich bays in dozens or to hunt the young of cormorants in their breeding colonies.

Banding data as well as genetic information confirm the belief that the Baltic region is inhabited by a related population and that casual migration across the sea is common.

Nonetheless, the White-tailed Eagle has not been re-classified as an ordinary bird. The threats to its life have by no means disappeared, if we shortly recall lost eagles due to the recent oil disasters, death in wires or in traffic accidents or by windmills or even by shooting or by eating the meat contaminated with lead.

Tiit Randla

THE USE OF CAMCORDER IN NESTING BIOLOGY RESEARCH OF *HALIAEETUS ALBICILLA (L)*

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We carried out CCTV bird-watching in the Volzshsko-Kamskiy Reserve, starting with the nesting preparations till chicks flying – over 22 weeks, both in 2016 and 2017. We turned on the camera in February, the nest was under snow. By the time eagles had already brought dry stalks of sedge and thin pine branches into the central part (tray) of the eyrie. Since that day birds actively carried dry branches and set them along the edge, staying in the tray. Wherein female loosened snow by beak and periodically lay down on the snow. Mating took place at that time. As temperature increased birds duration in the nest increased too. Female sat down on the tray more often, warming up it, periodically rising and turning nest layer.

The first egg was laid on February 24. The oviposition consisted of three eggs both in 2016 and in 2017. The first chicks appeared April 1 and 2. The second and the third ones hatched after 3 days each. Third chicks perished after 4 days. The female mostly hatched the eggs (79.2 per cent of the time of the whole period), male substituted for her in the mornings. Birds began to nurse on the second day and chicks conflicted during feeding. On day 80 of development chicks began to feed themselves. On the 102 – 103 day chicks left the nest completely.

Chicks basic nutrition (96.7 per cent) was fish. It included mostly *Abramis bramf (45.6 per cent)* and *Carassius auratus (18 per cent).* Besides birds brought one 1.5 kg *Vulpes vulpes*, *Ondatra zidtthica* and *Anas penelope* head. The use of the camera made it possible to determine the size and weight of the fish brought by birds. Food mass fluctuated from 0.49 to 3.52 kg, its mean being 1.72 kg.

WHITE-TAILED EAGLE ON THE RYBINSK RESERVOIR: ABUNDANCE, ECOLOGY, MIGRATION AND WINTERING SITES

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Presently, the most important sites of white-tailed eagle conservation in the north of Russian forest zone are located in the protected natural territories (reserves and national parks) as well as coasts of large waterbodies less affected by anthropogenic press and transformation. The most significant site with white-tailed eagle highest abundance in the Russian North-West is situated on the Rybinsk reservoir in Darwin nature reserve (N58.64683°, E37.78800°). Reserve's area is 112,6thousand ha, with 67,1 locatedon land and 45,6 on the reservoir. Eagle's abundance here has grown right from the moment of reserve's founding (1945). Now, it has reached 28-35 annually nesting pairs, population density – 35-43 nesting pairs/1000 km^2. In 2010-2017 the share of juvenile birds in the population during the nesting period was 23-45 per cent. The share of young birds on the territory of the reserve is higher in spring and autumn – up to 57-78 per cent. Mass aggregations of eagles are observed on the reservoir's coast during this period reaching up to 23-48 birds/10 km of coast.

White-tailed eagles were seen preying on 28 species of different organisms, predominantly fish (85,1 per cent; 10 species) and birds (12,6 per cent; 13 species) (n=352). Two fish species – pike (*Esoxlucius*) and bream (*Abramisbrama*) dominated, 32,3 and 29,1 per cent, respectively. In June-August cyprinid fish species (bream, blue bream) infested with tapeworm *Ligula intestinalis* and swimming on the surface of water were a usual food object. Such fish make up to 40-65 per cent in white-tailed eagle diet during this period. Average mass of caught fish – 1062,1±55,3 g (min=120 g, max=4500 g; n= 298). Eagles were seen preying on the muskrat (*Ondatra* zibethicus).

Nests are built in coastal high forests or small forest islands (S=0,5-3 ha) within the zone of reservoir's temporal flooding. Distance between active nests 2,67±0,2 km (min=0,7 km, max=5,5 km; n=38). Nests are preferably built on aspen (*Populustremula*) (J=+0,8). Pine (*Pinussylvestris*) (J=-0,1) and birch (*Betula verrucósa*) (J=-0,1) are utilized proportionally to their presence in cenoses. Pine is chosen more often than other tree species (71 per cent).

Habitability within the control group in 2002-2017 was 85±3 per cent. The least share of inhabited territories (active and occupied) was seen during years of low water level in the reservoirin2003 (53 per cent) and 2011 (61 per cent) (Fig. 1). Average productivity of Darwin reserve group in 2002–2017 – 0,88 fledglings per each inhabited territory. In 1986-1995 this index was lower – 0,52 per territory. The correlation between eagles' productivity and their nesting activ-

ity was statistically significant. Average brood size in the Darwin reserve was 1,62±0,06 chicks (n=142). Sex composition in a sample of 22 chicks taken from 12 nests was determined using DNA analysis was the following 54,5 per cent females, 45,5 per cent males.

A total of 85 chicks were ringed in the nature reserve during 2004-2017. A number of photo-posts – artificial perches with camera traps were erected on the Rybinsk reservoir coast to photograph tagged birds. Photoposts are popular perches for white-tailed eagles as there is lack of tall trees on the reservoir's coast and vast reed beds with no perches. We received information on 16 (19 per cent) birds ringed in the reserve and one bird tagged in West Lithuania (1090 km, azimut - 69°).In autumn-winter, two birds aged six months and one and a half year were seen in the vicinity of Central-Chernozem nature reserve near Kursk (N51.77522°, 36.18894°, azimut 185°), 758 and 800 km from the natal nest, correspondingly. One dead bird was found the Azov Sea shore on Biryuchiy island (N 46.13227°, E 35.06637°) in the Azov-Sivash national park (Ukraine), 1428 km from the place of birth (azimuth 189°). A large share of juveniles (18,7 per cent) tagged in different years were later encountered in the reserve. Average remoteness of repeated eagle encounters in the spring and summer period was – 23,3±7,9 km (median=14 km, min=0,7 km, max=145 km, n=17). Almost 90 per cent (89,7 per cent) of all encountered tagged birds were found in 40 km radius from the nest. Two year old birds were encountered most often (55,5 per cent), older, 4-5 year old birds were seen more rarely (14,8 per cent).

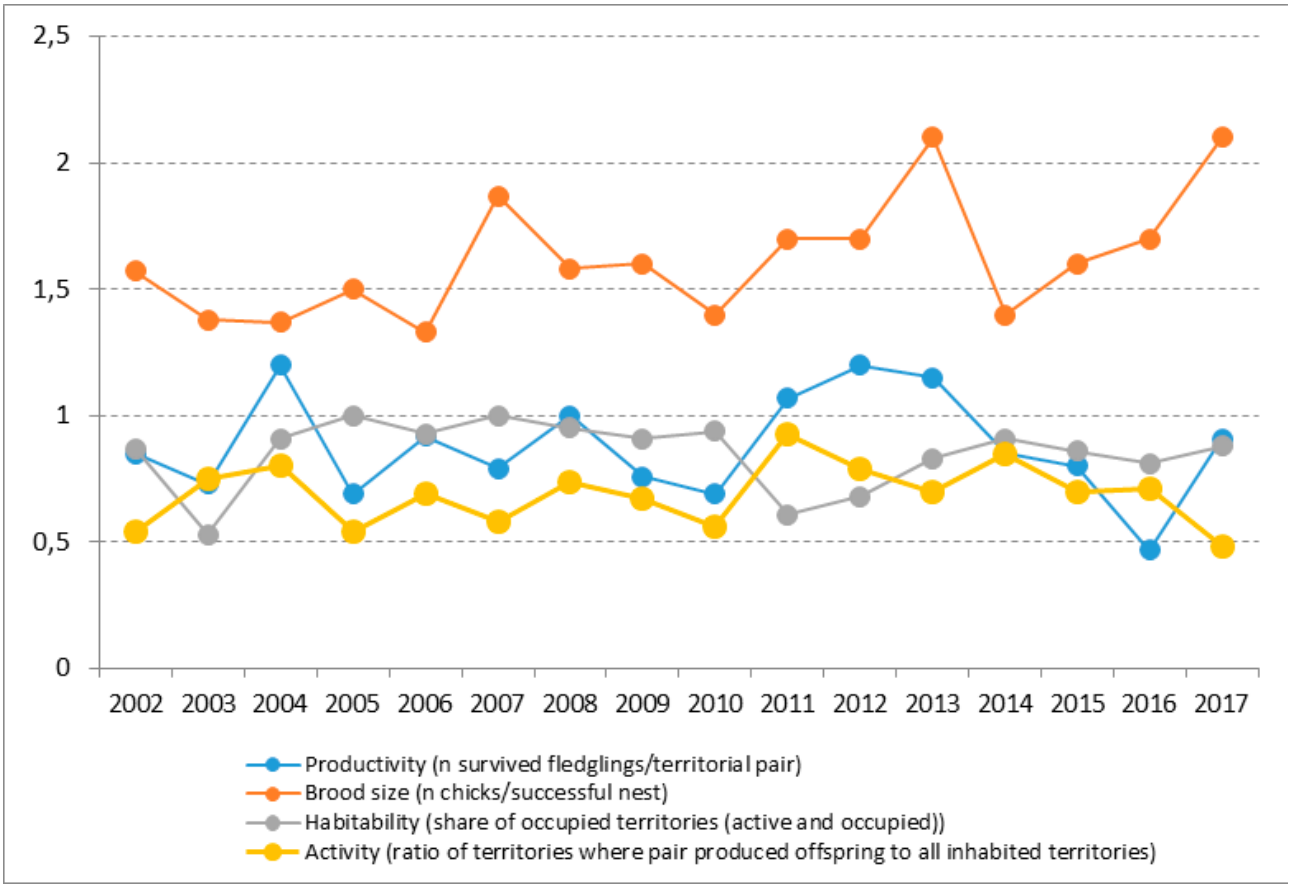

Figure 1. Productivity and nesting activity index dynamics in the Darwin nature reserve white-tailed eagles

In 2015 (Vlad, ♂) and 2016 (Maksima,♀) two chicks born in the nature reserve were tagged using GPS-GSM-transmitters. Vlad twice wintered in the Okskiy biosphere reserve N 54.7207°, E 40.96369°, 485-500 km to the south of natal nest, azimuth – 160°). He got there in 5-16 days each time arriving on the wintering ground in October the 4th. He stayed close to the single

known nest of white-tailed eagle on the territory of this reserve, foraging on wild hog carcasses during the winter. The bird returned to the Rybinsk reservoir coast on April 8-11th. Vlad spent the first and second summer in the Darwin reserve, 0,5-55 km from the natal nest. Maksima spent she is first winter on the Kremenchug water reservoir coast (N49.43656°,E 32.46673°), close to Cherkassy city (Central Ukraine) 1100 km away from the birthplace (azimuth - 18°). She moved around Ukraine the first half of winter, with maximum distance from natal nest 1330 km. In spring-summer of 2017 Maksima spent the majority of time in the Darwin nature reserve (7-60 km from the nest), however in the period from 30.04 to 08.06.2017 she flew north along the shores of all largest waterbodies of the region, up to 560 km from the natal nest and after covering 2445 km, returned to the reserve. Obtained data show that juvenile birds born on the territory of the Darwin nature reserve winter in the southern regions of European Russia and adjacent countries, not on the Baltic Sea coast as thought previously. During the period of post-nesting migrations where anthropogenic press and human disturbance factor are minimized, eagles preferspending time in the protected natural territories.

ESTABLISHING OF NEW BREEDING GROUPS OF THE WHITE-TAILED EAGLE *HALIAEETUS ALBICILLA* AFTER CONSTRUCTING OF WATER RESERVOIRS IN VOLGO-KAMSKIY REGION OF RUSSIA

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In the 20th century the river valleys of Volgo-Kamskiy Region – the main habitat of White-tailed Eagle underwent terraforming, which led to population decrease. From 1955 to 1982 four water reservoirs with the total area of 118,88 sq km were constructed on the rivers Kama and Volga. Soon White-tailed Eagle got used to a new habitat and at the end of the 20th – beginning of the 21st centuries population number began to grow. It formed new breeding populations with another spatial structure than before. Along the river banks the spatial structure of breeding sites remains lineal. But in some areas of the Kuybyshev and Nizhnekamsk reservoirs it resembles colonial type of nesting. In the study area in Tatarstan Republic we located five breeding groups with the total number of around 100 breeding pairs. Colonial structure of these breeding populations was formed due to high density of breeding sites in forests on artificial islands in reservoirs, on highest points of former flooded plains of the rivers, and on native river banks.

At the beginning, White-tailed Eagles occupied the most covered and safe breeding biotopes – forests on the waterfront and bank slopes, the river terraces. As the population grew, competition for food sources took the main place leaving safeness of breeding sites in the background. Thus, on artificial islands and flooded plains some pairs started breeding in the open sites. These sites, however, are less stable in the ecosystem. Nests located in the open sites are more vulnerable to fires and disturbing by humans. The distance between nests became shorter and the area of breeding sites shrunk respectively, hunting areas of neighboring pairs overlapping. The shortest distance between neighboring pairs in terraces of river Nizhnaya Kama covered with coniferous forests was 2.7 km in 2007 and 1.3 km in 2012–2016, and

in the Volgo-Kamskiy Nature reserve it was 1.4 km in 1997 and only 0.37 km in 2012-2016. In other dense breeding groups around reservoirs the shortest distances between the neighboring pairs were 0.49 km; 0.79 km; 0.85 km and 0.98 km in 2016.

The growth in the numbers of openly breeding pairs on artificial islands of reservoirs is an indicator of the population growth, and now we can estimate the time needed for the establishment of such breeding sites. Kuybyshev Reservoir was constructed in 1955 and its islands were occupied by White-tailed Eagles for the first time at the end of the 1970s (Gorshkov et al., 1983). The Nizhnekamsk Reservoir was created in 1979 and by the start of the 1990s breeding sites of White-tailed Eagle were located only on shore slopes and river terraces covered with forests (mostly scots pine (*Pinus silvestris*)). But in the early 2000s new breeding sites were formed on the small islands and on the flooded trees of former plain of the river Kama.

It seems that the process of breeding group formation is identical for all the reservoirs of Volgo-Kamskiy region. We predict the emergence of new breeding sites on the islands of Cheboksary Reservoir that was constructed in 1982. However, some differences related to the diversity of new-born landscapes like artificial island systems could be indicated. For instance, no colonial structure was found among breeding population of White-tailed Eagles at the Wotkino Reservoir constructed in 1961.

Reservoirs do not solely promote the growth of the population number of White-tailed Eagle, but also contribute to changes in its diet – prevalence of fish and decrease of other prey species. For instance, according to the data from camera-traps the proportion of fish in the diet of White-tailed Eagles in Volgo-Kamskiy Nature Reserve is 96.7 per cent (Ayupov et al., 2016), while in the 1990s it was 27 per cent (Karyakin, 1998) and 31 per cent in earlier times (Zharkov, Teplov, 1932).

The construction of reservoirs is not the only anthropogenic impact that has led to the growth of White-tailed Eagle population in Volgo-Kamskiy region. Satisfactory conditions for wintering were established in the region. Together with the climate changes that lead to the reduction of migratory movements of the White-tailed Eagle in the region, the number of wintering specimens is growing and breeding period shifts to earlier period in the year.

Nowadays the White-tailed Eagle is one of the most common large birds of prey in Volgo-Kamskiy Region. Its breeding population here is not less than 500–600 pairs: from 160 to 180 pairs breed in the Tatarstan Republic (Bekmansurov, 2016), from 90 to 100 pairs in the Samara region (Karyakin, Pazhenkov, 2008), from 60 to 80 pairs in the Ulyanovsk region (Korepov, 2015), from 8 to 15 pairs in Chuvashiya (Isakov, 2016), from about 80 (Shepel, 2008) to somewhere between 110 and 130 pairs in the Perm region, from 10 to 15 pairs in the Nizhniy Novgorod region (Bakka, Kiselyova, 2007), from 60 to 70 pairs in Bashkiriya, from about 45 to 65 (Shlyakhtin, Tabachischin, 2006; Moseykin, 2008; Antonchikov, Piskunov, 2003; Zavyalov et al., 2005) to 100–120 pairs in the Saratov region. Its distribution over slightly-disturbed natural habitats is limited by the number of such habitats and forage conditions, and on wintering sites – due to limited availability of forage provided by rubbish dumps and dumps of by-products of livestock and poultry farming. – For those reasons we observe slowdown in population growth and resettlement outside the reservoirs nowadays. However, trend in the population growth is still present in the region.

EFFECTS OF EAGLES ON BREEDING CORMORANTS

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INTRODUCTION

Predators like White-tailed Eagles *Haliaeetus albicilla* have the potential to limit the distribution and population size of colonial waterbirds and seabirds. Such limitation can operate through effects on breeding performance, survival of breeding adults and/or by affecting where birds establish colonies. The impact of predators on colonial waterbirds and seabirds depends not only on predator species but also on the nature of its behaviour, its food choice and the frequency with which it occurs. Some species of seabirds and colonial waterbirds will also, at least to some extent, be able to alleviate the effects of predator presence through antipredator behaviour and/or habituation. For example, Pelagic Cormorants *Phalacrocorax pelagicus* can reduce their vulnerability to sea eagles *Haliaeetus* sp. by nesting in caves and under urban bridges (see Hipfner et al. 2012).

The issue of how colonial waterbirds and seabirds are affected by avian top-predators has become increasingly relevant with the recent return of large raptors such as the White-tailed Eagle. Along the Norwegian Atlantic coast, White-tailed Eagles are known to have affected the development and distribution of seabird colonies. There are also records from Finland and Denmark of White-tailed Eagles attacking nesting Common Eiders *Somateria mollissima* with the effect, at least in Finland, that colonies exposed to Eagle predation declined markedly.

Presently, there seems to be plenty of room for further geographical expansion and population growth both in the Baltic region and elsewhere in Europe. This gives rise to the question of how well potential prey species such as the Great Cormorant *P. carbo* (hereafter Cormorants) are coping with this new and potentially important predator.

In the current absence of quantitative studies of how White-tailed Eagles have influenced Cormorants in Europe until now, we have tried to organize qualitative and some quantitative information about Eagle-Cormorant interactions in countries around the Baltic Sea. More specifically, we will present descriptions of White-tailed Eagle presence and behaviour in Baltic Cormorant colonies and give examples of behavioural responses by the Cormorants and the impacts of Eagles on breeding performance.

RESULTS AND DISCUSSION

Occurrence of Eagles in colonies. White-tailed Eagle records in Cormorant colonies are dominated by observations from late in the breeding cycle, i.e. when most Cormorant chicks are large.

Predation and kleptoparasitism. Records of White-tailed Eagles predating nests in Cormorant colonies come from all the countries around the Baltic Sea, except Kaliningrad and Latvia. However, observations across countries strongly suggest that the degree of Eagle 'interest' in Cormorants as potential food items varies strongly between regions, individuals and breeding pairs. Some Eagle pairs apparently specialized in predating Cormorants, eggs and/or chicks, while adjacent pairs did not. Likewise, there are records of single Eagles roosting regularly inside colonies without showing any interest in Cormorants, while others systematically were flying from nest to nest emptying them of eggs and/or chicks.

Behavioural responses by Cormorants. Nearly all countries around the Baltic Sea reported that the presence of White-tailed Eagles in Cormorant colonies caused disturbance, although in several of the colonies where White-tailed Eagles were nesting inside Cormorant colonies, the Cormorants habituated to their presence. There were many observations of defensive behaviour by both parents and chicks when White-tailed Eagles approached nests but the by far most frequent response of parents to approaching Eagles have been to leave the nest and take flight.

Effects on reproductive performance. There is evidence from most of the countries around the Baltic Sea that White-tailed Eagles frequently influence the breeding performance of Cormorants because of their predation on chicks and juveniles and especially because the induced disturbance facilitate predation by gulls, crows and/or ravens taking advantage of the exposure of roosts during the disturbance cause by the Eagles.

Abandonment, development and distribution of colonies. The regular occurrence of White-tailed Eagles in Cormorant colonies has apparently – in a number of cases – had consequences not only for the breeding success but also for the distribution and development of individual colonies. There exist reports from areas where occurrence and predation by Eagles was suspected to have been causing abandonment of nests, a decline in colony size and a regional redistribution of colonies and breeders.

GENERAL DISCUSSION AND CONCLUSIONS

Our review of White-tailed Eagle occurrence and behaviour in Cormorant colonies has shown that, at the present time, White-tailed Eagles are recorded in Cormorant colonies all around the Baltic Sea. The effect of their presence and activity varies considerably among colonies, and we found that Cormorants do show some habituation and behavioural adaptations whereby they reduce the risk of predation and loss of eggs and chicks.

There is huge variation in the tendency of Eagles to exploit Cormorant colonies as a food resource, partly due to variation between individual Eagles and breeding pairs and partly due to differences among sub-populations of Eagles, possibly related to geographical variation in the foraging opportunities on offer.

We suspect that with the range expansion of the species in Europe and the continued increase in population density, it will become increasingly common for Cormorant colonies to be exploited as a food resource by White-tailed Eagles. Thus many colonies, and especially ground nesting colonies, seems to offer food which is easily accessible to the Eagles. We predict that more and more colonies will be affected either by the presence of local breeding pairs or by the appearance of immature Eagles excluded from breeding pair territories. Even in situations where Eagles predate only a fraction of the eggs and chicks present in a colony they may cause long-lasting disturbance whereby eggs and small chicks become exposed to extensive predation by gulls and corvids, sometimes leading to complete breeding failure of an entire colony.

There is now some evidence to suggest that the White-tailed Eagle can act as a limiting factor on local and regional population size partly through the effects Eagles can impose on the productivity of individual breeding colonies and partly through the effects on where Cormorants decide to breed. As described above, regular predation by Eagles can trigger Cormorants to abandon otherwise highly suitable breeding sites and Cormorants may tend abstain from founding new colonies in regions that are densely populated by breeding and/or non-breeding Eagles.

Overall, Eagles may limit Cormorants in their exploitation of certain feeding areas during the breeding season, thereby indirectly reducing the overall carrying capacity of a region. In line with this, Adkins et al. (2014) suggested that Bald Eagles *H. leucocephalus* through their direct and indirect effects on Double-crested Cormorant *P. auritus* colonies now acts as a limiting factor on the growth of the Double-crested Cormorant population in the most western part of North America. For Europe, it remains to be seen how well Cormorants will adapt to this new predator and to what extent White-tailed Eagles will restrict the distribution of Cormorant colonies in future.

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DOES MESOPREDATOR LESSER SPOTTED EAGLE SUFFER BREEDING COSTS IN A HIGH-DENSITY AREA OF THE WHITE-TAILED EAGLE?

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INTRODUCTION

Recent evidence suggests that intraguild predation may affect populations of top predatory species, including such diverse taxa as arthropods, fish, amphibians, mammals and birds of prey. Among birds of prey, intraguild predation is a widespread, size-based phenomenon (predator being ~3 times larger than the victim). The intraguild predator could affect intraguild prey in various lethal (direct killing) and non-lethal ways (e.g., territory abandonment, depressed breeding success and activity time, induced spatial avoidance, changed habitat preferences). Hence, intraguild predation may present sharp conservation dilemmas because both the killer and the victim species are frequently endangered or protected. Moreover, intraguild predation effect on the victim species depends upon predator density. Thus, most prominent non-lethal effects may be expected in the areas where intraguild predator breed at high densities.

We studied sympatric internationally protected Lesser Spotted Eagle (body mass ~ 1.1 – 2.2 kg) and White-tailed Eagle (body mass ~ 3.1 – 6.9 kg), species which represent typical intraguild victim – predator system. In the present study we focus on non-lethal effects and aim to determine whether or not: 1) the Lesser Spotted Eagle avoids White-tailed Eagle when occupying territories; 2) reproduction of the Lesser Spotted Eagle is affected by the proximity and the breeding performance of the White-tailed Eagle.

METHODS

Between 2015 and 2017 data on both eagle species nests occupancy and breeding performance were collected in ca. 520 sq. km coastal area of the Curonian Lagoon (western Lithuania; N 55° 21′ 50.74″, E 21° 22′ 11.09″). During these three years 22–23 pairs of White-tailed Eagle and 11–12 pairs of Lesser Spotted Eagle nested annually in the study area. We used four variables to describe competitive environment of the Lesser Spotted Eagle:

1) distance to the nearest nest occupied by a White-tailed Eagle; 2) number of nests occupied by White-tailed Eagle pairs in a radius of 3 km; 3) breeding success (0 = failure, 1 = at least one fledgling raised) and 4) brood size (0 – 3 fledglings) of the nearest White-tailed Eagle pair. We estimated the effect of these explanatory variables and their combinations on reproduction of the Lesser Spotted Eagle through generalized linear mixed models. In these models, breeding performance of the Lesser Spotted Eagle (0 = failure, 1 = success; this species usually raise 1 nestling) was the dependent variable with binomial error structure and logit link function, and the Lesser Spotted Eagle pair identity included as a random factor. We used an information-theoretical approach for model selection and multi-model inference.

RESULTS AND CONCLUSIONS

The mean distances between Lesser Spotted Eagle nest and the nearest nest occupied by White-tailed Eagle were 1.74 km ± 0.82 sd, 1.64 km ± 0.73 sd and 1.63 km ±0.84 sd in 2015, 2016 and 2017 respectively. The smallest distances between Lesser Spotted Eagle and White-tailed Eagles nests, including simultaneous successful reproduction of both species, was only 0.14 km. In the study plot, Lesser Spotted Eagles were spaced from the conspecifics on average 1.71 km ± 1.06 sd, 1.69 km ± 1.06 sd and 1.98 km ± 1.43 sd in 2015, 2016 and 2017 respectively. All 11 territories, occupied by the Lesser Spotted Eagles in 2015, where re-occupied in 2016 as well as in 2017. Similar interspecific and conspecific distances as well as constant reoccupation of the same territories irrespective of the distance to the White-tailed Eagle nest may indicate a lack of predator avoidance distribution pattern in the Lesser Spotted Eagle. The mean breeding performance of the Lesser Spotted Eagle was 0.64 fledgling ± 0.5 sd in 2015, 0.6 fledgling ± 0.52 sd in 2016 and 0.58 fledgling ± 0.5 sd in 2017. Modelling the relationship between the breeding performance of the Lesser Spotted Eagle and explanatory variables resulted in only one model, weakly supported by the data (Δ AICc = 1.76). This model included breeding success of the White-tailed Eagle as a fixed variable and, based on the evidence ratio between Akaike weights, was 2.4 times less supported than the null model. The low coefficient of determination (3%) for the above mentioned fixed effect further indicates low importance of the White-tailed Eagle breeding success in explaining the reproduction output of the Lesser Spotted Eagle in studied area. In summary, our data indicate that internationally protected Lesser Spotted Eagle may coexist with the intraguild predator in its high density area without obvious costs on territory occupancy and breeding performance.

POSSIBLE ECOTOXICOLOGICAL HAZARDS OF CARBOFURAN IN WILD BIRDS

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INTRODUCTION

The incidence of fatal poisonings by carbofuran in wild birds, particularly white-tailed eagles and other raptors has remarkably increased in Hungary since 2008. The aim of the present study has been to determine the carbofuran concentrations in edible tissues and stomach content of birds poisoned with sublethal doses that can pose an ecotoxicological hazard to wild animals and possibly be viewed as a public health concern also.

MATERIALS AND METHODS

Eight chickens were administered orally via gastric tube an insecticide containing carbofuran with a single dose of 2.5 mg/kg b.w. One animal served as untreated control specimen. After the administration the clinical signs were observed carefully, blood samples were obtained from each bird, and after exsanguination liver, breast and leg muscle samples and stomach content were taken. The carbofuran concentration of the blood and tissue samples was measured by gas chromatography with NPD detector. The LOD and LOQ were 0.02 and 0.05 mg/kg for tissues and 0.1 mg/l for blood. The tolerance limit for carbofuran in edible tissues is 0.1 mg/kg.

RESULTS

Salivation, excitement, ruffle of neck feathers and defecation were seen within three to five minutes after administration. Then tremors, ataxia, incoordination, convulsions, opisthotonus, ticking of the head and hyperpnoe occurred, followed by hyperexcitability and muscarinic signs. Thereafter in 30 to 45 minutes, dyspnoe and typical side-winging of the head appeared together with all other signs observed previously. About in 50 to 55 minutes, the signs began to ease up, and the clinical status of the birds tended to be stabilised.

The carbofuran concentrations of the stomach content ranged between 0.21 and 6.14 mg/kg, and 0.62 and 18.68 mg/kg in animals 1-4 and 5-8, respectively. In breast muscle, the measured carbofuran concentrations varied between 0.058-0.120 mg/kg and of 0.070-0.101 mg/kg in animal 1-4 and 5-8, respectively. The carbofuran concentrations of the leg muscle and liver samples were, however below the quantification limit of 0.05 mg/kg. In the blood, the levels of the insecticide carbamate were found between <0.1 mg/kg and 0.363 mg/kg (Table 1).

Table 1. The concentration of carbofuran in the blood (mg/l) and the tissue samples (mg/kg)

Animal No	Leg muscle	Liver	Breast muscle	Stomach content	Blood
1	<0.05	<0.05	0.105	0.21	0.122
2	<0.05	<0.05	0.120	6.14	0.363
3	<0.05	<0.05	0.092	1.42	<0.1
4	<0.05	<0.05	0.058	3.64	<0.1
5	<0.05	<0.05	0.070	18.68	<0.1
6	<0.05	<0.05	0.101	1.91	<0.1
7	<0.05	<0.05	0.080	1.79	<0.1
8	<0.05	<0.05	<0.05	0.62	<0.1
Control	<0.05	<0.05	<0.05	<0.05	<0.1

DISCUSSION

The carbofuran levels in stomach content are in correlation with authors [1] who detected carbofuran amounts of 5.44–72.7 μg/g wet weight in the gastrointestinal tract of red-winged blackbirds after the treatment of corn field. Death of different heron species was described after dermal exposure to carbofuran or due to ingestion of contaminated food. At the same time, crayfish could be identified in the prey of some herons with carbofuran up to 0.6 mg/kg wet weight [3].

The concentrations of carbofuran found in edible tissues indicate the possibility of secondary poisoning of predators, and thus a significant ecotoxicological risk for these animal species. It is unfortunately not a theoretical possibility as it was shown in several cases during the past two years in Hungary [2]. Moreover, the concentrations exceeding the tolerance limit established for edible tissues may also pose a risk for human consumers.

In conclusions, data obtained from the present study indicate that sublethal concentrations of carbofuran can result in residue levels exceeding the tolerance limit in edible tissues of acutely poisoned birds, which can pose human health hazards and possible ecotoxicological risk for predators.

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EMPTY EYRIE – A DATING PLACE FOR IMMATURE WHITE-TAILED SEA EAGLES LOOKING FOR TERRITORY AND PARTNER

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ABSTRACT

The behaviour of white-tailed sea eagles (WTEs, *Haliaeetus albicilla*) has been observed at an unoccupied WTE nest in Kurzemē, Durbe County in western Latvia in order to get information about how WTEs date, i.e. how they find a spouse and bond to form a breeding couple. The nest was observed with a video camera installed at the nest. All available material from the first quarters of 2016 (93 days) and 2017 (95 days) was used together with additional camera data.

On the average 2.16 WTEs per day were seen visiting the nest during the total of 183 days observation period. The eagles were individually identified (58 altogether), their ages estimated and sexes determined. The eagles were classified in two categories, *sporadic visitors* and *dating singles*. The behaviour of dating singles was observed and characteristic features in various aspects of the behaviour will be described.

The numbers of females and males were virtually equal in both groups, but the age distributions were quite different. Among sporadic visitors there were eagles of all ages, but all dating singles were at least 4 years old. Therefore it can be concluded that WTEs become interested in the opposite sex and begin to express breeding-oriented behaviour at the age of 4 years. This is at least 2 to 3 years earlier than they reach sexual maturity. The observations also suggest that WTEs begin breeding later than is believed.

The selection of partners was partly a random process depending on the order of arrival of eagles at the nest, and partly depended both on the individual physical and mental strength of the eagles. The readiness of single WTEs to accept a new partner varied: some accepted anyone who came but some needed more time to get acquainted with the potential partner. The bonding between partners grew stronger with time. When a 'third wheel' arrived a contest arose between the eagles of the same sex. The partner of the opposite sex usually stayed outside the struggle. If a long-term partner was banished or vanished the remaining partner usually didn't accept the new partner right away.

INTRODUCTION

WTEs need two essential resources for breeding: a spouse and a territory where to raise their offspring. Requirements of a good territory can be listed shortly: it must be safe, it must have at least one suitable tree or other platform to support the heavy nest and it must have sufficient food supply.

WTEs mature slowly both sexually and in their looks. The stage of development in the appearance can be used in estimating the age of an immature WTE. The WTE attain sexual maturity at the same age as their look develops to full adult attire. According to literature male WTEs become sexually mature at the age of about 5 to 6 years and females on average about a year later. WTEs bond in a life-long relationship and a disappeared spouse is said to be soon replaced by a new mate. [1, 2, 3].

The breeding behaviour of WTEs is well known but little is known about how they bond in their life-long relationship. It can be assumed that immature, 'teenage' eagles begin to feel the effects of sex hormones in winter at the same time as adults start their breeding season. Thus it may be expected that 'teenage' WTEs begin to display breeding-oriented behaviour and begin to search for a territory and a partner. An unoccupied nest in a good territory is likely to attract immature eagles and thus a camera placed on an empty eagle's nest, an eyrie, is ideal for making observations of WTE bonding behaviour.

MATERIAL AND METHOD

A video camera system was set up at the Durbe nest by the Latvian Fund for Nature and stream from the camera has been broadcast in the internet with few pauses since February 2015. More information of the nest and an introduction to the camera project can be found in [4]. During the seasons with short days the camera is switched off for the dark time in order to save power. With increasing light the operation is made longer and in the summer-half of the year the camera operates 24 h a day. Some occasional relatively short breaks due technical difficulties have occurred. Almost all material is saved and made available for research purposes. Links to these can be found in the Looduskalender forum (LK-forum) [5, 6]. All available material from 19.1.–20.4.2016 and 1.1.–11.4.2017 has been used in this study, together with some additional camera material outside the specific study period. The observations documented in LK-forum (in English, [5], [6]) and in the Latvian Dabasdati-forum (DD-forum, in Latvian, [7], [8]) have also been utilized.

All WTEs visiting the nest were identified individually either by their rings or by details in their appearance, especially the black marks on their tails which are characteristic to each eagle. Their ages were estimated on the basis of their appearance. Eagles whose ring codes were read were used as comparison in estimating the ages of un-ringed eagles. The pace of development of specific features (colours in tail, eyes and beak) in the appearance of WTEs differs from one individual to the other and this made the aging difficult. Laborious effort to estimate the ages in a coherent way was pursued, but the assessment of the ages of the eagles remains the weakest part of this study. The inaccuracy of the ages is estimated to be ± 1 year.

The varied appearances made the individual identification of eagles possible even when they didn't have rings, if only they were seen for sufficient time. This applied especially to the group which was in the focus of this study, the dating singles. Their tails showed a wide spectrum of black & white patterns which were utilized in naming the eagles according to the associ-

ations they raised (some examples of names: Butterfly, Checkers, DoublePsi, -sin*x*, Sunglasses, TreKronor) . Care was taken not to introduce any more eagles than were necessary to explain the events seen. The number of eagles seen at the nest is comparable to the numbers seen in 2013 at a winter feeding place in Nõva in North-Western Estonia. The feeding place can be considered an equally interesting place for eagles as the empty nest. In Nõva at least about 6.3 eagles per day were observed during a period of 92 days in the first quarter of 2013, with 32 % of individuals wearing rings [9]. In this study the corresponding numbers were 2.16 eagles per day, with 21 % wearing rings.

The sexes of the eagles were determined primarily by their voices and behaviour. Mating behaviour gave absolute sexing. The voice turned out to be a very reliable indicator of the sex: females are usually bigger than males and thus have bigger vocal organs which produce lower-pitch voice than the male vocal organs (females are 'mezzo sopranos' and males are 'tenors'). Inspection of the thickness of the tarsus was used if no other indicator was available. One sporadic visitor remained unsexed, because it was seen so poorly. The identification of the sexes is much more reliable than the estimation of ages, especially for dating eagles, and it can be considered certain for those who stayed longer at the nest.

The camera was off due technical difficulties on 4 days during the study period (2. – 4.1. and 14.3.2017). Observations cover the available camera time. It is possible that some brief visits have been missed, but it is unlikely that any important events have been missed thanks to the diligent surveillance and reporting of the events by the members of LK and DD fora.

The eagles were classified in two categories, *sporadic visitors* and *dating singles*. Sporadic visitors were seen on the nest only few times and they had practically no contact with other eagles. Dating singles were interested in the nest and sought contact with eagles of the opposite sex. Table 1 gives the sex and age distributions of the observed eagles in both seasons and both groups, the sporadic visitors and the dating singles. Table 2 gives other statistics of the observation periods. Five ringed eagles came from Lithuania and the rest seven from Latvia. Two ringed eagles were observed and identified in both seasons and thus appear in the figures of both seasons. Therefore the total number of individuals seen in the whole observation period is 58.

Table 1. Age and sex distributions of the eagles at the Durbe WTE nest in springs 2016 and 2017.

A: sporadic visitors

age	♀	♂	?	Σ
1	1	1	0	2
2	3	3	0	6
3	1	6	1	8
4	7	6	0	13
5	0	2	0	2
6+	4	1	0	5
	♀	♂	?	S
Σ =	16	19	1	36

B: dating singles

age	♀	♂	Σ
1	0	0	0
2	0	0	0
3	0	0	0
4	6	4	10
5	3	4	7
6+	2	5	7
	♀	♂	Σ
Σ =	11	13	24

Table 2. Other statistics from the Durbe nest. Two ringed eagles were seen and identified in both periods.

2016		**2017**	
days	93	days	95
eagles	average / day	eagles	average / day
197	2,12	212	2,23
individuals	31	individuals	29
ringed	identified	ringed	identified
8	5	6	6
proportion of individuals		proportion of individuals	
26 %	16 %	19 %	19 %

Figure 1 shows the numbers of observed eagles in both periods. The most prominent feature is the apparently strong variation of numbers from day to day. This is due to the small numbers of eagles. Even on the liveliest days only 5 eagles were seen (but they made so much traffic that LK-forum members began to call the nest the Central Station). Another feature is that 2 eagles is the baseline of the occupation. This was the true situation: on most days there were two dating eagles present. "Extra" eagles seemed to come in waves which are seen as spikes in the graphs. Some gaps in the graphs are due to camera being off.

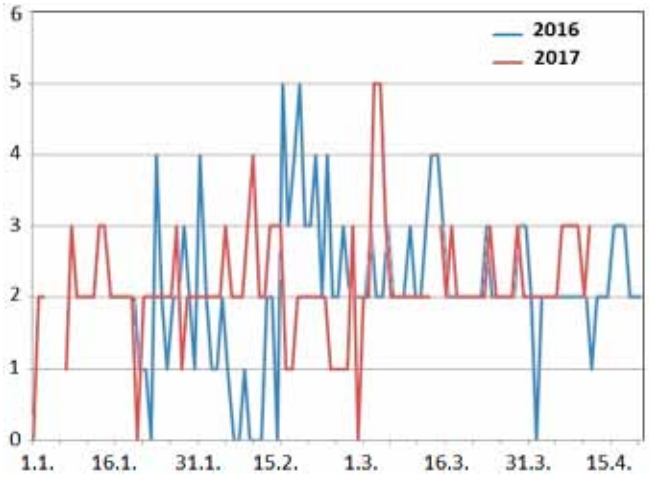

Figure 1. The numbers of observed eagles at the nest.

The eyrie was visited by someone almost every day during the 189-day study period. There were 9 days without any WTE visit (but voices of eagles were heard from the forest on most of these days), and 9 days when no single dating eagle made a visit (but some sporadic visitors were seen on some of these days). A single dating eagle was alone at the nest on 13 days out of 189. This is reflected on the average number of eagles at the nest which is slightly over 2: 2.16. The longest unbroken time that a single WTE waited for the next date was 4 days.

The time which the dating singles spent at the nest varied a lot in each age group. Most of the 4-year olds spent only few days before moving on (3 eagles were seen only on one day, 2 on two days, one on 3 days, and two on 4 days). The average length was 2.25 days. These eagles were either banished soon after their arrival or they left on their own. One 4-year old eagle stayed for 36 days before she was banished by a 5-year old female. The range of durations of stays of 5-years olds was even wider: 1 day, 5 days (banished), 18 days (banished), 22 days (disappeared without apparent reason), 53 days (banished), 3 months 10 days (banished). One 5-years old ringed male came on 17.4.2016 and stayed for 8 months 25 days. He lost his 6-year old fiancée (also ringed) who probably died in the end of January 2017. He was last seen on 11.2. 2017, being maybe banished by another male or he left voluntarily.

6 years old single eagles either made flash visits or stayed long. One was seen only once and the other on two consecutive days. The latter took part in a long and very dramatic-sounding fight after which it was not seen again. The vanished fiancée mentioned above stayed at the nest for 6 months and was seriously preparing the nest for breeding before she vanished in the end of January 2017. She was the only eagle who knew how to build nest.

The present couple (situation on 20.8.2017) is a 5-year old male whole arrived on 3.3. His fiancée is a 6-year old female who arrived on 7.4., and banished the previous girlfriend. These eagles have occupied the nest for about 6 and 5 months respectively and they have already begun to bring new sticks to the nest.

BEHAVIOURAL CHARACTERISTICS OF EAGLES ON THE NEST

The activity of eagles at the eyrie increased considerably in the latter half of January: the numbers of visiting eagles became about 2 to 3-fold in February – March compared to early January. The eagles also made daily multiple visits at the nest so that the overall activity at the nest increased much more than the numbers of visiting eagles suggest. Statistics of the visit frequencies or durations are not made yet. It seems that increasing light in the winter and early spring activates all eagles. No significant difference in the activity of sporadic visitors and dating single eagles was observed: eagles of both groups visited the nest about equally frequently and their activity seemed to vary in the same way. The activity decreased slowly in April. The total numbers of the eagles were so low that no further and more decisive conclusions can be made.

A: Sporadic visitors

The visits of sporadic visitors lasted from seconds to few hours. 27 eagles visited only once, 2 eagles were seen twice on consecutive days and one eagle visited on two consecutive days and after a few days again on two consecutive days, altogether 4 times. One eagle wearing Latvian rings (it was ringed western Latvia in 2013, in the same area where the nest is located,) has been exceptional: it made 6 visits to the nest during the study period. Altogether it has been identified 10 times on the nest since the camera started in 2015. Despite of its frequent visits this eagle belongs to the group of sporadic visitors.

Sporadic visitors usually didn't stay long, but some of them stayed longer and spent their time resting and looking at the nest and its surroundings. Some were interested in nest materials, but especially the youngest only played with sticks and cones instead of organizing them. The visits of the few adult eagles among the sporadic visitors gave the impression that they made a check-up -visit on the way back to their own territory: they had a brief look at the nest and the surroundings and then continued away.

B: Dating eagles

The durations of the stays of the dating singles varied from hours or less (if they were banished quickly from the nest) to several weeks. They were interested in eagles of the opposite sex and in the nest. They organized the sticks and other materials on the nest both alone and with a partner, but usually managed to tear more than construct the nest. They also dug the nest bottom with their beaks. This behaviour is similar to what breeding adults do when they have chicks in the nest, and it is often called 'airing the nest'. They also often lay down on the nest to 'fake-brood'.

Selection of partners

A single WTE usually accepted as a girl- or boyfriend the first single of the opposite sex who came to the nest. Some males tried to mate with the new girlfriend right away, but the females refused every time. Partners changed when one of the eagles disappeared for some reason, or as results of fights which took place between eagles of the same sex. The winner usually became the new girl- or boyfriend. How soon this happened depended on how long the previous couple had been together. If the previous relationship had been short (a few days) then the remaining partner usually accepted the new partner quickly. If the relationship had been longer the remaining partner hesitated, or sometimes didn't accept the new partner at all but left the territory instead. The present 5-years-old male was an exception: he accepted new girlfriends readily and tried to mate with them right away in each observed change. The first change was

between a two-night-stand and a girlfriend who then stayed for 36 days. He tried to mate with both females within two days. After the second change he also tried to mate with the third girlfriend (who has remained so far) right away and after that repeatedly for several weeks but was refused every time.

In longest relationships the bond between the partners became so strong that a disappeared partner was not replaced (at least not within the frames of this study). Two such cases were observed during the study period. The 16-years old female of the original owner couple of the territory disappeared (probably died) in the beginning of the study period. The male was probably about the same age as she was. He didn't accept any new mate although eligible bride candidates were available and tried to entice him persistently. Instead he tried to keep the territory only for himself while he waited for his spouse in vain. Eventually the old male disappeared, too.

The other long relationship was a couple of two ringed eagles who met in July 2016. In the winter 2017 they began to prepare for breeding when the female was in her 8th (ringed in 2009) and a male in his 7th calendar year (ringed in 2010). They were probably aiming for their first breeding. Unfortunately the female disappeared in January 2017 after living in the territory for 6 months. The remaining male did not accept the new partner who joined him 5 days after the fiancée was last seen. The male was last seen at the nest two weeks after the disappearance of his fiancée, after living nearly 9 months in the territory. A new male appeared at the nest on the next day.

Fights

Apparently eagles are able to tell the sex of other eagles visually from far, as often before a conflict the resident eagle who later engaged in a fight gazed at the sky for long periods. If the partner was present, too, it remained calm. A conflict arose when two eagles of the same sex encountered at the nest. The partner of the fighter stayed out of the way, if the relationship with the fighter was relatively fresh. Eagles in long-term relationships defended the nest together against intruders.

If one of the competing eagles was clearly overpowering the weaker receded almost voluntarily, protesting only vocally. Equal competitors engaged in a fight where usually no actual physical contact was observed. In two cases, however, the eagles fell down together and a 'fist-fight' was heard from the ground. On the other occasion the bloodcurdling screams and wailing continued after the drop for a few hours till dark. In the next morning one eagle capable of flying and a few loose feathers were found on the site [9].

Sometimes one plunge was enough to decide which eagle won, but sometimes several consecutive attacks took place when competitors were equal in strength and persistence. The maximum number was 7 attacks observed in one day. Sometimes the struggle was heard continuing outside the nest, and sometimes it continued to the next day or two. Some of the struggles must of course have taken place also outside the hearing range or during nights when camera was off, as some changes in eagle 'personnel' happened overnight.

Only once more than three eagles were observed to be involved in a struggle. Even then the male of the challenger couple was fairly passive: it stayed most of the time out of sight and out of action and only screamed. Also only once a female was seen defending the nest alone in two consecutive attacks by two different males within only 7 min. One of these males had banished the female's long-term boyfriend who was seen for the last time on the previous day, and one

of these new males also banished the other new male. It took a week before the female began to show affection towards the winning male. After about a month she disappeared and the winning male was left alone.

On three occasions a male was seen attacking a female.

Courtship behaviour

Females often expressed their fondness to their boyfriends by pulling the feathers on his head, shoulders, sides or tails. The forum members call pulling head feathers 'eagle kisses'. The males often react to these kisses with mixed feelings, especially if the relationship is new: seeing a huge beak of a virtual stranger approaching one's eyes must feel daunting. Also males pulled feathers of their female companions but much less frequently.

Courting couples made some rudimentary nest work which didn't essentially improve or prepare the nest for breeding. Occasionally some courting couples brought small sticks or hay to the nest. When a relationship became more established the eagles began to bring sticks and hay to the nest more regularly. In the middle of the summer there was a pause in nest building activity, but it restarted in the middle of August.

Often the courting couple slowly stepped around nest side tightly by side and cheek to cheek with their heads bent down. Sometimes they dug inside the nest bottom with their beaks or pulled some sticks out of the nest construction. This behaviour has been observed as foreplay before mating of established, mature eagle couples.

Young males don't seem to master the mating technique congenitally. In the beginning one of them didn't even seem to know that he should get on the female's back. Many males tried to mate with their girlfriends but often aimed poorly and they always failed. None of the females was ready for mating and reacted to her boyfriend's attempts first with astonishment, then with resistance and finally with aggression. Instead of bending down and staying still and raising her tail the females stood up higher, pushed the male farther with her wings, and if the male managed to get on her back she shook him off quite effortlessly. The female often expressed explicitly that she didn't like the mating attempt: she vocalized resentfully and tried to peck the male's head. Sometimes she then kissed the male. In the end the males learned to give up even attempting whenever the thought of mating crossed his mind. Mating attempts gradually ceased in May (the last mating suggestion by the present male was seen on 14.5.2017).

No clearly successful mating was observed taking place outside the nest either. During a successful mating only the male sings a characteristic song which is different from normal singing. He begins with a slow rhythm and lower pitch notes. As he rises on the female's back the notes begin to rise gradually and the rhythm becomes denser. In the end the pitch of the notes varies up and down and up faster and faster while the over-all pitch keeps rising, and the song ends ecstatically in the climax. The female remains silent all through the process. This kind of mating song was never heard. Instead of this the eagles were often heard singing together normally. In the normal song both sing in regular rhythm and constant pitch for almost all of the duration of the song.

Courtship flights were seen a few times although the camera is not suited for long-range observations.

Food

A few eagles (both female and male) brought some food items to the nest but all were reluctant to share the food with their companions. Once a female brought a deer's leg and her boyfriend stole it from her. A few times a male brought some food items to the nest, but they kept the food for themselves although the girlfriends tried to take the food. One male brought fish repeatedly to the nest with his girlfriend following him closely. Every time the male left just before his girlfriend arrived and took the fish him. This was the male who got pecked in the face after his mating attempts. – Maybe females had been more compliant to mating if their boyfriends had provided food gifts for them.

One young submissive male managed to get in the favour of an indifferent older female by bringing a food gift to her. Even he didn't give the food to her quite voluntarily, but she took the food by force. Nevertheless the gift made the female interested in the male, while before the gift she ignored the male completely.

The male is the 'bread-winner' of the eagle family: he hunts and feeds both the female and the chicks. The willingness to hand over food to another eagle is a measure of the male eagle's maturity for family life. None of the males seen at the nest passed this test. On the other hand, the original male owner of the territory brought superfluous amounts of fish for his family in 2015.

DISCUSSION AND CONCLUSIONS

It seems that immature WTEs become interested in breeding-oriented behaviour and begin dating at the age of 4 years, i.e. 2 to 3 years before they reach the expected breeding maturity. The relationships of the youngest eagles were broken easiest. The eagles who were at least 5 or 6 years old formed longer-term relationships lasting for at least a few weeks. The longer the previous relationship was the more reluctantly the remaining partner accepted a new partner if the previous was lost.

The selection of partners seems to take place among the own sex and the winner takes all, the territory and the partner. Who will be the winner depends both on individual qualities (physical and mental strength) and on chance, i.e. on the order in which the eagles happen to come to the territory. Those who come early in the season face completion more likely than the eagles who come later. They will also probably have less time to bond with the partner. The partner will help more likely in struggles if the couple has bonded longer. Thus the early-comers may have less chance to become winners in the end than the eagles who arrive in the territory later in the dating season. Both eagle couples who have stayed over summer formed later in the spring: in 2016 the male arrived on 17.4. and the female on 29.7., in 2017 the male arrived on 3.3., and the female on 7.4. None of them were seen meeting competitors after their arrivals.

Eagles seem to bond when they learn to know each other over a longer period of time. The longer the couple has bonded the more reluctantly they seem to accept new partners if old partner is lost. Two such cases were observed at the Durbe nest. In both cases the remaining eagle chose to leave the territory instead of accepting a new mate although an eligible candidate was available. The candidates appeared at the nest quickly after the last sighting of the lost spouse. Also the resident eagle was replaced by a new single eagle overnight in both cases. If the nest had been observed from a large distance with binoculars or a telescope and not all day every day it might have been difficult to notice the replacements of eagles. It seems that a

disappeared spouse of an established WTE couple will not be replaced as readily as has been thought.

Not even the 6-years old eagles were ready to breed yet: females didn't want to mate, males didn't want to share their food and no-one knew how to prepare the nest for breeding. These observations seem to indicate that WTEs begin to breed later than believed.

Acknowledgements
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SATELLITE TRACKING OF WHITE-TAILED EAGLES (HALIAEETUS ALBICILLA) IN DENMARK: INVESTIGATING MOVEMENT ECOLOGY AND INCREASING PUBLIC AWARENESS

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In 2017, BirdLife Denmark and the University of Copenhagen launched a satellite-telemetry project tracking White-tailed Eagles. The project will have two primary focuses: one is studying movements and habitat choice during the pre-breeding years and movements in relation to on- and offshore windfarms among others. On the other hand, the project will focus on public outreach and educating the public about the White-tailed Eagle. This includes online access to an automatically updated interactive map, which allows the public to follow the individuals on a day-to-day basis. It will also include the development of educational material targeted at elementary- to high school level students. Here we present the first movements gathered during the summer and autumn of 2017 and demonstrate how we will use it to increase public awareness about the species.

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THE WHITE-TAILED EAGLE AS A POTENTIAL THREAT TO LIVESTOCK

Evidence of White-tailed Eagle impacts on livestock in Norway:

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INTRODUCTION:

A number of handbooks count for sheep and lambs or other ungulates under certain circumstances may fall victims to the white-tailed eagle. In Norway J. F. Willgohs apparently accepted 14 cases when white-tailed eagles were thought to have killed livestock, and eagle's impact on livestock was a main topic in Norwegian Sea-eagle Project when established 1974. No one questioned the opinion that White-tailed Eagle *did* kill livestock, but there was a need to quantify the problem. During 43 years of Norwegian Sea-eagle Project and 30 years of a carcass autopsy scheme carried out by Norwegian Nature Inspectorate on livestock suspected to have been killed by protected predators, there has been only one case verified on white-tailed eagle's attack on sheep/lambs, goat/goat kids or semi domesticated reindeer in Norway.

Norwegian studies on possible impact on livestock from White-tailed Eagle:

Although Willgohs apparently accepted a number of livestock losses where *the eagle* was guilty, in the English summary of his report from 1984 he was counting for only one incident of livestock attack by white-tailed eagle. A recent re-analysis of his data identified this to be an incidence from June 1957 when a pair of white-tailed eagles had eaten off the tail of a Cheviot ewe laying on its back without being able to turn on to its legs. The ewe was still alive and survived.

A national scheme on carcass autopsies in Norway during 1987-2017 on livestock losses suspected to be caused by protected predators, counting a total of 166.000 reports by 2017, has verified only one white-tailed eagle impact (May 2012, Co Rogaland). This was a lamb still alive when the sheep farmer approached. Post mortems showed no signs of killing marks from the eagle. However, the eagle had started eating on one of the lamb's hind legs. It was confirmed heavy infections and pus in the lamb's leg joints and in its lungs and the conclusion was that the lamb had been moribund.

White-tailed Eagle attacks on livestock/ungulates described elsewhere:

An incidence on Isle of Rum June 1979 is described by Love in his book "A Saga of Sea Eagles" where a two days old red deer calf had been killed by an immature white-tailed eagle. No

lethal talon punctures were found on the skinned carcass, only the wounds where the eagle had opened its prey by breaking through its ribs. These three incidences seem to be the only known incidences where the White-tailed Eagle has been verified attacking live ungulates globally. The lack of evidence about white-tailed eagle as a potential threat to livestock is well in accordance with historical sources, even handbooks, where white-tailed eagle's impact on livestock is not mentioned, and livestock species are hardly included to the white-tailed eagle's prey list before 1961.Two clerks and a major from Western Norway have been describing the white-tailed eagle in the 1700-eds as a harmless bird to livestock, living mainly of fish and left overs. A Swedish handbook on Nordic birds (Kolthoff & Jäger 1898) question whether the white-tailed eagle is hunting terrestrial mammals at all. Four citations by Love from Scotland are describing the white-tailed eagle's clumsy way to hunt, their preference for fish, and for carcasses and other types of foully food. The oldest handbooks in Norway and seemingly elsewhere do not mention livestock on white-tailed eagle's food list except when scavenged. At this time the white-tailed eagle was still numerous along the coast and was a resident in the districts with sheep and goat farming. Not until rather recently, when the eagle population had declined dramatically and was exterminated close to settlements, did the white-tailed eagle get the reputation as a lamb killer. Recent studies in Scotland conclude that the reintroduced white-tailed eagle stock in Western Scotland may kill a small number of lambs. The possibility for left overs or klepto parasitizing from golden eagle kills has been assessed, but regarded negligible. During recent field studies there was found no clear evidence of white-tailed eagles killing lambs in a preliminary study on Gairloch peninsula, Wester Ross, Scotland where there had been reported heavy losses of lambs by white-tailed eagles during preceding years. The practice of white-tailed eagles picking up left over or even to klepto parasitize other predators is an important way of getting food. The data sets from Norway have one verified attack of white-tailed eagle on livestock (described above). There was found no evidence of eagle predation on sheep in studies on sheep carcass used by bald eagles in Oregon, and worldwide only three species of Sea Eagles have been reported killing lambs (North America, Europe, and Australia), but with little evidence to support the accusations. In Utah there are described two incidences during the winter 1980-81 when bald eagles killed a new born lamb and a pregnant ewe laid flat down without being able to raise up, in a grotesque way describing the behaviour of a scavenger as opposed to a predator, which fits well with the incidences described on the white-tailed eagle above. This behaviour is well in accordance with the behaviour of other scavengers.

Hillsheep farming in Norway and white-tailed eagles:

From ancient time hill sheep farming was the traditional way of sheep farming along the Norwegian coast up to the Lofoten Islands. Norwegian short-tailed sheep breed (the Norse Breed) was the only breed in Norway up to the eighteenth century, when the long tailed cross breeds took over. By 1950-60 hill sheep farming had almost disappeared in Norway, but a campaign was set to save the tradition, and by now there may be more than 100,000 wintering ewes roaming the heathland along the Norwegian coast, behaving like the black-face do in Scotland, lambing in the hills, not in-bye or indoors. Hill sheep farming in Norway is covering most of the densest populated white-tailed eagle breeding range and without impact problems on the livestock. From 1968 onwards the WTE population in Norway has increased from 7-800 pairs to an estimated 4.000 territorial pairs today, extending the breeding range southwards to the Swedish border, even inland.

CONCLUSION:

Historically there was hardly any evidence for regarding the white-tailed eagle as a potential threat to livestock in Norway. The species was obviously regarded as a more or less harmless scavenger or fish hunter. During 1974-2017 the species has been monitored in Norway, including feeding behaviour. Only two incidences when the white-tailed eagle has attacked live livestock have been verified in Norway, and then behaving like a scavenger on still live, but immobilized sheep/lambs, like it has been verified on a red deer calf in Scotland, and in two incidences of bald eagles on sheep/lambs in US. Studies in Scotland are indicating a very low frequency of similar behaviour on lambs.

The conclusion then has to be that the white-tailed eagle is quite clearly not a threat to livestock. There may be some very few exceptions when the species seems to behave like a scavenger on still live but immobilized or moribund livestock, starting feeding on the animals without killing them, just like other scavengers do occasionally.

NUMBER DYNAMICS OF WHITE-TAILED EAGLES (*HALIAEETUS ALBICILLA*) WINTERING ON THE DNIEPER NEAR THE KANIV HYDROELECTRIC POWER STATION (CENTRAL UKRAINE) IN 1987–2017

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The Kaniv Hydroelectric Power Station is located on the Middle Dnieper in the central part of Ukraine (49.46 N, 31.28 E). It was built in early 1970s. In winter, due to working of the station in peaking operation, ice-free parts of water remain downstream even during hard frosts. Many waterbirds use this area for wintering. White-tailed Eagles (*Haliaeetus albicilla*) were observed here for the first time in the season 1974/1975. In 1970s and 1980s their number did not exceed 4-6 individuals, then it began to increase (Loparev & Grishchenko 1992). Now this is one of the main wintering areas of White-tailed Eagles in the inland part of Ukraine. It has got the status of IBA.

We have monitored the number of wintering eagles near the town of Kaniv since 1987. They were counted at least 2-3 times during a season. The length of route made up from 12 to 18 km depending on the ice situation on the river.

For the analysis of population dynamics, we used the maximum number of registered birds (Fig. 1). The amount of sea eagles depended on weather conditions and fluctuated within large limits but in general it increased. The positive linear trend is well-defined ($p < 0.001$). If in 1990s and 2000s the maximum number ranged mainly 5 to 15 individuals, then since 2011 it did not sink below 17 (Fig. 1). This trend is related to population growth of the species. The largest number of White-tailed Eagles (31) was observed on 14.01.2013: 2 adult and 29 immature birds. On 28.01.2012 we registered 29 individuals (6 adult and 23 immature ones).

White-tailed Eagles can be located on the Dnieper near Kaniv all year round. In early winter their number is low, usually adults prevail (probably resident pairs). At this time large gatherings of these birds can be found on fish-farming ponds and water reservoirs. After the intensification of frosts, eagles move to non-freezing parts of the Dnieper. Their number reach maximum in January. Till February it can decrease to an extent. The number dynamics during the season depend on air temperature. In warmer periods birds disperse again. During midwinter counts the immature eagles form the considerable majority, their proportion could amount to 90-95 per cent.

The total number of wintering White-tailed Eagles in Ukraine was estimated from 260 to 370 individuals (Gavrilyuk 2009). Therefore, the area of the Kaniv Hydroelectric Power Station is very important for the species. Here up to from 5 to 10 per cent of the wintering population can be concetrated.

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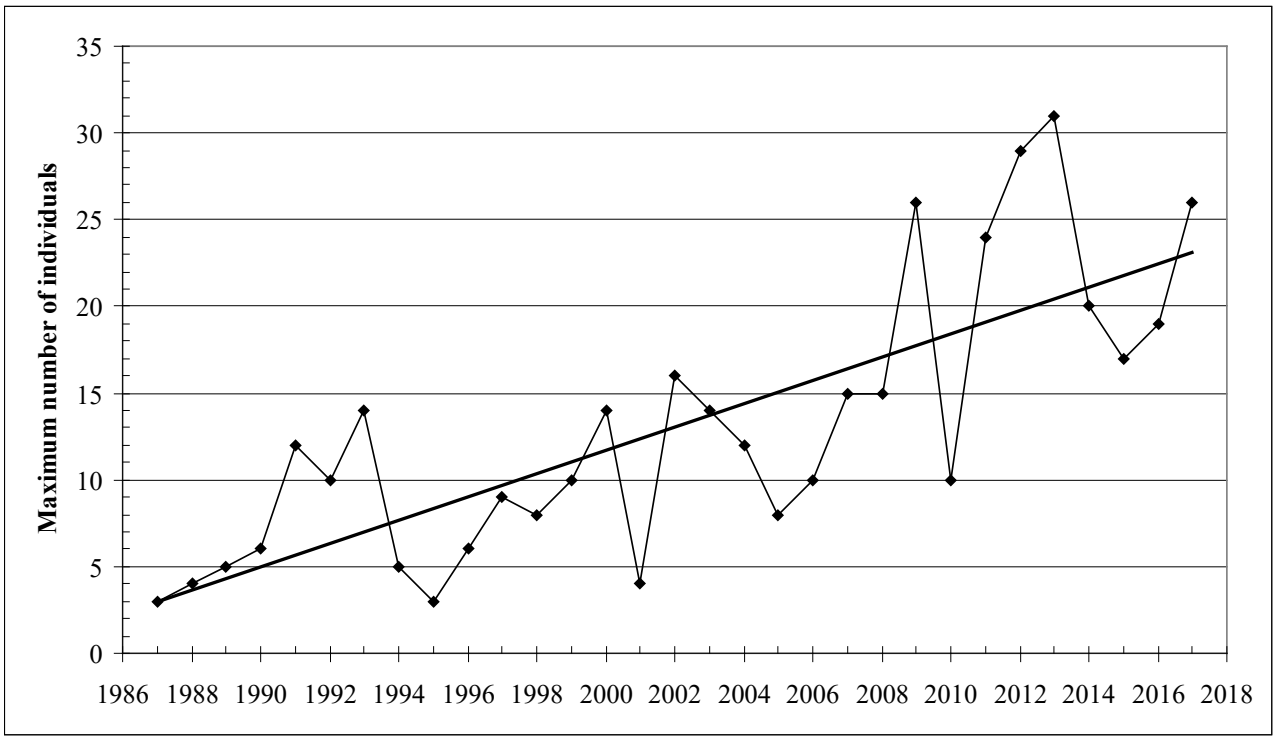

Figure 1. Number dynamics of wintering White-tailed Eagles with linear trend.

WHITE-TAILED EAGLE IN SERBIA, POPULATION GROWTH AND BREEDING SUCCESS, 2008–2017

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Presented will be the results of the realized monitoring of the WTE (white-tailed eagle) in Serbia, which started more than ten years ago (Ham et al., 2009a; Ham et al., 2009b). The whole field-work in connection to the monitoring was done by myself, it was financed by personal funds and to a limited extent through partial and occasional project support of the Public Enterprise "Vojvodinašume" and WWF-Austria (office: Belgrade).

The nesting areas were visited at least twice and if needed, thrice and more. Criteria, definitions, protocols and terminology were used according to Oehme (2003).

The recovery and mild increase in the number of breeding pairs of WTE in Serbia was observed at the end of the 1980s, with the number of pairs increasing four times at the beginning of this monitoring. The expected further trend was an exponential growth. To what extent has this been achieved, we can see in Fig. 1A. For each year the total number of breeding territories is shown, based on previous nesting and operative existence of the nest. The dimmed part represents the total number of surveilled pairs according to the monitoring criteria. Over the years, new couples have been constantly discovered, the number of well-known couples has been steadily growing, but some couples have been lost due to death (complete pair) and relocation to an unknown territory, both in Serbia and beyond its borders. As a result, from 2008 to 2017, there were registered 152 nesting territories in Serbia. The number of breeding pairs has been steadily increasing, mostly due to new pairs, but also due to the late detection of old pairs nesting in remote, previously unsearched locations. A distinct increase in 2016 and 2017 is evident, which indicates a clear further trend in the growth of the breeding population. Based on the potential of breeding and feeding territories, the stationary state of the population should be expected to be between 150–160 pairs.

Nesting performance indicators are shown in Fig. 1B. On all three curves, especially on Productivity and on the average size of the brood, two low values can be noted for 2012 and 2014. Both are the result of extremely adverse climatic conditions. We know that the feeding possibilities are always conditioned by climatic factors and that the WTE in general more or less manage each year, so we do not see the particular effect of some factor, but sometimes the unusual-extreme values of temperature, precipitation/rain and wind are visibly reducing the number of eggs and chicks. This happened due to extremely cold February in 2012 and to heavy rainfall in May 2014. This year we also had extreme and long-lasting cold in January, but this did not significantly affect the success of nesting. Adult birds survived this and in few cases only laying the eggs failed. Most eagles began laying eggs only after bad weather. This resulted

in a greater synchronization of the start of egg laying, and after successful incubation and bigger broods. There was a high percentage of nests with two eaglets and ultimately this resulted in high productivity and a high value of the breeding success.

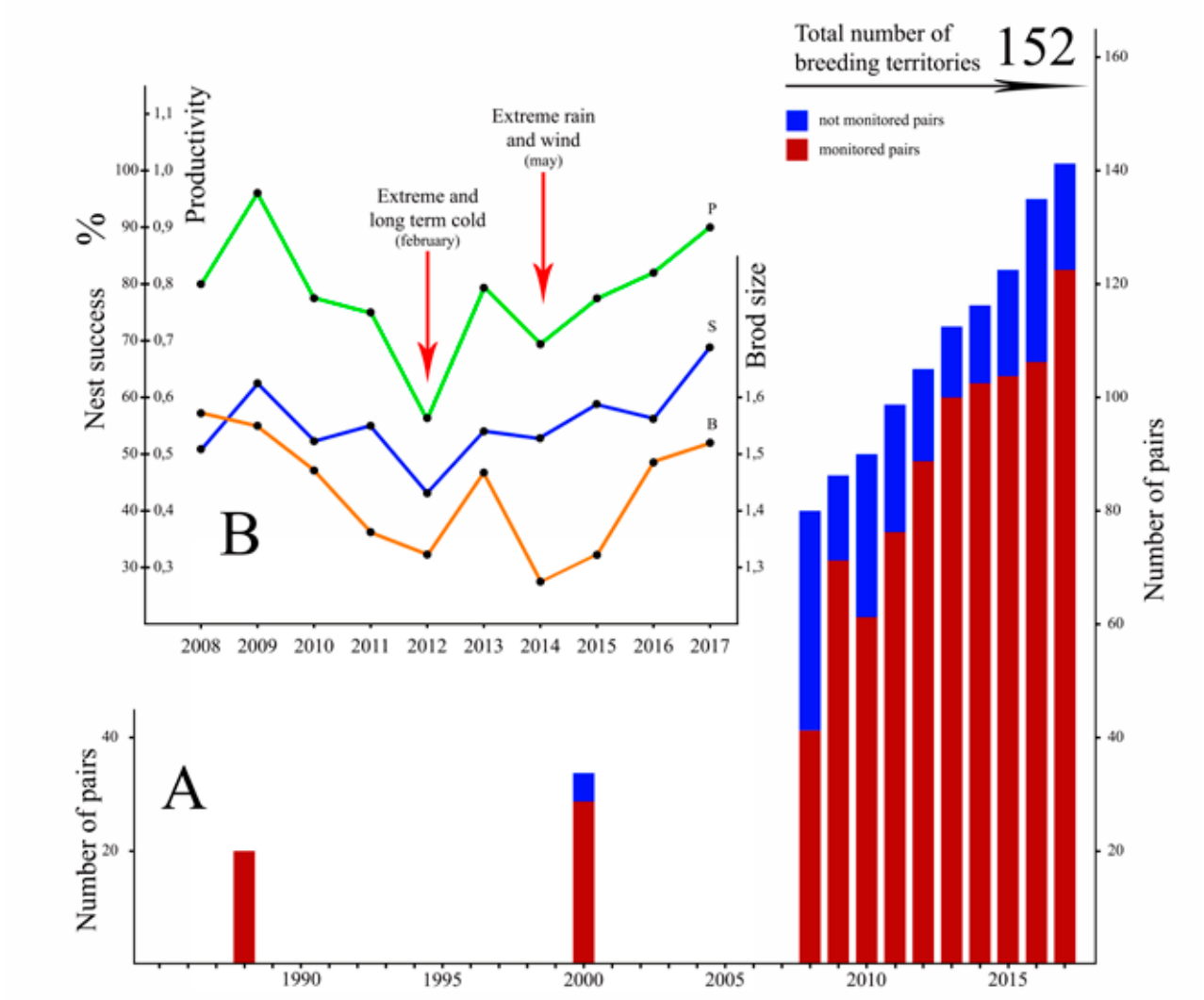

Figure 1. A Growth of breeding pairs in Serbia; B Breeding success: brood size, nests success and productivity

ADOPTION AND DEVELOPMENT OF CONSERVATION MEASURES OF WHITE-TAILED EAGLE (*HALIAEETUS ALBICILLA*) NESTING SITES IN SERBIA

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White-tailed Eagle in Serbia almost completely breeds in floodplain forests (Hám et al., 2009a, b). Its conservation is, therefore, strongly focused to the protection of nests and forest stands around nests against destruction and disturbance. However, these practical conservation activities have not been introduced at once and were not accepted instantly by forest management companies. The process of the adopting of White-tailed Eagle conservation measures in Serbia is described in this article from the perspective of applied activities, and actors who applied them in the period between 2005 and 2017. In that period several coherent and coinciding activities were undertaken by expert researcher (István Hám), organizations of nature conservation (mainly Institute for Nature Conservation of Vojvodina Province, to the lesser extent Institute for Nature Conservation of Serbia – after 2010), forest management companies (Vojvodinašume Public Enterprise and to the lesser extent Srbijašume Public Enterprise), Provincial Inspectorate for Environmental Protection of Province of Vojvodina (and to the lesser extent the State Inspectorate for Environmental Protection) and civil society organizations. Most of those activities were aimed to improve the survival of White-tailed Eagles and improve the implementation of species conservation measures, prescribed in the current Serbian Law on Nature Conservation (Official Gazette of the Republic of Serbia no. 36/2009, 88/2010, 91/2010 – corr. and 14/2016).

Table 1. Chronology of acceptance and applying of legislation, conservation guidelines and educational activities in the protection of breeding sites of White-tailed Eagle in Serbia

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Conservation according to the Law on Nature Conservation	■	■	■	■	■	■	■	■	■	■	■	■	■
Preliminary expert monitoring: limited surveys on some nests, strenghtening of the network of local contacts (land managers)	■	■	■										
Expert monitoring: monitoring projects (partially financialy supported)				■	■	■	■	■	■	■	■	■	■
Permanent education of forest managers by monitoring experts				■	■	■	■	■	■	■	■	■	■
Monitoring by forest managers (within the process of FSC forest certification)				■	■	■	■	■	■	■	■	■	■
Elaboration and adoption of „Danube Action Plan[1]“						■	■						
Implementation of „Danube Action Plan[1]“								■	■	■	■	■	■
Prescribing of legal nature conservation conditions (restrictions)[2] in the conservation and management of nesting sites								■	■	■	■	■	■
Control of the implementation of conservation measures by civil society organizations										■	■	■	■
Forest managers have fully accepted and implemented in practice the legislation, “Danube Action Plan” and education messages												■	■

[1] Gaborik & Probst (2011)

[2] According to the articles 9, 57 and 74 of Law on Nature Conservation („Official Gazette of the Republic of Serbia no. 36/2009, 88/2010, 91/2010 – corr. and 14/2016).

Slow progress in adopting the conservation measures has been the result of the traditional

lack of understanding the importance of following the legislation, but also due to the weaknesses in legislation itself prior to 2009. Important legislative instrument, legal nature conservation conditions (restrictions)[2] in the conservation and management of natural habitats has been in place even before 2009. However, in 2009 the general Law on Nature Conservation was adopted in Serbia and according to it, nature conservation conditions are described in theform of obligatory decision (Art. 9). 'Danube Action Plan' (Gaborik & Probst, 2011), whose adoption has followed, has defined conservation action as a very high priority in all the countries along the Danube as follows: 'To ensure strict obedience of the nest and habitat protection zone of 100 m radius." This was implemented in the nature conservation conditions by two Serbian nature conservation institutes in the processes of forest management planning. In this framework the legal protection of active nests and of the immediate surroundings of nesting sites was improved. The period coincided with the publication of the first ever inventory of active nests of White-tailed eagle in Serbia (Ham et al., 2009). The inventory was published in the ornithological journal *Ciconia* and contains the location of each nest with geographical data found during intensive monitoring in 2009. This approach was discussed as unconvenient, with some fears that it could threat the nests once their locations are publicised. On the contrary, the inventory has strenghtened the awareness of forest management companies (and to the lesser extent other managers) and improved the transparence of conservation measures applied. Instruction, using informal and formal meetings and sessions with all the structures of forest management companies, has to a great extent improved acceptability of conservation measures, despite also numerous refusals and protests.

These measures have had coherent and synergetic effect to the protection of the nest sites of White-tailed Eagle and its surroundings. The predominant role of particular activities or interventions of stakeholders in this process was illustrated by the establishment and maintenance of the nest protection zones of selected nests (Table 2). In order to ensure survival and further increase in population of this species in Serbia, further combination of these activities (monitoring, legislative measures and education) go on.

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Table 2. Influence of previous information/interventions to the forming of protection zones around nests of White-tailed Eagle in Serbia

Locality	Year of key intervention		Type of intervention					Procenat očuvanja prethodne vegetacije u zoni r= 100m 3,14 ha	Obeying of restrictions outside of 200 m radius around the nest
		General ban of threats to the species (Law on Nature Conservation)	Independent decision of forest management company	Instruction of species expert prior to design of nest protection zone	Prescribing of obligatory nature conservation conditions	Educational intervention of inspection	Intervention of inspection after some threats were already reported		
Adler	Pre 2008.	?	X					80 and 100	NO
Čurug	Pre 2008.	?	X					50	NO
Kazuk	2008.	X		X				50	NO
Ušće Tise	2008.	X						5	NO
Poloj	2010.	X	X					25	NO
Rljak	2010.	X	X					75	NO
Marin Prud	2010.	X		X				70	NO
Breška **Š**uma	2010.	X			X			50	NO
Krasnica	2011.	X		X				20	NO
Bakšan	2011.	X		X				30	NO
Banov Brod	2011.	X		X				50	YES
Susek	2011.	X					X	30	NO
Karakter	2012.	X		X				50	NO
Karapandža	2012.	X		X				80	NO
Crni Lug	2012.	X	X					40	NO
Ločka Ada	2012.	X	X					70	NO

Kasapnica	2012.	X		X				35	YES
Neštinska Ada	2013.	X			X			95	YES
Mužljanski Rit	2013.	X		X				90	YES
Sakule	2013.	X		X				80	YES
Kličevac	2014.	X			X		X	30	NO
Kalandoš 4	2014.	X	X					95	NO
Ivanovačka Ada	2014.	X		X		X		85	NO
Kovilovo Centar	2014.	X			X			40	YES
Belegiš S	2014.	X			X	X		5 and 95	YES
Varadin	2014.	X	X					70	YES
Sefkerin	2014.	X	X				X	20	YES
Gornjopalanačka Ada	2014.	X	X					100	YES
Deronje	2015.	X	X	X				90	YES
Hajlaš	2015.	X		X				65	YES
Ljutova	2015.	X		X				90	NO/YES
Kamarište	2015.	X	X					85	NO/YES
Titelski Breg	2015.	X			X		X	90	NO/YES
Belegiš N	2015.	X			X	X		100	NO/YES
Ušće Morave	2016.	X		X		X		100	YES
Vrbovski	2017.	X			X	X		100	YES

OUTBREAK OF HIGHLY PATHOGENIC AVIAN INFLUENZA IN FINNISH WHITE-TAILED EAGLES

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Influenza A viruses (IAV) are commonly found in wild birds, particularly in Anseriformes (ducks, geese and swans) and Charadriiformes (gulls, terns and shorebirds). Viruses can be low pathogenic causing no visible illness or highly pathogenic causing serious disease and mortality. Some avian IAV types can infect even humans and other mammals. Influenza A viruses carry two kinds of surface proteins, hemagglutinin (HA) and neuraminidase (NA), that are the basis of classification of viral subtypes. Eighteen HA subtypes and eleven NA subtypes have been recognized. Highly pathogenic avian influenza (HPAI) is usually caused by HA subtypes H5 and H7 that can occur in combination with different NA subtypes.

In the autumn and winter of 2016-2017, a highly pathogenic H5N8 virus spread rapidly in Europe causing mortality in wide variety of wild bird species, also in scavenging birds of prey. First cases were seen in Central Europe and later in November outbreaks were reported further north in Denmark, Sweden and in southwestern Finland. In Finland, HPAI was first discovered in tufted ducks (*Aythya fuligula*) in the archipelago of Åland but later the white-tailed eagle (WTE, *Haliaeetus albicilla*) turned out to be the species most frequently found infected with H5N8.

General wildlife disease surveillance in Finland is based on opportunistic sampling by the general public. Wild animals found dead can be submitted to the Finnish Food Safety Authority for disease investigations. Carcasses of WTEs were collected for necropsies in collaboration with the Finnish Museum of Natural History, WWF and local veterinary officials. WTEs were sampled for avian influenza either by swabs (cloacal and tracheal) or by organ samples. Samples were examined for IAV by real-time and traditional RT-PCR methods. Virus subtype was determined by sequencing. Routine necropsy was performed on the carcasses, and histological examination was performed when possible. Samples of liver and kidney were analyzed for lead concentration by inductively coupled plasma mass spectrometer (ICP-MS). Results are reported as wet weight.

Between November 20, 2016 and April 8, 2017, eleven WTEs positive for HPAI were found, most of these in November, December and January. All the HPAI cases in WTEs were found in relatively small area, five in Åland and six in continental southwestern Finland. Seven individuals were found dead, four were euthanized due to general weakness and inability to fly. Most cases (8/11) were immature birds. Gender could be confirmed in ten cases of which five were female and five male. Nutritional condition varied widely from good to emaciated. Pathological

findings in necropsy were mostly non-specific suggesting dehydration and/or starvation. However, histologically, certain inflammatory lesions in internal organs and brain could be found. Nonsuppurative encephalitis was the most common finding (5/8 examined) followed by myocarditis (4/8) and splenic necrosis (4/8). In two cases, no specific histological findings were observed.

Lead concentrations of liver and kidney have been analyzed in five cases, three cases are yet to be examined. In one case, the lead values were on lethal level (liver 9.9 mg/kg, kidney 8.6 mg/kg). In three cases, values were elevated on toxic or subclinical level (liver 2.4-3.5 mg/kg, kidney 1.8-2.1 mg/kg). The fifth case had lower but not negligible values (liver 0.6 mg/kg, kidney 1.3 mg/kg).

The HPAI H5N8 outbreak of 2016-2017 was the first notable outbreak of infectious disease in the Finnish white-tailed eagle population. Although WTE carcasses are collected as systematically as possible, it is reasonable to assume that a part of infected carcasses was not observed and the actual number of cases is higher than the confirmed eleven. Interestingly, other scavenging birds apparently did not suffer from the outbreak. Only one infected eagle owl (*Bubo bubo*) was found, but no other species of birds of prey nor corvids. In spite of the epidemic, the WTE population has been expanding to new areas and the observed number of fledglings was higher in 2017 than in 2016. Indeed, the confirmed HPAI cases were mostly found in juvenile, non-breeding individuals. Lead poisoning has been a common cause of death in WTEs for years. The preliminary results suggest that individuals suffering from high lead levels may somehow have been more prone to HPAI infection. In this case, the mortality associated with HPAI would not have been only additive to earlier levels. Previously, concurrent lead poisoning and HPAI H5N8 infection has been found in mute swans (*Cygnys olor*) in Sweden. However, our sample size was very small and more studies are needed about the connection between lead and HPAI.

THE CURRENT STATE OF THE NESTIING GROUP OF WHITE-TAILED EAGLE (*HALIAEETUS ALBICILLA*) AT NORTHERN BELARUS

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Belarussian Poozerie (Vitebsk region) has an area of 40.1 thousand km^2, forestation - 34%. River network density is 45 km per 100 km^2 area, the lakes occupy 2.5% of the territory.

In the period of 1985-2016 at the Belarusian Poozerie the number of White-tailed Eagles increased and at the same time the number of Golden Eagles decreased (Fig. 1).

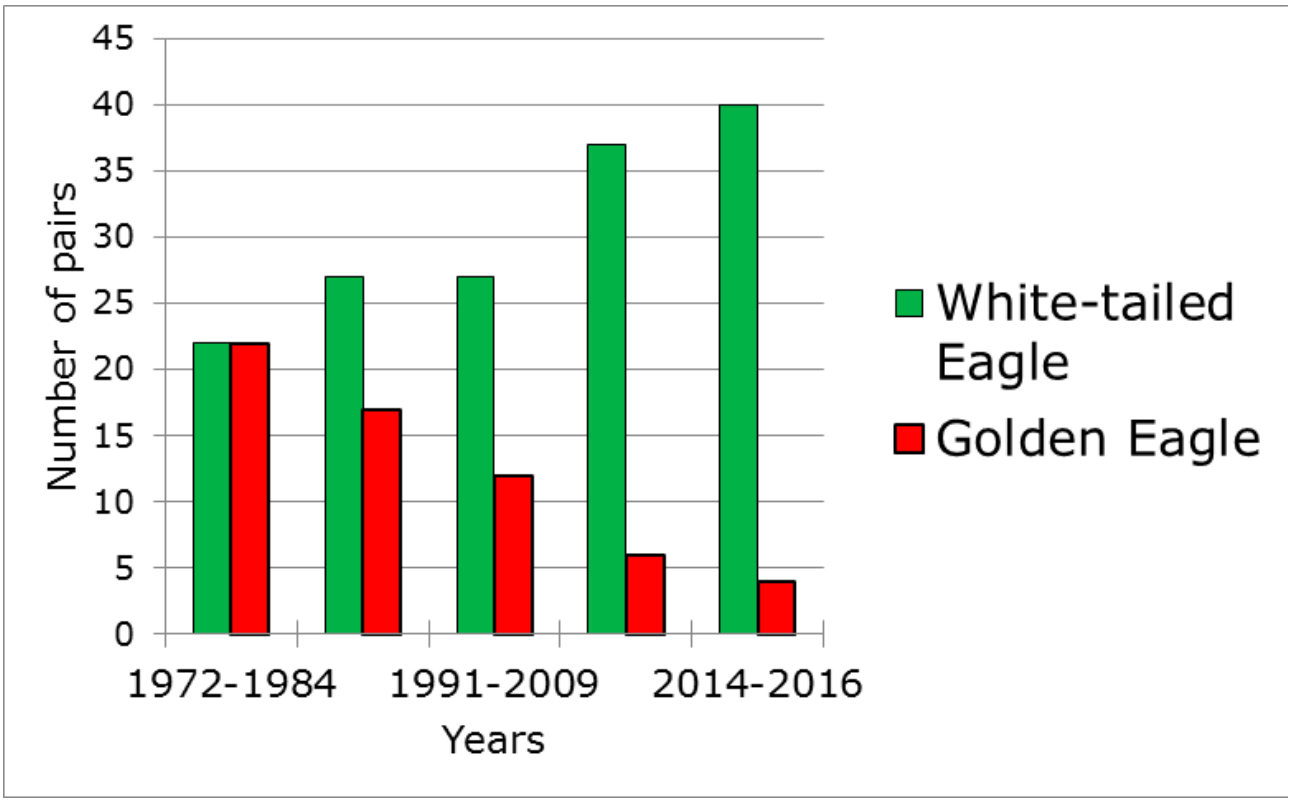

Figure 1. The annual dynamics of the number of breeding pairs of White-Tailed Eagles and Golden Eagles at the Belarusian Poozerie

The comparative analysis of certain parameters of ecological niches of these two species is given in the Table 1 (Ivanovskii 2014).

Table 1. Summary table of some parameters of ecological niches of Golden Eagle and White-Tailed Eagle

Parameters	The width of Golden Eagle niche	The width of White-tailed Eagle niche	Overlapping of niches	G-test
Nesting area	1,945	1,587	0,147	184,24 p<0.001
Nesting site	2,95	3,973	0,369	157,19 p<0.001
Nesting tree species	1,52	1,901	0,99	**7,5 p=0,19**
Architectonics of the nest	1,76	2,994	0,736	69,07 p<0,001
Food composition	1,647	2,2		206,88 p<0,001

The analysis of Table 1 shows that the differences in almost all analyzed parameters of ecological niches of Golden Eagle and White-Tailed Eagle are significant, except parameter «nesting tree species.» This is natural, since in the condition of Belarussian Poozerie only old powerful pine and aspen trees are able to withstand heavy long-term used nests. According to the results of the present analysis we make conclusion that the increase of the number of White-Tailed Eagle is not associated with reduction in the number of Golden Eagle.

The examined clutches (n=20) contained 1–2 eggs, in average 1,9 eggs per clutch. The productivity of white-tailed eagle population, calculated from 41 broods when fledged chicks were seen with parents, was 1.34 fledglings per successful breeding pair and 1.12 fledglings per pair, laid at least one egg (n=49). The success of reproduction was 83.7% (41 of 49 cases of nesting has terminated successfully).

The list of feeding objects of the White-Tailed Eagle includes more than 30 species of vertebrates (n = 335). Mammals as preys are 3.9%, birds - 41.8%, fish – 53.1%, carrion – 1.2%. The basis of nutrition is: Pike (*Esox lucius*) - 27.5%, Crested Grebe (*Podiceps cristatus*) – 10.4%, Common Pochard (*Aythya ferina*) – 7.8%. Cases of cannibalism in the nests of White-tailed Eagles have not been observed.

The minimum distance between the neighboring pairs of White-Tailed Eagles was 5 km.

The stability and further growth of the White-Tailed Eagle population in the Belarusian Poozerie will depend on the condition of the forage reserve, the safety of high coastal forest and the recent positive trends in the attitude of man to this largest breeding bird of prey in Belarus.

LEAD POISONING FROM HUNTING AMMUNITION – DANISH REGULATIONS AND EXPERIENCES

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INTRODUCTION

A worrying concern for hunting in recent times has been the ever-growing body of evidence pointing to the impacts of lead ammunition for multiple species of birds, including also non-hunted species, *inter alia* White-Tailed Eagle. Concerns about gunshot and the threats to waterbirds are long recognised, the research is well documented, and countries have enacted regulations. Many non-wetland species living in upland habitats ingest gunshot. Avian scavengers, notably eagles, buzzards, kites and vultures are poisoned when they consume meat from animals of all kinds shot with either gunshot or fragmenting rifle bullets. Impact on White-tailed Eagle is of particular concern. In general, the scope for concern has widened during the last ten years to encompass other wildlife taxons, habitats outside wetlands, as well as food safety and human health. Several studies show that phasing out lead ammunition has an immediate impact on the reduction pollution risk to wildlife (Mateo et al 2014, Vallverdú-Coll 2016).

BAN OF LEAD SHOT IN DENMARK SINCE 1996

Denmark has a long hunting tradition and a very high density of hunters. The total annual bag is approximately 2.3 million specimens. More than 90% is harvested by shooting, be that driven shoots of pheasant and mallard, walk-up shooting of upland game, decoyed waterbirds or open sea motor boating targeted at sea ducks. In Denmark, the use of lead shot was first regulated in 1986 by setting up a ban on *inter alia* the use of lead shot for hunting in 26 wetlands designated as Ramsar-sites. A total ban on the use of lead shot was enforced in 1993 in all areas outside forests and with a subsequent enforcement of a lead shot ban in forests in 1996. Since then all use, trade and possession of lead shot has been banned throughout the country. However, Denmark has not yet introduced regulation of the use of lead rifle ammunition. Concerns for an eventual impact on scavengers and human consumers is so far only articulated by a few single persons, scientists and private districts and not by authorities, as it is seen in other countries, e.g. Germany and California.

MORE HUNTERS THAN EVER

The phase-out of lead shot in Denmark during the 1990s raised a number of practical and social barriers. One was the availability of alternative shot types, and the efficacy of alternative shot types, safety to hunters, and the risk of damage to guns and machinery in the forestry industry, were raised as potential obstructions to the implementation of the regulation. However, all issues were discussed and managed. The hunters' community made their own investigations of the lethality of non-lead shot. Guidelines were drawn up to ensure safe hunting practice and to guide hunters to the appropriate combination of gun, cartridge and shot. Since the mid-1990s non-lead shot has been available and can be obtained for any hunting purpose in any habitat and with any type of shotgun. Efficacy of non-lead types is proven to be comparable or even higher than lead shot. During the phase-out period many Danish hunters feared that the process would cause a decline in numbers of hunters and weaken the socio-political power of the hunters' community. However, today, 30 years after the first regulation of lead shot and almost 20 years after the total ban, the number of hunters in Denmark is the highest (177,000) since the registration of hunters was introduced in the 1930s.

NO DECLINE IN HARVEST RATES CAUSED BY REGULATION

The annual bag of quarry species has over the last decades shown a high degree of fluctuation but a general trend of decline. However, there seems to be no connection between this decline and the regulation of lead shot since the 1980s and 1990s. The decline is caused by other regulations of hunting, e.g. the protection of species, combined with a general population decline in central quarry species. The Danish example of a total ban on lead shot for hunting has demonstrated that a switch to non-lead gunshot is possible: the challenges can be overcome (Kanstrup 2015). Change can be achieved without jeopardising the hunters' interests and weakening the hunters' community. On the contrary, it is believed, though never investigated, that the public image value of hunting not being connected to a pollutant such as lead is of paramount importance for the perception and long-term political sustainability of hunting.

NO SYSTEMATIC CHECK OF COMPLIANCE

The compliance with Danish lead shot regulations has never been studied systematically. However, it is a collective understanding that the obedience was far from absolute from the beginning. The primary data on compliance stems from police control reports. However, this dataset has not been compiled and published systematically and most information originates from output in the public media based on access to single police reports. According to this information, there are several cases of no-compliance in the period 2000 to 2010. However, the general picture is that hunters, today, in general respect the regulations. Kanstrup (2012) found that of 77 pheasant gizzards with shot-in shot 12 (15.6%) had lead shot. The equivalent frequency for 94 mallard gizzards was 9.6% (Kanstrup 2012).

At present, a research program is taking place to improve evidence to what degree the regulations are respected. The methodology is based, *inter alia,* on analysis of gunshot in harvested game, and in sediment in hot-spot hunting sites. Furthermore, we have analyzed types of dispersed plastic litter from hunting in coastal areas. This revealed that app. 90 % of dispersed plastic wads originated from steel shot cartridges, and 10 % from lead shot. However,

we were not able to conclude the same ratio in a sample of shot shells, firstly, due to difficulties with precise identification, but also because shot shells in a marine environment, obviously, follow other paths of transport than wads.

NON-LEAD RIFLE AMMUNITION WORKS

Although lead rifle ammunition has not yet been regulated in Denmark, the potential transition to use non-lead types for hunting raises several concerns, *inter alia* the question of efficacy. We examined whether non-lead rifle ammunition fulfills the demands of ethical and humane hunting by causing a rapid kill of hunted animals equivalent to lead rifle ammunition. A field sample of 657 hoofed animals, mostly red deer (*Cervus elaphus*) and roe deer (*Capreolus capreolus*), were hunted under normal Danish conditions by sport hunters using commonly used rifle calibers. The efficiency of copper versus lead bullets was tested using flight distance after being hit as the primary response parameter. For red deer, we were not able to show any statistically significant difference between performance of non-lead and lead bullet. For roe deer, we found a small statistically significant relation between flight distances and shooting distance for roe deer struck with non-lead bullets but not with lead bullets. However, this difference was not of such magnitude as to have any practical significance under hunting conditions. We conclude that in terms of lethality and animal welfare, non-lead ammunition within the tested range of bullet calibers can be recommended as an effective alternative to lead-core bullets (Kanstrup 2016).

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WHITE-TAILED EAGLE *HALIAEETUS ALBICILLA* IN SOUTHERN SIBERIA

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Vast territories of Southern Siberia remain undeveloped until now which makes them very interesting and important for observing species population dynamics, especially in comparison with the populations of the same species in Europe. White-tailed Eagle is one of those species.

The biggest breeding populations of White-tailed Eagle are concentrated in Western Siberia. However, due to insufficient fieldwork, we lack a reliable estimate of the population figures. Only a small part of the habitat has been studied, mainly in Federal Nature Protected Areas. According to our estimate the basin of the river Ob could accommodate up to several thousand pairs of White-tailed Eagles only.

The species is well-studied in the Altai Region of Russia where population number is low since the region lies close to the southern boundaries of the species' range. In 2005 the breeding population was 124-137 pairs (Karyakin et al., 2005), in ten years this number has duplicated and is now 230-260 pairs. The most intensive population growth has been observed in the swampy areas of a strip-shape forest on the left bank of the Ob where the number of breeding sites has grown from 20 to 48 in ten years and population has increased from 60-70 to 120-140 breeding pairs (Karyakin, Nikolenko, 2015). This growth has occurred on the background of the Golden Eagle (*Aquila chrysaetos*) population collapse in the same area.

The distribution of the species has developed analogically in the Novosibirsk Region on territories adjoining the Altai Region. In the recent years White-tailed Eagle number has increased in wood-covered banks of the river Ob and it has began to breed within the city limits (Andreenkov et al., 2009). However, methodical studies from this region are absent. Population number from Novosibirsk region (excluding Vasjuganska plains) is 250-350 breeding pairs.

Unfortunately, the positive trend in White-tailed Eagle population in Southern Siberia is limited to the basin of the Ob. Further east this species has become rare, population decreasing, at some sites is even extinct.

In Altai Republic White-tailed Eagle was always rare on breeding, but common on seasonal migrations (Sushkin, 1938). For many years Altai Nature Reserve remained the only proved breeding area, and three more sites have provided regular observations of the species. No positive trends in population number were noticed during the last 17 years, while number of migrating individuals significantly decreased.

In the Kemerovo region in 1990s few pairs bred in the basin of the river Kiya, but nowadays this breeding area is empty (Gagina, Skalon, 2012).

In Khakasia and adjacent territory of the Krasnoyarsk Region White-tailed Eagle was common in the past (Sushkin. 1938), but from 1980s onwards it has become rare – only few breeding cases were documented on the lakes of Minusinsk Hollow (Prokofyev, 1987), and no breeding cases have been observed after 2000. During the last five years White-tailed Eagles have been still encountered in summer on water reservoirs of the Krasnoyarsk region, but no nests have been found.

In the Tuva Republic the species was not rare in the basin of the river Tes-Khem (north of Ubsunur Hollow) and in Tuva Depression (Sushkin, 1938). Until 2002 several breeding pairs of White-tailed Eagle were observed at Tes-Khem, on the lakes in Tuva Depression, and on the river Enisey and a sizable population was breeding on the lakes of East-Tuvinian highlands. After large-scale disinfestation campaign in Mongolia in 2002 (Karyakin, 2010) breeding White-tailed Eagles disappeared from all Tuvan territories and adjacent regions of Mongolia for 10 years, remaining on the East-Tuvinian highlands only. Population of East-Tuvinian highlands is stable and consists of 30-35 breeding pairs (Kartashov, 2002). In 2010 White-tailed Eagles reappeared in Mongolian part of the river Tes-Khem (Tejsin-Gol) (Karyakin et al., 2011), and in 2016 in the Ubsunur Hollow Biosphere Reserve, Russia. Both facts indicate the slow population recovery in Ubsunur Hollow.

In the Irkutsk region main breeding groups of White-tailed Eagles are concentrated in the valley of the river Nizhnaya Tungusska and in the Kazachinsko-Leninskiy district. On the shores of the lake Baikal species was common in the 1950s (Gusev, 1965), but in the 1970s this population tended to decline (Gusev, 1976). Until the 1980s a population remained on the Olkhon island of the lake Baikal but after 1980s birds abandoned it (Ryabtsev, 1977). Today only one pair is supposed to be breeding there (Ryabtsev, 2007). Total population of White-tailed Eagle in the Irkutsk region was 50-100 breeding pairs in 1990s (Ryabtsev, Sonin, 1993), and is 50-75 pairs today (Popov, 2013).

In Buryatia the species is sparsely distributed along big rivers and lakes and do not form huge breeding groups. For instance, from six to eight pairs breed in the valley and mouth of the river Verkhnaya Angara, 3 - 5 pairs breed in the Chiviirkuyskiy bay of Baikal and on the Svyatoy Nos peninsula, 3-5 pairs in Barguzinskaya valley, 2-3 pairs in the delta of the river Selenga. Other known breeding sites are located in Myjskaya valley on the northeastern shore of the lake Baikal, in Vitimskoye highlands, in Eastern Sayan, in Gusinoozyorskaya and Borgoyskaya Hollows (Ananin, 2013). Bauntovskaya Hollow in 1980s housed 25-30 breeding pairs of White-tailed Eagle (Popov, 1987), but the present population number there is unknown. Total verified population of the species in Buryatia today is 20-30 pairs (Ananin, 2013), but we consider it slightly underestimated.

Thus, the present breeding population of White-tailed Eagles is 580-610 pairs in the basin of the river Ob (265 000 km^2, Altai and Novosibirsk regions) and 120-170 pairs in the rest of Southern Siberia (1 400 000 km^2).

In the most part of the Southern Siberia the diet of White-tailed Eagles is mainly waterfowl and partly water mammals (beaver, muskrat) and marmot, instead of fish diet like in the European populations (e.g., the valley of the Volga). The specificity of the diet determines the breeding calendar, which is later in Southern Siberia than in the Volga basin and Eastern Ural that

are located on the same latitude. In Southern Siberia, breeding season starts in March-April, nestlings fledge at the end of June - middle of July, and till August (sometimes even September) young birds keep near to their nests.

Wintering sites of White-tailed Eagles from Southern Siberia are unknown. It has been supposed that young birds from the basin of the river Ob migrate to Kazakhstan, and that birds from the rest of the territory migrate to China. In China eagles encounter a high pressure of negative anthropogenic factors that lead to their death, while in Kazakhstan negative pressure is much lower. This theory explains the differences in number and density of populations of the basin of the Ob compared to other regions of Southern Siberia.

WHITE-TAILED EAGLE AT THE AREA OF KRASNY BOR HUNTING ECONOMY (BELARUS)

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White-tailed eagle in Belarus is a rare predator listed in the Red Data Book of Belarus. In the recent years there has been an increase in the number of eagles in Belarus[1]. Throughout 2016 and 2017 we have paid special attention to this predator on the territory of Krasny Bor hunting economy (128 thousand hectares), located at the north of Belarus (Rossony and Verhnedvinsk districts of Vitebsk region). On the same territory two landscape reserves "Krasny Bor" and "Osveisky" are based, which also have the status of Important Bird Area (IBA).

Since 2009 artificial populations of the Red Deer, European Deer and Bison have been created by hunting, supported up to this time by feeding in winter and creating fodder fields. Ungulate animals live freely and are also kept in a hunting enclosure. The employees of the Scientific and practical center on game and wildlife management, as well as the huntsmen, repeatedly saw white-tailed and golden eagles on dead animals in winter. In addition, birds regularly visit the cattle cemetery, where the skins and entrails of mined animals are brought. Also in this area since 2006, regular feeding of eagles in winter is organized by "Zamka Leshego" farmstead in order to attract wildlife photographers. Thus, in the north of Belarus conditions have now been created in which the eagles easily endure the winter.

Many lakes (including the relatively large Osveyskoye (52.8 km^2) and Lisno (15.7 km^2) and the presence of rivers with natural floodplain (Nishcha, Svolna, etc.) allow eagles to get enough food in spring-summer period .

In this territory in 2016 we checked seven nesting sites of eagles, four of which were occupied (in three nests were nestlings, one was unsuccessful) [2].

In 2017 we conducted visual observations on the lakes and also checked seven nesting sites and three artificial platforms built in 2016. In three nests three chicks were hatched, under one nest and two artificial platforms the molting feathers of eagles were found, but there was no nesting.

Quite a few immature (subadult) birds are found on the territory: on January 2 one bird was seen on the feeding place near Sosnovy Bor village (Rossony distr.); eight birds were observed on Lisno lake on April 13; five birds on April 14 on Buzyanka lake, on the same day probably the same birds were observed gathering on an overnight stay on old fir trees near Izubrica lake; on June 7 three birds on Beloe-Kotlyarovo lake; on June 12 one bird on a high bog near Osveyskoe lake.

In 2017 we continue the color ringing of eagle chicks. For two years, five chicks were marked (two in 2016 and three in 2017). The color scheme for Belarus is registered as follows: a black ring on the left leg and blue-orange ring on the right leg.

In accordance with the normative acts of the Republic of Belarus, habitats of species listed in the national Red Book must be protected by the land user. For White-tailed eagles the zone of complete tranquility is within the radius of 200 m from the nest (where any economic activity is forbidden), and a buffer zone with the radius of 500 metres from the nest is the zone with certain restrictions of economic activity. In practice, everything looks a little different. Over the past two years, we have seen how forestries of Verhnedvinsk and Rossony were the culprits of the unsuccessful nesting of eagles. So, during the elimination of the consequences of winds in March-April 2017, the exported trees were stored in close proximity (30 m) from the eagle's nest occupied in 2016. Birds did not start nesting. In the second case, the felling was planned no more than 50 m from the nest. Since the work was not started, we managed to "defend" the nesting biotope for a while.

We assume that no less than eight pairs and about twenty subadult white-tailed eagles can live on the territory leased by the hunt farm.

Thus, in the given territory at the moment we have fixed only one factor affecting the success of the reproduction of eagles, ie., anthropogenic. Anxiety in nesting time and disturbance of nesting biotopes lead to the fact that birds leave the territory or do not start breeding. Apparently, the eagles do not experience the lack of fodder resources on the territory of the "Krasny Bor" hunting farm.

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TEMPORARY NESTS BUILT BY THE TAGGED NEWLY TERRITORIAL ADULT WHITE-TAILED EAGLE

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With a view to gather information on the movements of adult White tailed Eagles *Haliaeetus albicilla* during the breeding season, first attempts to catch the adult birds were started in Latvia in 2012. Various methods of trapping were used without success until first two birds were caught in early 2013 by the use of remotely controlled net gun at bait sites.

Both of the trapped birds were young adults (in their sixth calendar year) of known origin. Male (A531) was ringed as a fledgling in the nest on 03.06.2008 in central Latvia (roughly 33 km from trapping site) while female (A540) was ringed as a fledgling in the nest on 16.06.2008 in western Latvia, roughly 42 km from trapping site. Both birds were equipped with 50g BUBO SOLAR GPS-GSM loggers produced by Ecotone Telemetry.

Information about movements of female was available only until June the same year when transmitter went silent due to the technical problems. Another transmitter, mounted on male, was still working in late 2017. Until September 2017 it provided 6378 GPS fixes. During the winters (when amount of sunlight was not sufficient to load the batteries) there were periods when no signals were received at all.

In first two years the bird has not shown the signs of territoriality – movements covered large but rather compact area on Latvian – Lithuanian border with exception of several more distant trips (N Kurzeme in May 2013, Kaliningrad region (Russia) and NE Poland in January 2014). First signs of possible occupied breeding territory were recorded on March – April 2015 (bird was in its 8th calendar year); in the area of largest concentration of GPS fixes (Area No 1) freshly built nest was found on the top of broken spruce tree. However, already in May bird started to frequent another territory ca 4 km from the first one. With exception of period in July (when both sites were visited occasionally), it continued to visit it throughout the second half of the summer and in the autumn. On 13th of September another freshly built (but not completed and rather unstable) nest was found there (Area No 2) on a branch in aspen tree. Area No 2 was visited till February 2016, after that, bird resettled to Area No 1 where first breeding attempt was recorded in a spruce nest. It was not successful, first fledgling left this nest one year later, in 2017.

The way A531 established a breeding territory is interesting from several perspectives. The surroundings of future breeding area were visited for the first time only in the previous autumn, when first GPS fixes were recorded there. In this particular case initial familiarization with territory took 4-5 months. First breeding attempt took place when bird was in its 9th calendar year.

In the newly established territory two nests were built before the actual breeding was started. Probable explanation for that could be in combination of two factors: 1) bird was not yet experienced as a breeder and 2) it was still getting acquainted with the new, recently occupied territory.

HISTORY OF FORMATION AND MODERN STATE OF INLAND POPULATION OF WHITE-TAILED EAGLE ON LARGE WATERBODIES OF RUSSIAN NORTH-WEST

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Land-based field and aerial surveys of the coastal areas of large bodies of water have been carried out in the vast geographical space limited by the Volga with cities of Rybinsk and Yaroslavl in the south and lakes Onega, Vodlozero and Vygozero in the north. This territory is situated in the southern, middle and partially northern (Vygozero) taiga subzones, covered with a dense river network and a large number of lakes, the biggest ones being Onega, Vygozero, Beloye, Vozhe, Lacha, Vodlozero, Kenozero, Lekshmozero etc. In addition there are two artificial water reservoirs (Sheksna and Rybinsk) on the Volga-Baltic water system. Large massifs of forests and mires cover vast areas of described territory; human population density here is lower than 2-3 people per square kilometer.

The distribution of white-tailed eagles' nesting is uneven, with largest densities observed on the coasts of large lakes and reservoirs. The biggest nesting group (55-60 pairs) inhabits the Rybinsk reservoir banks and over a half of these (35-38 pairs, up to 6 pairs/100 km^2) annually nest in the Darwin biosphere nature reserve and its protected zone. Here, nesting figures of white-tailed eagle has constantly increased right from the start of nature reserve operation (from 1945). In late 1980's it has reached such a level that young birds started intensively dispersing from this high density breeding ground, colonizing suitable habitats similar to those formed in the nature reserve. At the same time, similar processes of abundance increase (by 3-4 times on average) have occurred on almost all large waterbodies of the studied region (Fig. 1).

Presently the described region has a single population of white-tailed eagle. Main feature of this population is the tendency of forming dense settlements on the coasts of large inland waterbodies of the forest zone. Its summary nesting figure is 140-150 pairs. Here is our estimate of nesting density on the large waterbodies of Russian North-West: Rybinsk reservoir (Darwin nature reserve) 55-60 pairs (5 pairs/100 km^2), Lake Vodlozero (Vodlozero national park) 25 pairs (2 pairs/100 km^2), Sheksna water reservoir 12-15 pairs (4 pairs/100 km^2), Lake Beloye11 pairs (4 pairs/100 km^2), Lake Vozhe11-13 pairs (2,2 pairs /100 km^2), Lake Vygozero10 pairs (3,3 pairs /100 km^2), south coast of Lake Onega 9 pairs (0,8 pairs /100 km^2), Lake Lacha6 pairs (1,2 pairs /100 km^2).

Uniformity of eagles' nests distribution with even distances between them (0.9 to 5 km) on the coasts of the Rybinsk and Sheksna reservoirs as well as in the Vodlozero and Vozhe lakes region evidences for birds' settlement density being close to maximal in these conditions. Natural capacity of these habitats is close to saturation and the possibility of eagles' population growth due to increase in the number of nesting sites on these waterbodies is low.

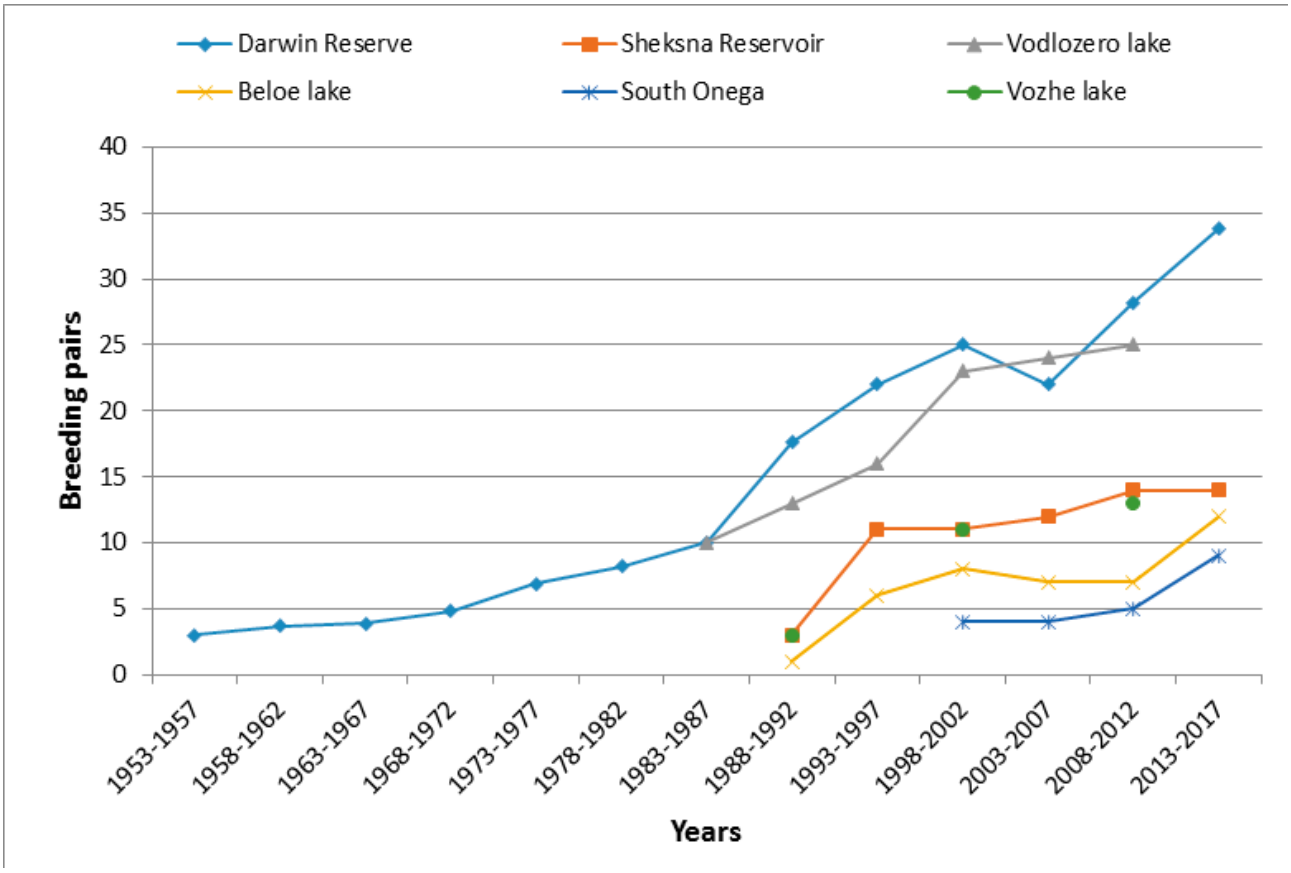

Figure 1. Dynamics of white-tailed eagle abundance (averaged data over five years) on large waterbodies of Russian North-West (1953-2017)

LOGGING THE LIFE OF SEA EAGLES DETAILED DESCRIPTION OF WHITE-TAILED EAGLE (*HALIAEETUS ALBICILLA*) BREEDING BEHAVIOUR BASED ON LIVE WEB CAMERAS IN ESTONIA

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SUMMARY OF PRESENTATION

Three white-tailed eagle *Haliaeetus albicilla* nests in two territories have been followed with live broadcasting web cameras during the breeding seasons from 2009 to 2014 and from 2016 to 2017 (one nest per season) by the Eagle Club. All the recordings (video and still pictures with one minute interval) have been made publicly accessible through EENet servers.

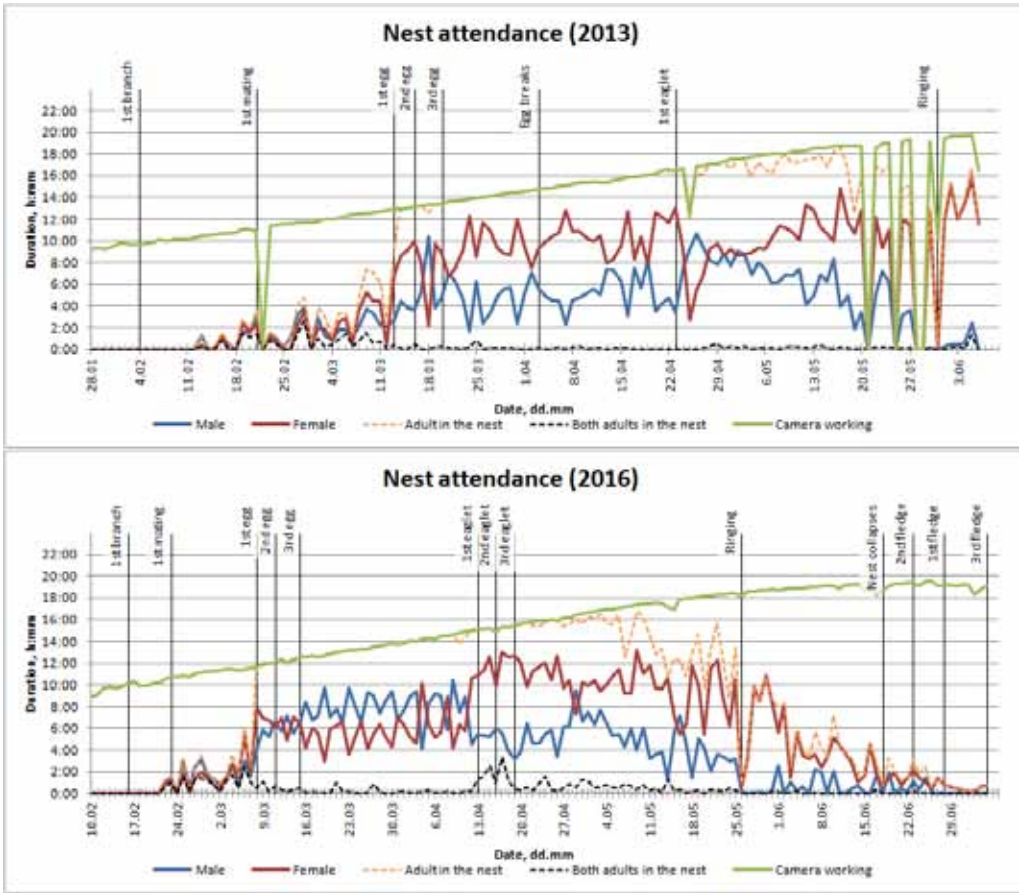

Figure 1. Nest attendance dynamics

The recordings of daylight hours from breeding seasons 2013 (28/01 – 06/06/2013) and 2016 (10/02 – 04/07/2016) have been analysed and a detailed description of nest attendance by the parents (*Figure 1*), food item and nest material deliveries to the nest (*Figure 2*), feeding behaviour e.g. were made. The breeding season was divided into four stages: before egg laying, incubating, early nestling stage (before the age of ringing) and after the ringing of the chicks.

It was found that the female and the male shared incubation duty during daylight hours, while on the average changing places after every 2 h 55 min (2013) and 1 h 15 min (2016). The female incubated 64.8 per cent (2013) and 43.5 per cent (2016) of daylight hours, but considering that there was only one case when the male remained on the nest in the evening and was first in the following morning the female probably incubated during nights, meaning that all in all she incubated 78.5 per cent (2013) and 68.6 per cent (2016) of the time. Ratio of female-male incubation duty was constant through the whole incubation period.

During the nestling stage the amount of time parents spent on the nest started to decline steadily when the eldest chick was around 14 days old. It was noted that the male's attendance to the nest declined more rapidly, being less than 15 per cent of daylight hours (female's attendance over 45 per cent of daylight hours at the same time) when the chicks were 38-43 days old (the age of ringing). Opposite to nest attendance the time spent feeding the chicks first increased rapidly (days 1-10), being the longest when chicks were 20-25 days old (1h 15 min per nestling per day), and then remained relatively constant at around 45 min per nestling per day until the chicks were 60 days old, beginning to decline afterwards (data from 2016 only). Number of nestlings and time spent feeding are related, as in 2016 (3 chicks) parents spent only 3.3 per cent less time per nestling feeding than in 2013 (1 chick). In 2016 the female did 77.2 per cent of the feeding before the ringing (36.7 per cent in 2013) and 91.6 per cent after the ringing of the chicks.

		2013					2016				
		Female		Male		Total	Female		Male		Total
Food item	*Before egg laying*	0	0,0%	5	100,0%	5	1	16,7%	5	83,3%	6
	Incubating	1	3,4%	28	96,6%	29	3	8,6%	32	91,4%	35
	Early nestling	1	0,9%	107	99,1%	108	83	34,3%	159	65,7%	242
	After ringing	10	38,5%	16	61,5%	26	221	83,1%	45	16,9%	266
	Total	12	7,1%	156	92,9%	168	308	56,1%	241	43,9%	549
Nest material	*Before egg laying*	26	29,2%	63	70,8%	89	12	14,8%	69	85,2%	81
	Incubating	22	34,4%	42	65,6%	64	33	33,0%	67	67,0%	100
	Early nestling	27	67,5%	13	32,5%	40	94	61,8%	58	38,2%	152
	After ringing	7	100,0%	0	0,0%	7	25	75,8%	8	24,2%	33
	Total	82	41,0%	118	59,0%	200	164	44,8%	202	55,2%	366
Total number of nest visits		394	47,1%	443	52,9%	837	712	51,1%	681	48,9%	1393

Figure 2. Number of food item and nest material deliveries to the nest

In total 837 visits to the nest in the season of 2013 and 1393 in 2016 were registered. 20.1 per cent of visits in 2013 and 39.4 per cent in 2016 were food deliveries. On the average 0-1 food items per day were delivered during incubation period, 4-7 food items per day (2-4 food items per day in 2013) during early nestling stage and 4-8 food items per day after ringing of the chicks. Over 90 per cent of food items during incubation and most of the food items (99.1 per cent in 2013 and 65.7 per cent in 2016) during early nestling stage were delivered by the

male. Female's contribution to delivering food items increased significantly after ringing, up to 83.1 per cent in 2016. Most of the food items were fish (91.1 per cent in 2013 and 98.5 per cent in 2016).

All in all, the analyses of web camera recordings show that the nest duties are divided between the white-tailed eagle pair, so that the female takes more responsibility in the later stages of breeding season being the main supporter of the young close to the fledging.

RAISING PUBLIC AWARENESS OF WHITE-TAILED SEA EAGLES IN SCOTLAND

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Scotland's sea eagle population has steadily grown over the past 40 years since the first importation of Norwegian chicks between 1975 and 1985 set off the main re-introduction project on the Isle of Rum. Supplementary releases in Wester Ross (1993-1998) and latterly in the third reintroduction phase (2007-2012) in east Scotland, have substantially boosted the population and hopefully ensured its sustainability into the future. As the population has thrived and re-occupied long lost haunts, the number of occupied breeding territories has climbed to around 120, with annual productivity in excess of 60 eaglets.

While this has been heralded as a tremendous success story by conservationists and enthusiasts, their arrival has not always been met with universal acceptance. With less than 50 years passing between their extinction in 1918 and the first small scale unsuccessful attempts to reintroduce the species to Scotland in 1959 and 1968, some of the attitudes, myths and perceptions that led to them being persecuted and hunted to extinction have not been fully laid to rest. Despite their scarcity and apparent inconspicuousness for at least the first 25 years after re-introduction began, they were blamed for extensive livestock predation and were widely regarded within some parts of the agricultural sector as a major threat to livestock and farming livelihoods. Although it is accepted that some individuals do, under certain circumstances, kill lambs, in the vast majority of cases the losses can be attributed to other causes. A great deal of effort has gone into addressing these issues and this will be dealt with in other presentations.

On reflection, perhaps it is partly because conservationists themselves were learning about the new eagle population as it slowly and steadily re-gained its foothold in remote western island locations, that efforts to educate other sectors within those communities and share experiences of these magnificent birds with the wider public, were limited or lacking for many years.

Measures to re-dress the balance were not widely implemented until the third phase of the re-introduction was underway. A combination of media coverage, education resources for schools, events and interpretation resources for exhibitions and community use, along with programmes for volunteer training and involvement in monitoring of breeding pairs, greatly enhanced the awareness, understanding and involvement from a wide range of ages and backgrounds.

The vast majority of the British public view sea eagles as a positive and welcome part of the UK's native wildlife and there have been increasing demands for people to see them in the wild. While the population was small the opportunities for live viewing were limited as the vulnerable nests were widely scattered and mostly occurring along remote sea cliffs and islands.

On the Isle of Skye this situation was addressed by providing live CCTV footage linked to a visitor centre for many years (MacLennan & Evans 2003) but on the Isle of Mull, fortunately, the eagles opted for more accessible situations, providing new and exciting opportunities for direct public observation.

Mull Eagle Watch began in 2000 and is a combined species protection and public viewing project with a number of NGO and statutory Government agencies in the partnership. It protects eagles from disturbance and offers its 'unique selling point' of direct viewing to active nests for the public. Over 3000 people visit between April and September and income earned from trips to the two 'Eagle Hides' supports a varied range of local community projects on both Mull and Iona. Both hides are now on forest land owned and managed by the island communities themselves. Mull Eagle Watch also strives to raise awareness of sea eagles through broadcast and print media and has been successful in achieving this especially with popular TV nature programmes such as the BBC's Springwatch, Autumnwatch and Winterwatch series which first featured the sea eagles in a live outside broadcast from a nest in 2005. They have been regularly featured ever since with audiences often in excess of 3 million viewers. The eagles also appear on a range of other flagship UK TV wildlife shows and in national newspapers and magazines. Mull Eagle Watch is accredited as a '5 star' visitor attraction and recently won two major tourism awards in Scotland which further helped to raise awareness of sea eagles with new audiences. Up to £5 million a year comes to the Mull economy as a direct result of people choosing to visit the island to see the sea eagles (*Wildlife at Work* RSPB 2011).

A dramatic increase in the sea eagle population on the Isle of Skye over the past 10 years has brought the birds into closer contact with settlements, human activities and community members. With so many new territories occupied, it brought new opportunities for watching the birds in the wild and understanding how they were fitting into a working landscape so very different from that which their long lost ancestors had been banished from.

RSPB Scotland opted for a view location in one stunning location, where the conjunction of a unique combination of topography, seasonal migration and tidal movements each summer, brings together a host of species and opportunity in a very dynamic and exciting natural spectacle. Overlooking the "Narrows", the thin strip of sea water separating the Isle of Skye from the mainland, the viewing hide is run as a partnership with the landowners, Forestry Commission Scotland and provides a panoramic, grandstand view of the activity in the racing tidal waters below. One territorial pair of sea eagles joins the seals, otters, dolphins, porpoise and many more attuned to the seasonal bounty in the Narrows, as they strive to feed their fast growing chicks. The feeding frenzy on a running tide is a sight to behold – a fast moving, unpredictable and at times aggressive interaction between species and the environment as each strives to capture fish racing through the churning waters. It's an entirely natural experience that excites and inspires the audience, while at the same time demonstrating many of the harsh realities and struggles of survival in a truly wild situation.

Both Skye and Mull have now been rightly re-occupied by sea eagles nearly 100 years since their extinction. There are few places where the true nature of sea eagles can be appreciated in such raw, natural and inspirational beauty.

2016

Mull Eagle Watch

Join us on a guided visit to discover Mull's majestic white-tailed eagles

Guided visits run from April to September and last for 2 hours.

What can I hope to see?

April: Adults sat on eggs
May – July: Chicks in the nest
August onwards: Chicks fledged but in the area

Booking & further information

Booking is essential, call us on **01680 812556**. More information will be given at the time of booking, or look out for the Mull Eagle Watch flyer.

How much does it cost?

Adults, including RSPB members, £8. Under 16s, £4. Family of 4 ticket, £20. Trips are free to permanent Mull residents. Income from the guided tours benefits local good causes.

This year, Mull Eagle Watch is being hosted by North West Mull Community Woodlands and South West Mull and Iona Development Tiroran Community Forest.

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@mulleaglewatch

Read our blog at mulleaglewatch.com

Designed by Design & Interpretive Services, Forestry Commission Scotland - D&IS/100/JTCP/March 2016.

Forestry Commission Scotland
Coimisean na Coilltearachd Alba

MULL & IONA COMMUNITY TRUST

rspb giving nature a home

Scottish Natural Heritage
Dualchas Nàdair na h-Alba
All of nature for all of Scotland
Nàdar air fad airson Alba air fad

POLICE SCOTLAND
Keeping people safe


THE ONE SHOW
TUESDAY 6TH SEPTEMBER
7PM ON BBC1
To celebrate 10 years of The One Show, Mike Dilger returns to the Isle of Mull to see how the project to reintroduce the White Tailed Eagle, back to British skies, is getting on.
tigress
PRODUCTIONS
the one show

FORUM IMPACT ON POPULAR EDUCATION IN NATURE CONSERVATION

Can Social Media like Internet Forums, Facebook and the like help to gain an educational benefit, propagate citizen science and also help specialists with their work?

Irene Mannadiar, Beate Wasner

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Looduskalender forum developed out of discussions of the Estonian Black Stork webcam at Hancock Wildlife Channel Forum in autumn 2008. Since then the forum provides its members an English language platform to write about their observations, share photos and videos, ask questions, exchange opinions and at the same time they supply Kotkaklubi (Eagle Club) with information about the species observed through a number of different wildlife cameras. It is also working, together with other social media platforms like Facebook or YouTube Chat, as multiplicator in self-education and citizen science.

At present about 3470 registered members from 65 countries write an average of 165 post every day on 600 topics. We asked six long-time forum members about their motivation to watch the cameras and register at the forum, about the time spent watching and writing and what they take from the forum into their daily lives.

From the answers we received and our long-time work at forum administration we can conclude that forum members benefit in general from watching the wildlife webcams and participating actively and passively in the forum. They spend a number of hours on a daily basis watching and documenting nest life, even watching the cams at work. Forum members teach each other about the observed nest life, share experiences with family members, friends and colleagues. International friendships have developed and some people have taken the opportunity to travel to Estonia. If the initiators need specific data, the forum people will try to help providing them, for example food items brought to a nest or right now efforts to finance data loggers for Black Stork chicks next year.

A White-tailed eagle database grew as an idea of a forum member and sparked the compilation of a second one about Spotted Eagles.

We also asked the initiators of the webcams about their forum use and found out that while they try to watch the cameras themselves as much as possible, this is during times of field work not always possible. For them it is possible to look for phenological data, incidents of disturbance or other important observations later, as everything is documented with photos and videos.

LONG-TERM DYNAMICS OF BREEDING ACTIVITY AND PRODUCTIVITY OF THE STELLER'S SEA EAGLE POPULATION AND THE INFLUENCE OF SOME FACTORS ON THEIR VARIABILITY

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In 2004–2014, we conducted monitoring of the Steller's Sea Eagle population in Sakhalin Island (Far East of Russia) with the purposes to estimate its reproduction rates, to identify the key factors affecting the reproduction, and to quantify their influence on eagles' breeding performance. The study area, about 3 thousand km^2, was situated in the north-eastern part of the island, and included coastal zone of five sea bays (Lunsky, Nabil, Nyisky, Chaivo, Piltun).

The total productivity during all the years of research was 0.53 fledglings per occupied territory, the average brood size was 1.37 chicks per successful nest, the average occupancy (percentage of occupied territories) was 0.70, and the average activity (proportion of occupied territories, in which breeding attempts have occurred) was 0.52. Large proportion of the sea eagle offspring was exterminated by bears. For the entire period of monitoring it totalled 19.8% of all healthy chicks. Other causes of nestling mortality were significantly lower (8.9%).

All population parameters greatly varied between years (fig. 1). The most important of them, productivity, varied with a 2.7-fold span. Its highest value (0.91 fledglings per occupied territory) was reached in 2004, and the lowest value (0.33 fledglings per occupied territory) was observed in 2010. There is some sign of cycling of nesting success parameters and of peaks in bear predation and other losses, but only longer study could reveal that for certain. The variability of other parameters was also great and the spatial distribution of these parameters was highly uneven also.

Previous studies of this population reported higher productivity of eagles. Thus, in the 1990s it was about 0.74 fledglings per occupied territory, and in the late 1980s – early 1990s it was even higher, 0.8–1.4 fledglings per territory. So we need to admit poor population performance in most of the years. Though productivity varied between years, its total value for the whole period of monitoring was fairly low.

The most important factor affecting the productivity was predation by brown bears, which exterminated nearly 20% of offspring. In addition to the immediate influence on productivity, it has a deferred effect through destruction of nest structures. As a consequence, the territory

holders may skip next breeding season, being busy with reconstructing or constructing their nests. Nestling mortality from other causes reduced productivity by 8.9%. In addition, nesting activity in the study period was quite low: nesting attempts were registered only in 52% of occupied territories.

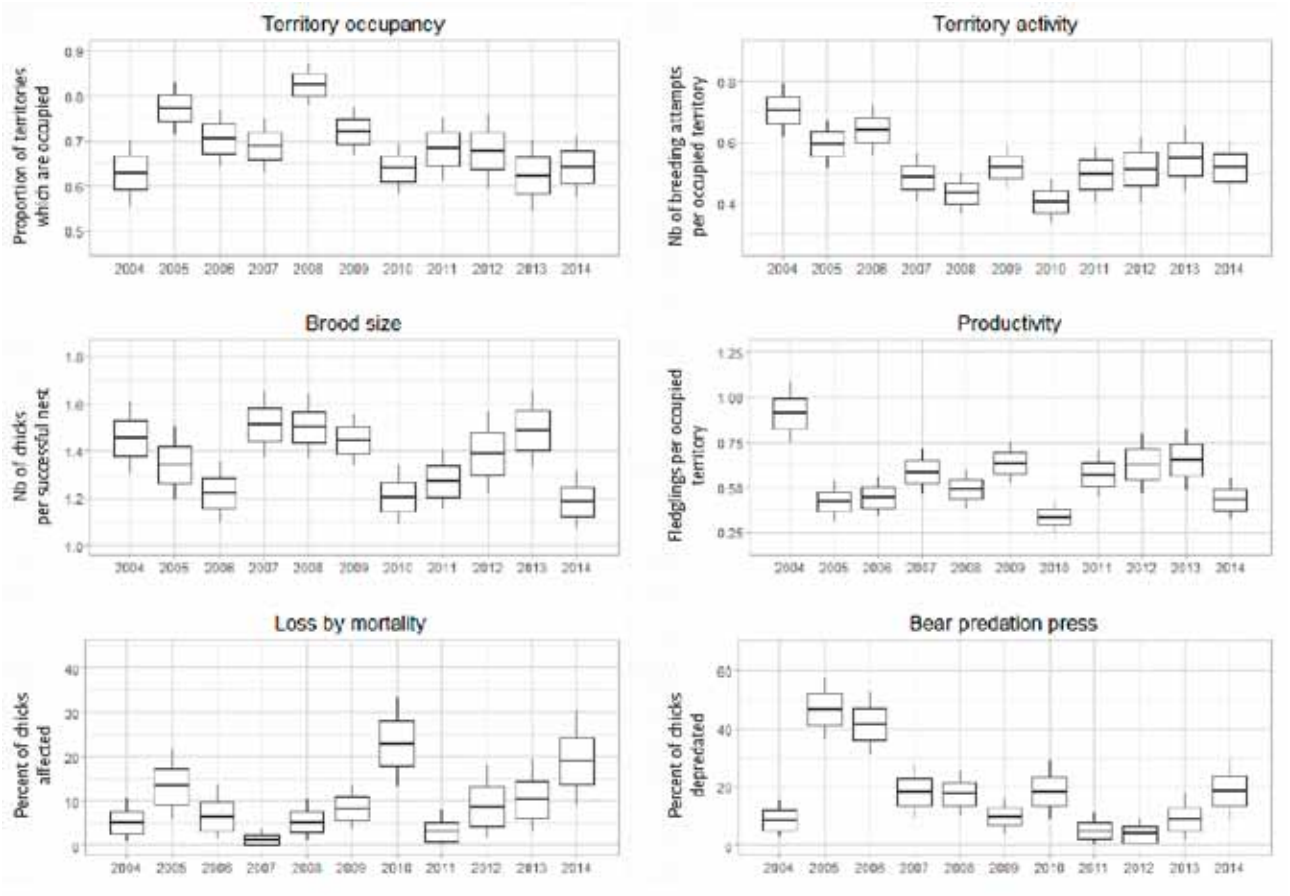

Figure 1. Distribution by bay of six characteristics of the population performance in 2004–2014

The causes of the poor breeding performance varied between years: the most common were predation by brown bears, adverse weather conditions, poor food conditions, and, possibly, disturbance at nest sites and habitat alteration. As a result, "good" breeding years are not frequent. Taking into account global climate changes and intensified industrial development of the region, great concern arises about future of the Steller's Sea Eagle population in Sakhalin.

In these circumstances, careful attention to the Sakhalin population of the species is required, which should include annual monitoring in the regions of maximum nesting density of sea eagles. Also, the installation of bear-protective devices on the most vulnerable nests can be recommended as a temporary measure.

WILDLIFE MANAGEMENT OF THE CONTROL GROUP OF STELLER'S SEA EAGLES INHABITING THE AREA OF INCREASED ANTHROPOGENIC IMPACT OF THE OIL AND GAS COMPLEX

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Industrial development in nesting grounds of sea eagles is often accompanied by habitat alteration. One of the purposes of our monitoring of Steller's Sea Eagle population in the NE Sakhalin was the identification of territories, situated in the zone of potential impact and their management. These measures included construction of artificial nests and perches, and protection against terrestrial predators.

Artificial nests. A nesting platform is a wooden frame of 80 × 80 cm with a metal mesh stretched in it. The platform is mounted on a suitable tree-top and is fixed with a soft steel wire. It is provided with added nesting material, forming the shape of a nest with tray.

19 nesting platforms were installed at Chaivo bay. In some cases eagles built new nests adjacent to the artificial ones and even partly used the construction material of the artificial structures, gradually dismantling them. In other cases, eagles occupied the artificial nesting platforms, finished building the nest, laid eggs, and successfully raised chicks. Once an emergency necessitated the relocation of a pair of sea eagles from the road construction zone. Birds 'voluntarily' changed the nesting site and built a new nest near the artificial one, and successfully raised offspring.

Artificial perches were made of larch trunks 15–20 cm in diameter and 6–7 m in height. Cross-bars made of round poles 1.2–1.5 m in length and 6–7 cm in diameter at one end and 8–10 cm at the other were fixed on the top of trunks. This allows perches to be used both by males and females having different foot size. Perches were installed along the shoreline at the distance of 20–30 m from the waterline, usually on a steep shore, which increased their overall height.

37 artificial perches were installed along the shoreline of the bay and the sea coast. Both adult birds and fledglings actively used the new perches and the shore has become an important resource for birds. The attractiveness of the area increased so significantly that in the next 2–4 years two more pairs of sea eagles moved here, that is, new breeding territories were formed.

Also, 15 perches were installed on the spit of Piltun bay. In subsequent years, the proportion of active territories has increased from 33–43% to 75%. Similarly, the installation of a series of artificial perches on the seashore near the pipeline of the Sakhalin-2 project at Lunsky bay helped conserve three pairs of sea eagles nesting in its vicinity, despite the fact that the coastal area for some time became the scene of intense construction operations.

Protection from brown bears. A simple yet reliable solution is to install metallic belts preventing bears from climbing the nesting trees. A corrugated iron sheet 1.5 m wide was wrapped around the trunk of a nesting tree at a height of 2–4 m from the ground and tied up with 3–5 steel strips. Finally, the structure was painted gray-brown.

94 nesting trees were protected. We recorded 19 unsuccessful attempts of brown bears to climb such trees. Their claws slid from the surface of the metallic belt, leaving only scratches on the paint. In three cases, the predators managed to overcome the protective belts. Eagles were not frightened by the presence of artificial structures and successfully bred on the protected trees and raised offspring.

Therefore, the installation of nesting platforms, artificial perches and protective devices against predators is an effective way to improve the quality of habitats. The use of these tools makes it possible to directionally influence the territorial behavior of birds, change the spatial configuration of home ranges, and appropriately shift the center of their territorial activity. This opens up the possibility of solving conflicts arising during the construction of industrial facilities in the areas inhabited by sea eagles.

USE OF THE BALD EAGLE (*HALIAEETUS LEUCOCEPALUS*) IN EDUCATIONAL PROGRAMS

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ABSTRACT

Benjamin Franklin, in a letter to his daughter during the summer of 1784, described the Bald Eagle as lazy, with low moral character, that would rather steal a fish from the fishing hawk (Osprey) than catch its own. His opinion of this magnificent raptor was obviously low, and he promoted the Wild Turkey as what should be chosen for the new country's symbol. With the observations I've made on this species in the wild and extensive work on training this species for use in educational programs, my opinion of the Bald Eagle is much higher than Mr. Franklin's.

For my presentation I will discuss the intelligence and abilities of the Bald Eagle. I'll briefly describe its natural history, its disappearance from wild in the U.S. and reasons why, and the comeback it's wild population has made with the help of the same entity that almost brought it to extinction.

I'll discuss the United States Fish and Wildlife Service laws that protect the Bald Eagle in the wild, and the permits that organizations like ours must acquire to utilize the species for display and education programs.

I'll briefly discuss the management of Bald Eagles in captivity, especially those birds World Bird Sanctuary keeps on anklets and jesses. I'll speak about and compare the birds we do and don't manage for free flight, and the A to B free flying behaviors we train our eagles to perform.

I'll also discuss how WBS educates the public about the eagle and its conservation. WBS presents outreach programs within St. Louis and its surrounding areas, and also contracted programs at zoos, theme parks and aquariums around the U.S. WBS presents programs about Bald and Golden Eagles in towns along the Mississippi River, from January through March, speaking about the large Bald Eagle winter population in this area and the population's health. I'll discuss the Bald Eagle free flights we fly at large sporting and other events, along with how we promote eagle conservation through social media.

WHITE-TAILED SEA-EAGLE TALLY DYNAMICS OF THE ASTRAKHAN NATURE RESERVE IN THE VOLGA DELTA FROM 1952 TO 2017

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Various authors from the second half of the 19th century and also later, in the 20th century, refer to white-tailed sea-eagle, alongside its general high numbers in the Volga Delta, as a common nesting and wintering bird there (Богданов, 1871; Яковлев, 1873; Бостанжогло, 1911; Хлебников, 1930; Воробьев, 1936; Луговой, 1963; Луговая,1968; Русанов et al., 1983).

One of the oldest protected areas of wild nature in Russia -- The Astrakhan Nature Reserve – was formed in the Volga Delta in 1919. The Nature is reserve is divided into three sections, covering the key habitats of the western (Damchiksky), central (Trekhizbinsky) and eastern(Obzhorovsky) part of the delta. Research department was founded as a structural part of the Nature Reserve at the very beginning. The formation of the ornithological laboratory started systematical research of ornithological wildlife of the region. All research of white-tailed sea-eagle from the beginning of 1900s till the present day have been carried out utilising Astrakhan Nature Reserve and its employees.

The earliest numerical nesting data of white-tailed sea-eagle were acquired in the course of the census of the nests of large and medium-sized predators of the western section in 1956. There were four nests of white-tailed sea-eagle (Луговая, 1958).

Nesting sites of the bird in the reserve started being counted annually from 1960s. The number of nestings was not too big, between 5 to 8 (see diagram 1). The figures, though, do not indicate the low number of eagles in the nature reserve or in the delta as a whole. These figures are conditioned by two factors. The first one is the peculiar pattern of bird placement, connected to the landscape of the Delta. Numerous new islets formed on the waterfront after the sea level of the Caspian dropped in the beginning of 1930s and over the next decades woodlands of willow developed on them. And a considerable number of birds started nesting on these inaccessible sites. The second factor are the difficulties of fieldwork in the area (researchers did their work in rowing and sailboats, large shallow areas remained inaccessible and thus uninvestigated). Thus the white-tailed sea-eagle were numerous in the delta, but they were spread on wide areas, with considerable distances between nests thanks to the huge suitable territories. The knowledge level of the territories increased over years, connected to the better technical devices at the researchers› disposal and the changes in the landscape.

The first white-tailed sea-eagle census of 1975 indicated that there were 150 – 160 nesting pairs in the Volga Delta, 33 of them in the Astrakhan nature Reserve and over a 100 pairs in the Volga-Aktyubinsk water meadows north of the delta. The large majority of birds were nesting in

the lower strip of the delta, the central and upper zones did not count more than 30 pairs. The second census in 1982 demonstrated the stability of the white-tailed sea-eagle population in the Volga Delta with 29 nesting pairs in the Reserve. The overall figure of white-tailed sea-eagle nesting pairs was estimated between 130 and 150 in 1987 (Русанов, Реуцкий, 2004).

Monitoring of isolated better accessible nesting pairs was carried out on the Reserve territory during intervals between full censuses. Abrupt changes in the numbers and low figures are caused by incomplete surveys. The result of the census of 1995 was at least 170 nesting pairs in the Volga Delta and the adjoining western Ilmen-Bugr state reserve. 41 of them were nesting in the Astrakhan Reserve, at least 34 pairs in the upper and central parts of the Volga Delta and no less than 72 pairs of white-tailed sea-eagle were nesting in other lowlands of it. There were more than 100 nesting pairs in the Volga-Akhtyubinsk waterland. Thus the nesting population of white-tailed sea-eagle of the Astrakhan oblast remained stable over a quarter of a century and was approximately 270 - 300 pairs. The addition of sub-adults and non-nesting adults should take the general estimate to about 1000 birds, maybe even more. A signal of this estimation have been the floodtime gatherings of sub-adults, having reached the figures between 60–100 in the reserve area only (Русанов, Реуцкий, 2004).

The number of white-tailed sea-eagle nestings in the reserve has been on the increase since 2000. This is mainly due to the relocation of birds in the lowlands of the Volga Delta caused by rising waterlevel of the Caspian Sea after 1977. The gradual dying of trees on the islets of receding delta front, brought about by flooding has made white-tailed sea-eagle to move into the lowest (southernmost) strip of the delta proper. Most of the birds settled on the territory of the reserve, on account of the strict protection regime and the presence of forest sites suitable for nesting. As a result of the recreational load and the uncontrolled fires the nesting density without area limits is much lower.

The relocation of White-Tailed Sea eaglesin the Volga Delta has aggravated its nesting competition with osprey. Sea-eagle, a numerically superior species having permanent nesting sites acquires material for its nests by pulling down eries of osprey, who is much less-numbering and particular to the conditions.

Thus the main factor limiting the tally and spread of the species in the Volga Delta is the existence of woodlands suitable for nesting, this being determined by ecological succession, sea level of the Caspian, volume flow rate of the Volga, fires of the vegetation as well as by the windstorms which break old, dead and fire-damaged branches and thus hurl eries to the ground.

In 2017 we started collaboration with the people from Estonian Eagle Club and Darwinsky Reserve to colour-ring white-tailed sea eagle of the Astrakhan Reserve. There are 16 ringed specimens in two sections of the reserve (Damchiksky and Obzhorovsky).

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APPLICABILITY OF TARSUS WIDTH MEASURE FOR SEX IDENTIFICATION OF WHITE-TAILED EAGLE NESTLINGS IN CENTRAL DANUBE

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Key words: White-tailed Eagle, nestling, sexing, tarsus width, morphometry

ABSTRACT

The aim of this study was to test the applicability of tarsus width measure recorded in field for sex identification of White-tailed Eagle nestlings in Central Danube. Measure of tarsus width, as described by HELANDER ET AL. (J Ornithol. (2007) allowed the correct identification of sex for 96 per cent of the nestlings from southern and central Sweden, but not for the Lapland population. It was suggested that criteria employed to separate sexes in field may have to be adjusted for each sub-population separately. We have measured 31 nestlings during 2016 and 2017 breeding seasons in Kopački rit wetlands. Tarsus width was measured in the field with digital calliper with the precision of 1/100 millimeter. Sex of the nestlings was independently assessed based on DNA samples taken from blood feathers using sex-specific fragments of the CHD gene that were amplified by using primer pair 2550F/ 2718R. In total, 14 males and 17 females were determined based on DNA analysis with 1:1.2 sex ratio. Males had the tarsus width in range from 12.19 to 14.74 mm (average 13.17 mm), while females had the tarsus width in range from 12.83 to 16.77 mm (average 14.70 mm). Proposed cut-off point at 13.8 mm allowed the correct identification of only 78 per cent of males and 70 per cent of females respectively. All nestlings with tarsus width bellow 12.8 mm were males, while all nestlings with tarsus width above 15 mm were females. White-tailed eagle nestlings in Central Danube floodplains had much wider overlap, ranging from 12.8-14.8 mm, which makes sex determination in field difficult.

INTRODUCTION

Identification of sex of an individual bird is particularly useful in long-term population, behavioural and ecological studies. In species lacking plumage dimorphism, such as White-tailed Eagles, sexual discrimination based on size is often impossible in the field, particularly if only single bird is present. Applying different colour-marking techniques (rings, wing-tags etc.)

makes possible recognition of individual bird in the field and additionally, knowing the sex of the particular individual gives extra added value to the clarifications of future observations. Sex determination based on DNA analysis is nowadays commonly used technique in avian research, but it is conditioned by the presence of a proper laboratory and certain financial costs, factors that are not easily available in developing or low-income countries. Thus a simple and accurate method for sexing White-tailed eagle in field, based on size dimorphism could still be handy. Several morphometric measures were tested on White-tailed eagle nestlings (Helander et al., 2007). Measure of tarsus width allowed the correct identification of sex for 96% of the nestlings from southern and central Sweden, but not for the Lapland population and it was suggested that criteria employed to separate sexes in field may have to be adjusted for each sub-population separately. Our aim was to test the applicability of tarsus width measure for sex identification of White-tailed eagle nestlings in Central Danube.

METHODS

We have measured 31 nestlings during 2016 and 2017 breeding seasons in Kopački rit wetlands, Central Danube Floodplain. Sampling of eagle nestlings was implemented during two-week period, usually from April 24 until May 9, during the regular ringing effort when the nestlings were 4-8 weeks old. Tarsus width was measured in the field with digital calliper with the precision of 1/100 of mm. Sex of the nestlings was independently assessed based on DNA samples taken from blood feathers using sex-specific fragments of the CHD gene that were amplified by using primer pair 2550F/ 2718R (Fridolfsson and Ellegren, 1999).

RESULTS AND DISCUSSION

In total, 14 males and 17 females were determined based on DNA analysis with 1:1.2 sex ratio. Males had the tarsus width in the range from 12.19 to 14.74 mm (average = 13.17 mm, median = 12.87 mm, SD = ±0.75), while females had the tarsus width in the range from 12.83 to 16.77 mm (average = 14.70 mm, median = 15.09 mm, SD = ±1.23) (Figure 1). The cut-off point of 13.8 mm, proposed by Helander et al., (2007) allowed correct identification of only 78 per cent of males and 70 per cent of females respectively. All nestlings with tarsus width below 12.8 mm were males while all nestlings with tarsus width above 15 mm were females.

Comparing our data with those from Sweden, male nestlings in Central Danube Floodplain had larger tarsus width at the age of ringing, while such was not true for females (Table 1). In our study, overlap in tarsus width among the sexes was much larger, from 12.8-14.8 mm, than in Swedish example. There could be several reasons for this discrepancy – from low sample size coupled with inexperience during the measuring nestlings in the field to larger range among the size of nestlings during the sampling (though we could not confirm this based on photographs taken during ringing). In any case, sexing the nestlings of White-tailed eagles by measuring tarsus width in the field proved to be useful for over a half of sampled birds. For nestlings whose tarsus width would fall between 12.8 - 14.8 mm some additional morphometric measures should be taken to identify their sex in the field with higher certainty.

Figure 1. Distribution of tarsus width measurements for 14 male and 17 female White-tailed Eagle nestlings from the Central Danube floodplain

Table 1. Comparison of average tarsus width in White-tailed eagle nestlings from Sweden (data from Helander et al., (2007) and Croatia

Country	Males (mm)	SD	Females (mm)	SD	Source
Sweden – Lapland	12.3	±0.7	13.2	0.8	Helander et al., (2007)
Sweden – south	12.8	±0.5	14.8	0.6	Helander et al., (2007)
Croatia	13.7	±0.7	14.7	1.2	This study

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SPATIAL ECOLOGY OF WHITE-TAILED EAGLE IN NORTH-EASTERN POLAND

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Nine white-tailed eagles were studied with GPS GSM loggers (Ecotone) between 2013 and 2017 in North-Eastern Poland. Seven were full-grown juveniles fitted with loggers already at the nests, while two were adults found poisoned and released with telemetry devices after treatment. Data were stored and analysed in ArcGIS 10 with ArcMET plugin. From 2 572 to 10 671 fixes per year were gathered when individuals were tracked for full year. Juveniles finally left their parents territories on 29th September on average (from 27th July to 20th January). During first year juveniles moved on average up to 367 km from nest (143 – 785 km). Similarly in later seasons, immatures moved up to 645 from place of born (310 km on average). Shorter distances (<350 km) were made in each possible direction , the longest distances were made southwards up to Romania and northwards up to Estonia. Three out of four juveniles did not survive first winter and eventually five juveniles perished (last one in 5th calendar year), while two loggers stopped transmitting in third tracking season. Causes of death were: electrocution in one case, most probably poaching in the second case, while three other individuals died on fish ponds and poisoning was suspected. Among two tracked adult males one proved to be a non-breeder for during three consecutive seasons and the second attempt to breed immediately after releasing (March 2017), but with a failure at incubation stage. The breeding male's home range was considerably small and depending on the estimation method covered 3010 (kernel 95%) or 5998 ha (minimum convex polygon 95%). Absolutely main foraging ground was a large channel and few different perching sites nearby. Non-breeding male home-range reached 495 765 and 911 490 ha respectively for those two methods.

WEB-GIS "FAUNISTICS" AS AN INSTRUMENT OF CROWDSOURCING COLLECTION OF INFORMATION ABOUT THE WHITE-TAILED SEA EAGLE

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1. The Programme "Faunistics" of Russian Raptor Research and Conservation Network accumulates the information about meetings of raptors in the web-GIS "Faunistics". The Web-GIS was developed on the SGPQ engine (http://webgis.pro/). This is an interactive system for input and representation of the data on the observations of different species of fauna and flora as well as a depository of the photo-proofs of species observations. The system allows to conduct the crowdsourcing collection of data that have geographical binding. Birdwatchers and photographers who share their observations help very much in the realization of the programme.

2. The information collected in this way is valuable scientific material for the study of target species; as a minimum, it allows us to specify species range, nesting and wintering places, duration of birds' stay in different territories, and their migration routes. Also, from the collected photos, we can learn the distribution of subspecies and morphs and much more.

3. Web-GIS "Faunistics" was created in the late 2012 and then the collecting of information was started. Now the database includes 42,200 observations of raptors at 31,617 points from 146 observers. The data in the web-GIS can be accessible to any visitor or closed – accessible to observers and moderators only. Users sign an agreement to observe the copyright of observers if they use their data.

4. Observers contribute not only current observations, but also finds of the past. Over the five years on the White-tailed Sea Eagle 1,522 observations at 1,082 points were made by 65 authors spanning over the period since 1977. But two thirds of observations refer to the period 2012–2017. Thus, as a rule, the authors make observations of the current years, i.e. they use the database to store their own observations.

5. Three authors from 65 carry out regular monitoring: R. Bekmansurov investigates the population of the Mid-Volga, I. Karyakin – the Altai Territory and D. Shtol – several nesting sites near Novosibirsk city. Twenty ornithologists and birdwatchers make regular observations of the White-tailed Eagle and their nests in different regions of Russia, others (42) – have 1–5 observations, as a rule, meetings of birds.

6. Additionally several other Russian online databases exist for crowdsourcing of birdwatching– 'Online diaries of observations' (http://www.ru-birds.ru/), 'Siberian Birdwatching Community' (http://sibirds.ru), 'Birds the European territory of Russia' (http://erbirds.ru/), 'Kazakhstan Birdwatching Community' (http://birds.kz/). For the purposes of this report, in addition to data from 'Faunistics', we take open data from these databases – on the White-tailed Sea Eagle in Russia and Kazakhstan – 471 observations from 88 users and 26 observations – population survey data. – A total of 2007 observations in Russia and Kazakhstan from 148 authors in the period from 1976 to 2017: 942 nest observations – residential, with chicks, and empty, old and destroyed; 1069 – of pairs and fledglings, include 204 in nesting periods; 861 – of single birds (Table 1).

Table 1. Number of observations of the White-tailed Sea Eagle on the regions of Russia and Kazakhstan in 1976–2017.

	Nests	**Pairs and fledglings**	**Single eagles**	**Total**
Russia				
Central Federal District	0	0	16	**16**
North-West Federal District	2	0	8	**10**
South Federal District	18	3	38	**59**
North Caucasus Federal District	1	0	5	**6**
Volga FD: Nizhny Novgorod Region	16	2	21	**39**
Volga FD: Orenburg Region	12	3	8	**23**
Volga FD: Perm Territory	116	62	19	**197**
Volga FD: Republic of Bashkortostan	15	21	4	**40**
Volga FD: Republic of Tatarstan	514	36	56	**606**
Volga FD: Udmurtian Republic	2	0	0	**2**
Volga FD: Samara Region	81	42	21	**144**
Volga FD: Saratov Region	1	0	1	**2**
Volga FD: Ulyanovsk Region	9	0	5	**14**
Volga FD: Chuvash Republic	16	1	5	**22**
Ural Federal District	14	5	14	**33**
Siberia Federal District	89	20	221	**330**
Far East Federal District	1	2	6	**9**
Total of Russia	**906**	**196**	**450**	***1552***
Kazakhstan				
Akmola region	0	0	3	**3**
Aktobe region	0	0	1	**1**
Alma-Ata's region	0	0	157	**157**
Atyrau region	1	0	10	**11**
East Kazakhstan region	1	0	64	**65**
Jambyl Region	0	0	19	**19**
West-Kazakhstan region	27	8	36	**71**
Kostanay Region	4	0	12	**16**
Kyzylorda Region	1	0		**1**
Mangistau region	0	0	51	**51**
Pavlodar region	0	0	17	**17**
North-Kazakhstan region	2	0	8	**10**
South-Kazakhstan region	0	0	33	**33**
Total of Kazakhstan	***36***	***8***	**411**	**455**

Observations of nests, pairs and fledglings in the nesting period are about known nesting sites. Meetings of single birds are either observations of nesting birds, when nest was not be found, or the observations of migrants. In the nesting period (from February to August) these two categories can not be divided, whereas from September to January they show exclusively migratory and wintering birds (Fig. 1).

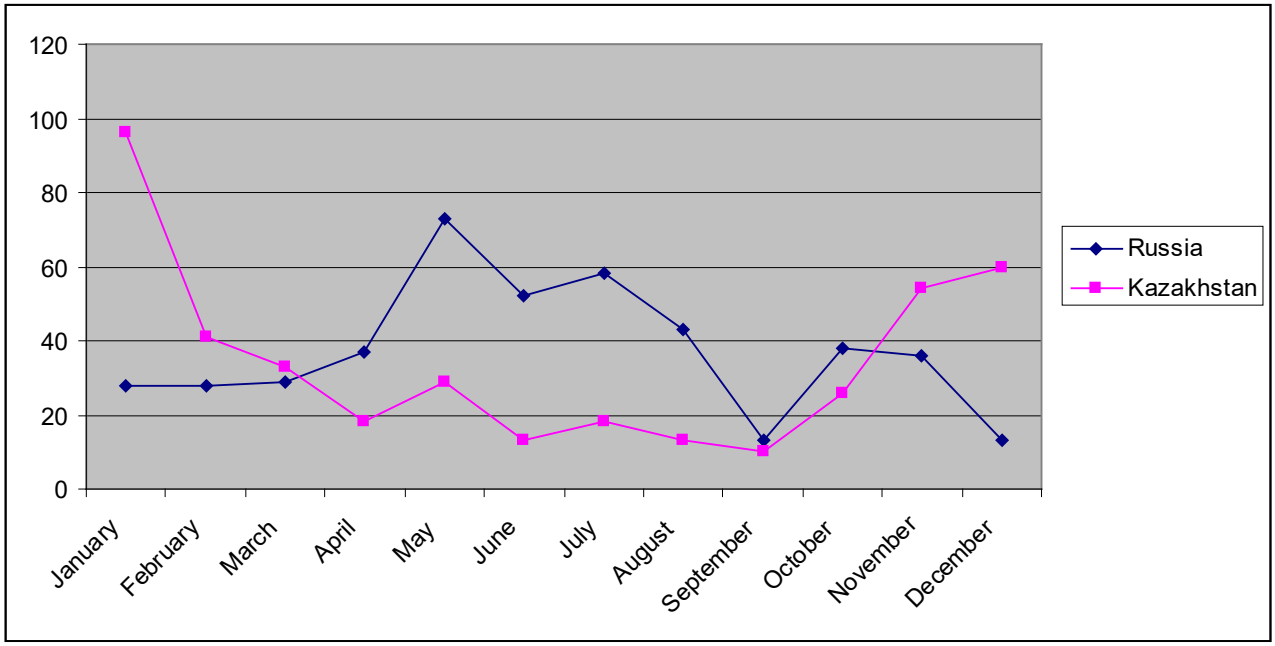

Figure 1. Observation number of single birds in Russia and Kazakhstan by months in 1988–2017.

Observers point twelve places of concentration of eagles during the period of migrations – as a rule these are landfills and places of waste near farms. Three eagle groups were recorded in Kazakhstan – in the Almaty region, where in November–December 2013 35, 44 and 120 eagles were observed simultaneously (Belyalov, 2013). In Russia small groups were recorded in the Republics of Tatarstan and Chuvashia (Middle Volga) – they were observed from January to May annually in 2013–2016 (Yakovlev, 2013; Kutushev, 2014; Bekmansurov, 2015; 2016). Also in the Altai Territory in May 2016 – a group of 14 young eagles (Karyakin, 2016) and the Novosibirsk region – several birds in November 2012 (Andreenkov, Andreenkova, 2012). The largest eagle group in Russia, introduced into 'Faunistics', is the observation of 42 eagles in the Tyumen region, the author points out that the birds kept the location for the whole winter from November 2015 to February 2016 (Mitropolsky, 2016).

November 2015 to February 2016 (Mitropolsky, 2016).

THE REINTRODUCTION OF THE WHITE-TAILED EAGLE TO IRELAND

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2 Irish White-tailed Sea Eagle Reintroduction Programme, Ardpatrick, Kilmallock, Co. Limerick, Ireland. kerryeagle@googlemail.comThe White-tailed Eagle *Haliaeetus albicilla* (WTE) became extinct in Ireland in the early 20th century. A programme to reintroduce this species, that once was a widely distributed species in Ireland, commenced as a feasibility-study in 2005. A project was formed in cooperation with the Irish National Parks and Wildlife Service, the Norwegian Institute for Nature Research (NINA), and Birdlife Norway (NOF). It was managed by the Golden Eagle Trust in Ireland, while in Norway collection activities were organized by NINA and NOF (Birdlife Norway), with the assistance of a team of expert volunteers.

WTE territories in Norway were surveyed each year during May to identify candidate nests for collection of young for the Irish reintroduction. As permission from the Directorate of Environment in Norway to take young from nests was restricted to nests with two or more young, on average between 4.3 and 5.6 sites had to be checked each year to provide one nest with twins or (rare) triplets. This means that between 75 and 125 sites had to be visited annually to provide sufficient chicks for collection to make up each potential release cohort.

Nestlings were collected from 15th-25th June each year at 5-10 weeks, always leaving at least one chick in the nest. Areas where nests were located were the islands of Hitra and Frøya, Snillfjord and Trondheim in the county of Sør-Trøndelag, and Inderøy, Flatanger and the islands of Vikna and Leka in Nord-Trøndelag counties (63°25' - 65°10' N). One hundred young WTEs were collected over five years (2007–2011): 15, 20, 20, 22 and 23 in consecutive years. Birds were kept and fed in pens at a farm near Trondheim airport for periods of 2-8 days. After a health-check by a veterinarian, birds were put in individual sky-kennels and flown directly to Kerry airport in SW Ireland by charter aircraft. Young eagles were immediately transported to large flight pens in a remote part of Killarney National Park, Ireland, where they were held for 6-10 weeks prior to release in early August – early September. All human contact was minimized.

Prior to release young eagles were marked with coloured wing-tags for individual identification. All birds were also fitted with VHF radio transmitters or GPS satellite transmitters to help in post-release monitoring. Most birds wintered near the release site in Killarney and dispersed

the following spring. However, some birds dispersed widely throughout the island of Ireland soon after release. At least six birds travelled to Scotland, including two birds that returned to breed in SW Ireland. One dispersing female has paired and nested in Argyll, Scotland.

During 2007-2017, of birds released, 33 were recovered dead, and an additional Irish bred bird. Poisoning has been the main cause of death of WTEs (14 birds), as for other raptors in Ireland. Since the use of poison baits (to control foxes and corvids) was banned in Ireland in 2010, the poisoning issue has decreased in severity. Only one poisoned WTE has been recovered since 2014. Over the years, other causes of death are wind turbines (3), power-lines (1), shot (2), starvation (1) and intra-conflict (1). Another 12 died of unknown cause, 10 of them likely by poisoning.

The initial reluctance of local farmers and farming organizations to accept a “new” large potential avian predator has apparently diminished over time. The general opinion among the public is now very positive, and the birds are already generating income to local communities through the number of visitors coming to view these charismatic birds. A public viewing facility at one nest site attracted over 10,000 visitors in two months.

The first breeding took place in 2012, by a three-year old female and a four-year old male, but failed at hatching. All in all, there has been 37 nesting attempts, (eggs laid), and 21 young have fledged. Overall, the number of fledged chicks per breeding pair was 0.57, and has increased to 0.78 during the last two years. The overall reproductive rate was 0.33 fledged young per territorial pair, increasing to 0.7 both in 2016 and 2017, indicating improved breeding skills probably due to birds being more experienced due to age.

Survival rates seem to be high, but no exact estimate is available as yet, since the total number of current survivors is not known. Only one death was recorded in 2016-17, indicating that more birds are now being born than are dying. This is a crucial milestone, and if this trend continues, Ireland should have a healthy and self-sustaining WTE population in the future.

MOVEMENTS OF THE MATURE WHITE-TAILED EAGLE SPECIMENS

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Data on the territorial behaviour of the White-tailed Eagles in the North-West of Russia and the Volga River area is given on the base of analysis of movements of adult specimens marked by GPS transmitters.

Adult female of the White-tailed Eagle was marked by GSM transmitter in February 2016 and released on the western shore of Chudskoe Lake. This bird received the name Pomo originated from the name of man who released her. The marked bird directed to the site of her breeding by short way. In two months after release of Pomo, her nest was discovered. It was situated in the south-eastern part of Kurgolov Peninsula. The distance between the Luga Bay coast and nest location was 1,4 km. In the year 2016, the bird had one fledgling. During the period of feeding chick the main place of feeding in this female was the central part of eastern shore of Kurgolov Peninsula.

Once the youngster was fledged, Pomo stopped to spend a lot of time in the nest region. She added to the places for hunting the territories of western shore of Lipovskoe Lake. Pomo did not fly to hunt further than this shore.

During the entire winter, before the beginning of nesting season in 2017, this female was situated in the eastern part of Kurgolov Peninsula and the western shore of the Luga Bay.

In 2017 Pomo has occupied the nest of the previous year. She had two fledglings. During the post-nesting season, the character of the use of the territory by this bird did not distinct from the use of the territory last year.

Adult female of the White-tailed Eagle was trapped on winter concentration in the middle part of the Volga River area. She got the name Kyrilla after the river close to which she was trapped. The bird was marked by GSM transmitter on the last day of January 2016. In 3 days after marking Kyrilla left the wintering site and began to move in the northern direction.

We assumed that the bird nesting on the Kama water reservoir had been trapped. However, flying through entire Tatarstan and Udmurtia, Kyrilla crossed the Uralian Mountains and turning to the north at the end of April reached the site of her breeding. Kyrilla's nest was situated in the Ob River flood plain, approximately 60 km south of Salekhard. Judging by the dates spent near the nest, her breeding in 2016 was not successful. Approximately at the middle of June Kyrilla left the breeding site and flew to the Yamal Peninsula. The northernmost point, reached

by marked bird, was the flood plain of the middle part of Yakhadyyakha River, approximately at 60 km from Malygina Strait. After that, Kyrilla returns to the breeding site. After spending here not more than two weeks, bird began migration and by the end of December reached the place where she was trapped.

The bird spent almost two months on wintering grounds. On the first dates of February Kyrilla has begun to move in the northern direction to her breeding site. She flew approximately by the same way as last year. She has reached the place of her breeding in the third 10-day period of April.

The data on movements of two White-tailed Eagles from two different regions show the various strategy of territorial behaviour of these birds.

THE WHITE-TAILED EAGLE IN AUSTRIA: DISTRIBUTION AND NUMBERS, PRODUCTIVITY, AND MIGRATION

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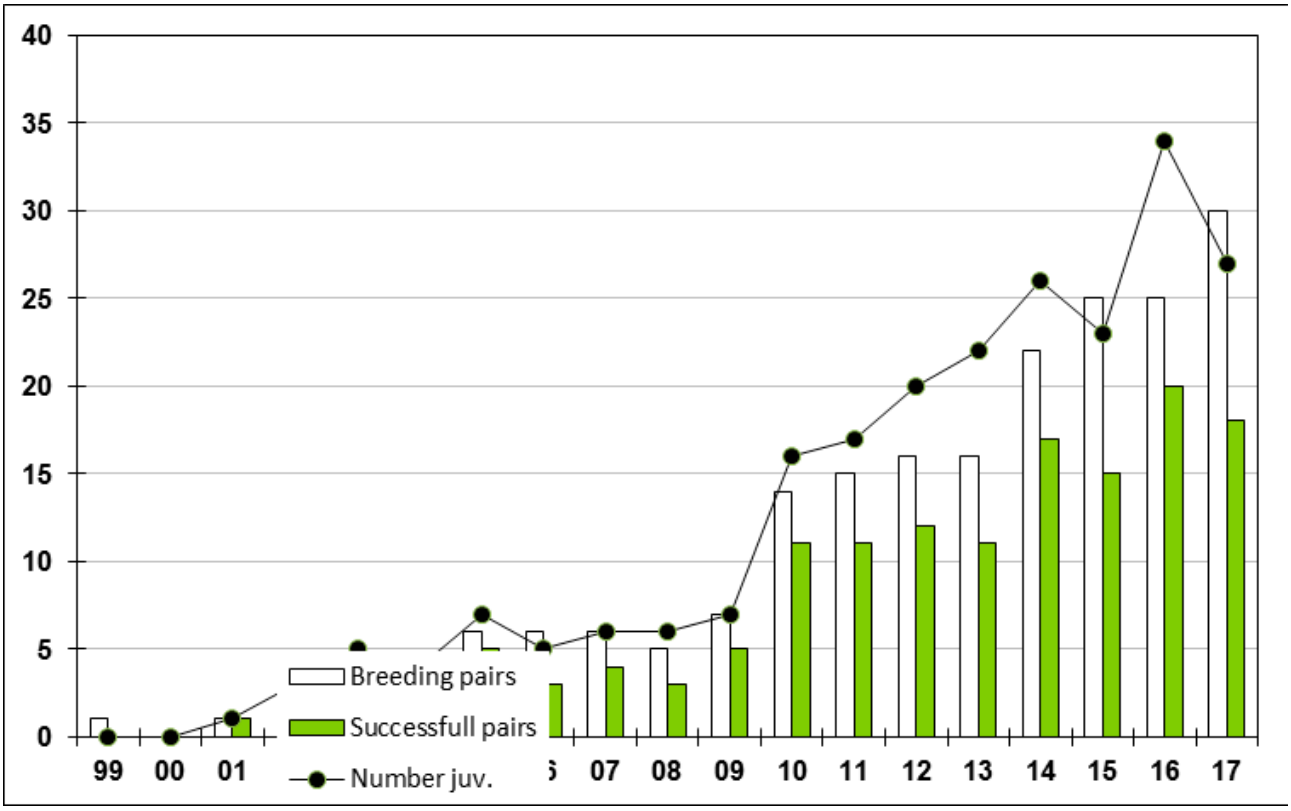
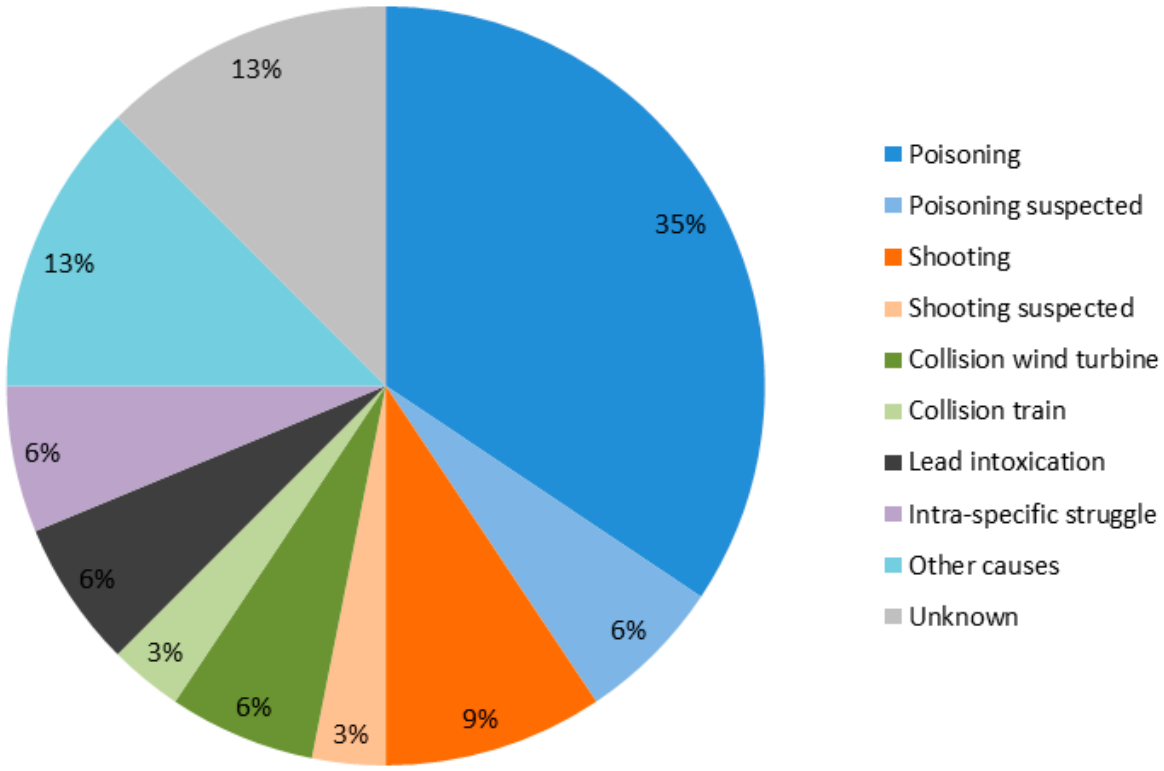
After 50 years of absence, the White-tailed Eagle returned to Austria as a breeding species at the turn of the millennium. Currently it inhabits parts of the eastern, non-alpine lowlands, particularly the Danube-Morava floodplains and the lake-land of the Waldviertel. In 2017, up to 35 pairs were suspected to be holding territories; 30 breeding pairs were confirmed. Since 1999, 205 breeding attempts have been recorded, which produced a minimum of 229 juveniles. Because 70 % of pairs are successful and mean productivity is 1.12, the Austrian breeding population can be classified as a source population. Synchronized censuses in January reveal a strong increase in the wintering population as well, with almost 200 White-tailed Eagles being found in recent years in Austria and the adjacent bordering areas of Hungary, Slovakia, Czech Republic, and Germany. Recoveries of ringed birds and data from the satellite tracking of 12 individuals show dispersal to several central European countries, especially Germany, Poland, Czech Republic, Slovakia, Hungary, and Croatia. Threats are manifold, ranging from disturbances at breeding sites (forestry operations) to collisions, however, in Austria illegal poisoning and shooting are still serious problems. The most important protection actions on a national scale are the preservation of undisturbed and safe breeding places and the fight against illegal persecution. However, because the Austrian White-tailed Eagle population is not isolated from populations in other European countries, international cooperation and the safeguarding of both core breeding habitats and non-nesting habitats that can be used by eagles as stepping stones during dispersal are warranted.



White-tailed Eagle breeding statistics in Austria since their re-establishment in 1999 as a breeding species after an absence of about 50 years. Breeding pairs, successful pairs and the number of chicks are shown.



Causes of casualties of White-tailed Eagle in Austria since 2000 (n = 32). Illegal persecution is still a serious problem, affecting not only the White-tailed Eagle but other raptor populations in the country.

HABITAT SELECTION IN A RECOVERING BIRD POPULATION: NEST SITES OF WHITE-TAILED SEA EAGLE (*HALIAEETUS ALBICILLA*) IN ESTONIA, 1928–2014

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This study compares the long-term distribution of nesting White-tailed Sea Eagles (*Haliaeetus albicilla*) in Estonia with the 'ideal' models of animal distribution. Data on reproduction and location of 528 nest sites were collected from various archives and databases covering years 1928–2014. According to the 'ideal despotic' (territorial) distribution model, the sites occupied at the lowest population levels should have the highest quality. In reality, the average productivity of new nests (established during the population recovery since 1980) was even slightly higher (0.95±0.20 SD) than in older nest sites (0.87±0.29). The White-tailed Sea Eagles are also nesting increasingly closer to their feeding areas and houses. The average distance to a feeding site has decreased more than twice (4.1 km in older vs. 1.8 km in new nest sites) and houses are located, on the average, 1.8 km and 1.3 km from the nests, respectively. The landscape variables that are connected with feeding and disturbance conditions did not correlate with the reproduction rates of eagles in the last 40 years. The Estonian recovering White-tailed Sea Eagle population does not follow the ideal despotic distribution probably due to the historical impact of human persecution, which forced the eagles to breed far from human activity. However, this also meant the abandonment of optimal nesting areas near human-inhabited shores.

MOVEMENTS OF FINNISH SUB-ADULT WHITE-TAILED EAGLES TRACKED BY SATELLITES 2009–2017

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In 2009, the White-tailed Eagle Working Group of WWF Finland started a satellite-tracking project to gather data on the movements of Finnish White-tailed Eagles (*Haliaeetus* albicilla) in relation to the plans to construct new wind farms in Finland. The original goal was to collect hard data on the extent of foraging areas of breeding males. These data was needed for assessing, on the basis of real data and not speculations, the risk probability of collision with a wind turbine to be constructed within different distance zones from the nest. Unfortunately all attempts to trap breeding males failed and the primary goal related directly to conservation could not be achieved. But because the transmitters were purchased and available, they were mounted on nestlings and the new goal was to gather information on the movements of White-tailed Eagles during their wandering period from fledging to first breeding.

During 2009–2013, in total 14 White-tailed Eagle nestlings from Åland (1), southwest coast (4), west coast (4) and Quarken area (5) were equipped with 70 g solar-powered Argos/GPS PTTs manufactured by Microwave Telemetry Inc. Because Finland is a northern country, the daily amount of sunlight was not sufficient to load the batteries properly during the mid-winter months from the middle of November to the middle of February. Thus, during the darkest period many fixes of birds spending the winter in Finland were totally missing. However, the transmitters woke up again in spring when the amount of sunlight increased. The transmitters have been working otherwise quite well and one of the transmitters mounted in 2009 was still transmitting in summer 2017.

The total amount of data on the movements of the individuals tracked are quite extensive. A good example is the database of locations of the male "*Junnu*", which was mounted with the transmitter in Quarken area in the middle of the Gulf of Bothnia in 2009. By the end of 2015, the database included in total 17,811 accurate GPS-locations, which composed a cumulative track of 61,516 km and showed all the areas, which were visited by Junnu during its prospecting years (Fig. 1). Corresponding data sets of other individuals demonstrated the large amount of individual variation in movement strategies of sub-adult White-tailed Eagles.

In the first autumn, some individuals (e.g. Junnu, Fig 1.) behaved like genuine migrants and started their first autumn migration towards south driven by their innate clocks as early as in Mid-September, when the weather and other environmental circumstances were still favorable. In contrast, some other individuals did not leave their natal areas before the harsh winter conditions forced them to move away in the end of the year.

Secondly, the total area, where the sub-adult White-tailed Eagles wandered, varied very much between the different individuals. The largest total area was covered by Junnu, which spent every winter in southwestern Sweden and every summer in northernmost Norwegian, Swedish, Finnish or Russian Lapland, and crossed every spring and autumn its natal area in Quarken (Fig. 1.). Figure 1 demonstrates quite well how the "worldview" of Junnu expanded during the years.

In addition to Junnu, seven other individuals made one or more similar "summer migrations" of several hundred kilometers towards north from their natal areas. Why so many headed just towards north? On the other hand, the rest of the individuals moved much shorter distances and a couple of them stayed almost all the time close to their natal areas.

This variation means that, during the "bachelor" years, some White-tailed Eagle individuals (like Junnu) gained experience and had to survive in very variable environmental circumstances and, as a result, got a wide worldview. In contrast, the worldview of some other individuals; which stayed close to their natal areas, was surely much narrower, but probably deeper, which means that they had more detailed information e.g. about the best foraging areas within their restricted home range. Which strategy gives higher LRS (lifetime reproductive success) to an individual of the White-tailed Eagle: (1) to wander widely around the world during the bachelor years or (2) to try to find and settle down to the future breeding territory as early as possible?

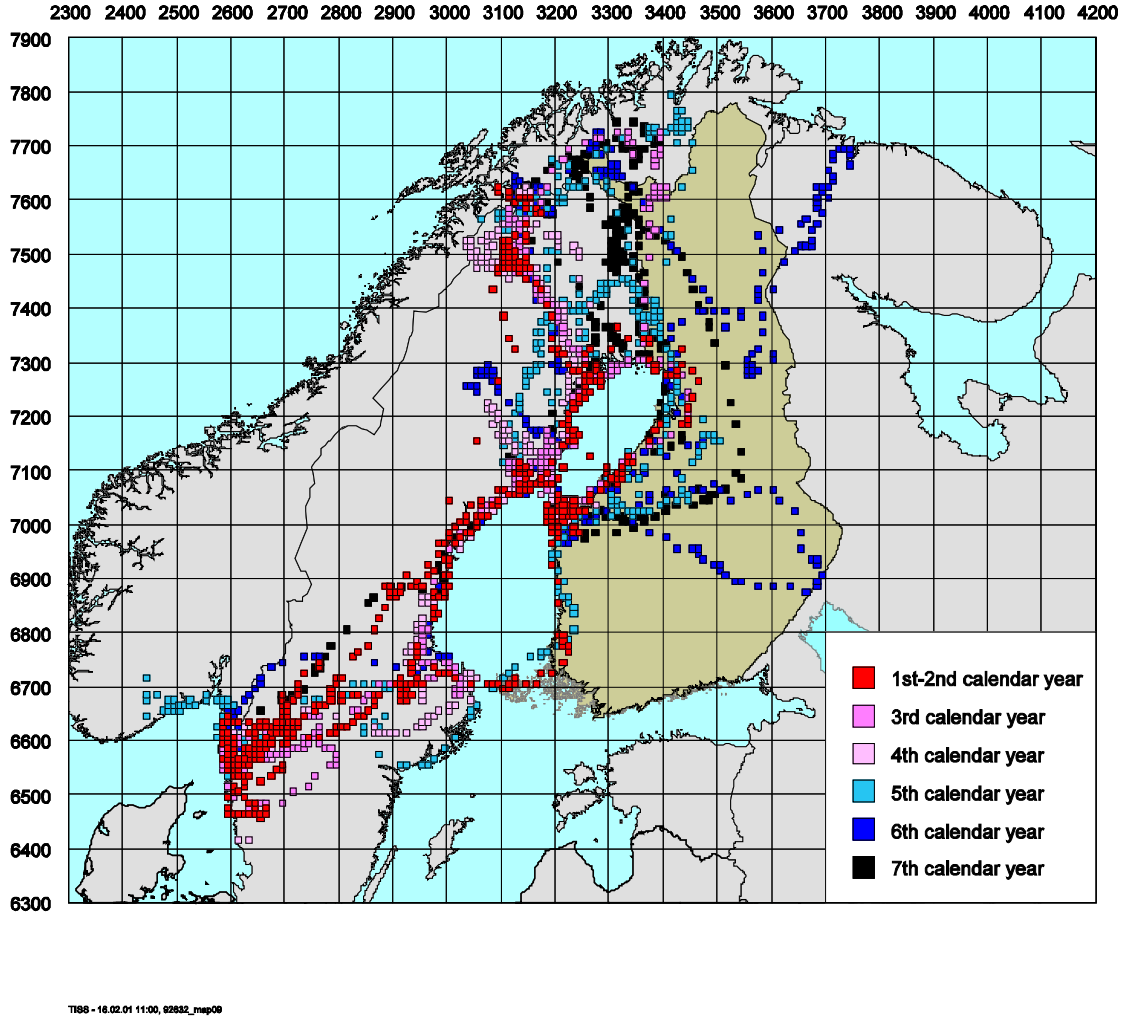

Figure 1. Spatial distribution of the locations of satellite-tracked White-tailed Eagle "Junnu" shown by 10x10 km squares of the extended Finnish National Grid. The color indicates the calendar year, when Junnu visited each square for the first time.

SEA EAGLES AND SHEEP FARMING IN SCOTLAND – FINDING A BALANCE FOR SUSTAINABLE CO-EXISTENCE

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Sea eagles were re-introduced to Scotland in three phases beginning in 1975 on the Isle of Rum, Wester Ross and Fife after the species were extirpated in the early 1900s mainly due to human persecution. The population has successfully expanded its range across Scotland with it's stronghold in the West. In 2015 the population reached 100 pairs. Recent population projections predict a continuation of the range expansion to occupy more of the sea eagle's former range. With no restrictions, it is estimated there will be over 800 pairs by 2040. (Sansom et al 2016) Sea eagles are generalist and opportunistic predators, and are known in Scotland to have a wide and varied range of prey depending on what is locally available to each pair. This can vary from a diet dependent on fish and sea birds near the coast, to grouse and hares in a more upland environment.

55% of Scotland's agricultural land is dedicated to sheep farming and mixed sheep and beef cattle in the uplands. These farms are characteristic of land that is disadvantaged in terms of agricultural production or Less Favoured Areas because of its poor soils and short growing season. (SNH website) There were 2.62 million breeding ewes in Scotland in June 2016, with the majority (1.53 million or 58 per cent) in flock sizes of 500 or more breeding ewes. (Scottish Government statistics) Most livestock production in the Scottish hills would not be economically viable without the financial support provided by the Less Favoured Area Support Scheme and the Single Farm Payment. (SNH website)

Hill farms are generally managed as ‹extensive› systems which frequently cover thousands of hectares. More often contact with stock is limited over the course of the year with ewes being hefted to areas of the hill, and lambs born in that area will maintain that tradition. Contact with the flock are limited to tupping, ‹marking› when lambs are between 2–12 weeks , clipping (in some systems, marking and clipping happen at the same time to limit contact and effort) and gathering for lamb sales. There are often substantial "black losses" during some years, and a certain proportion of this is now suggested to be due to sea eagles.

When the Scottish sea eagle population started expanding following the first successful breeding attempt in 1985, sheep farmers began reporting lamb losses attributed to sea eagles. Viable lambs were being reported as being killed as well as dead lambs being scavenged.

In large areas of Western Scotland, some of the sea eagle's "natural" prey has been removed – rabbits for example have been eradicated from large areas of the west coast as they

are perceived as agricultural pests. This coupled with frequent reductions in the population through introduced diseases has made it impossible for rabbits to recover over most of their previous ranges.

Initially according to the National Farmers Union of Scotland (NFUS), the Royal Society for the Protection of Birds (RSPB) and Scottish Natural Heritage (SNH) were widely viewed as being insufficiently concerned about potential impacts on sheep farming when the sea eagle reintroductions were proposed and carried out.

Some farmers in the areas most affected by predation claim to lose on average 11 per cent of their lamb crop to Sea Eagles (NFUS) and a huge increase in the numbers of farmers having to purchase replacement ewe stock in extensive systems due to losses to Sea Eagles.

As a result of increasing pressure from the farming community, a study was carried out on the Isle of Mull by Mick Marquiss and Mike Madders between 1999 and 2002 to quantify the contribution of viable lambs in the sea eagle's diet and therefore the economic impact of losses. The study also aimed to provide some recommendations to reduce the impact of sea eagles on lambs in areas where this occurred.

The study found that some lambs were indeed killed by sea eagles, but there was circumstantial evidence to show that many of these lambs were not viable. Most lamb carcasses found in nests had been scavenged. (Marquiss et al 2002) The study was carried out over three years and the number of lambs killed each year varied and may have been due to the predisposition of those lambs. Further research was carried out in Gairloch in 2009 where lambs were fitted with radio collars to determine how many of them were killed and taken to sea eagle nests. No lambs were found to be killed by sea eagles during this study, however 5 lambs were found to have been scavenged (Simms et al 2010)

Following the observations made in this study that weaker or non-viable lamb that were more likely to be predated, financial support was offered to farmers to help improve the health of their stock through the "Sea Eagle Management Scheme". Measures eligible for funding included scanning ewes to separate single lambs and twins (who are more vulnerable), better nutrition by providing feed blocks, medication against diseases and extra shepherding to increase the human presence on the hill and to spend more time attending to lambs. Farms within 5km radius of a sea eagle territory were able to apply for a maximum of £1500 per year (depending on the size of their holding) for three years to carry out these measures through the scheme. Farmers were also able to apply for all of the funding in a lump sum of £4500 to carry out capital works such as liming areas of their farm to increase soil fertility, fencing new areas to create safer lambing areas, or to build poly-tunnels to lamb inside in order to protect the lambs while they were at their most vulnerable. The uptake of this first version of the scheme was reasonable, but many farms found this approach patronising as it suggested that their husbandry was inadequate (pers. comm). Also, farmers felt unwilling to adapt their farming system or to move their stock – sometimes as it was unpractical due to restrictions on suitable grazing land.

After the first three years of the scheme, some changes were made to the way that interested parties interacted with each other and also the way that the scheme was delivered. Following a meeting between the NFUS and SNH in 2014, and an action plan outlined by the NFUS, two stakeholder groups were established in the areas experiencing the biggest perceived impact from sea eagles – Argyll, and Skye and Wester Ross. The stakeholder groups consist of representatives of NFUS, SNH, RSPB Scotland, Scottish Crofting Federation and Forestry Commission

Scotland, and aim to meet four times a year. It is now the role of these stakeholder groups to steer SNH's management of the Sea Eagle Management Scheme, to decide on the best allocation of funds, and to review applications to the scheme.

Measures available through the previous schemes remain available to applicants, however there is a greater emphasis and a more flexible and creative approach to preventative measures, and the scheme is now open to farmers across the sea eagle's range. Two "call off contractors" per area were employed to provide face to face visits and provide expert advice to farmers interested in becoming involved in the scheme, which helped build rapport and trust between SNH and the farming community. Applicants to the scheme are asked to provide detailed information on their flock, sea eagle sightings and retain carcasses for immediate collection for post mortem.

As a result of this work, progress continues to be made to try and ensure a sustainable coexistence between sea eagles and the farming community across Scotland.

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WEBCAMS AS A TOOL IN OPENING OF NEW PERSPECTIVES

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We always try to use some tools to enhance the results of our work. Sometimes the value of elaborated tools turns out to be even higher than originally thought. We always have some dreams and hope to fill them someday. It may be that your childhood dreams come true at the age of retirement...

We installed the first online nest camera in Estonia **in 2007** at the Black Stork nest. Next year there were two cams (plus Lesser Spotted Eagle) and in 2009 already four nest cameras (plus White-tailed Eagle, Tawny Owl), etc. In course of Eagles Cross Borders project between Estonia and Latvia (2011-2013) webcam technology and know-how was exported to Latvia, improved there and shared between both countries in a new quality (4G GSM transmission, YouTube streaming, carefully selected cameras and audio, etc).

EAGLES CROSS BORDERS

The quality of streaming has changed in ten years remarkably as you can see in these two comparative images from 2007 and 2016. That was achieved by teams of technicians in both countries through constant improvement of quality and searching for new technical solutions.

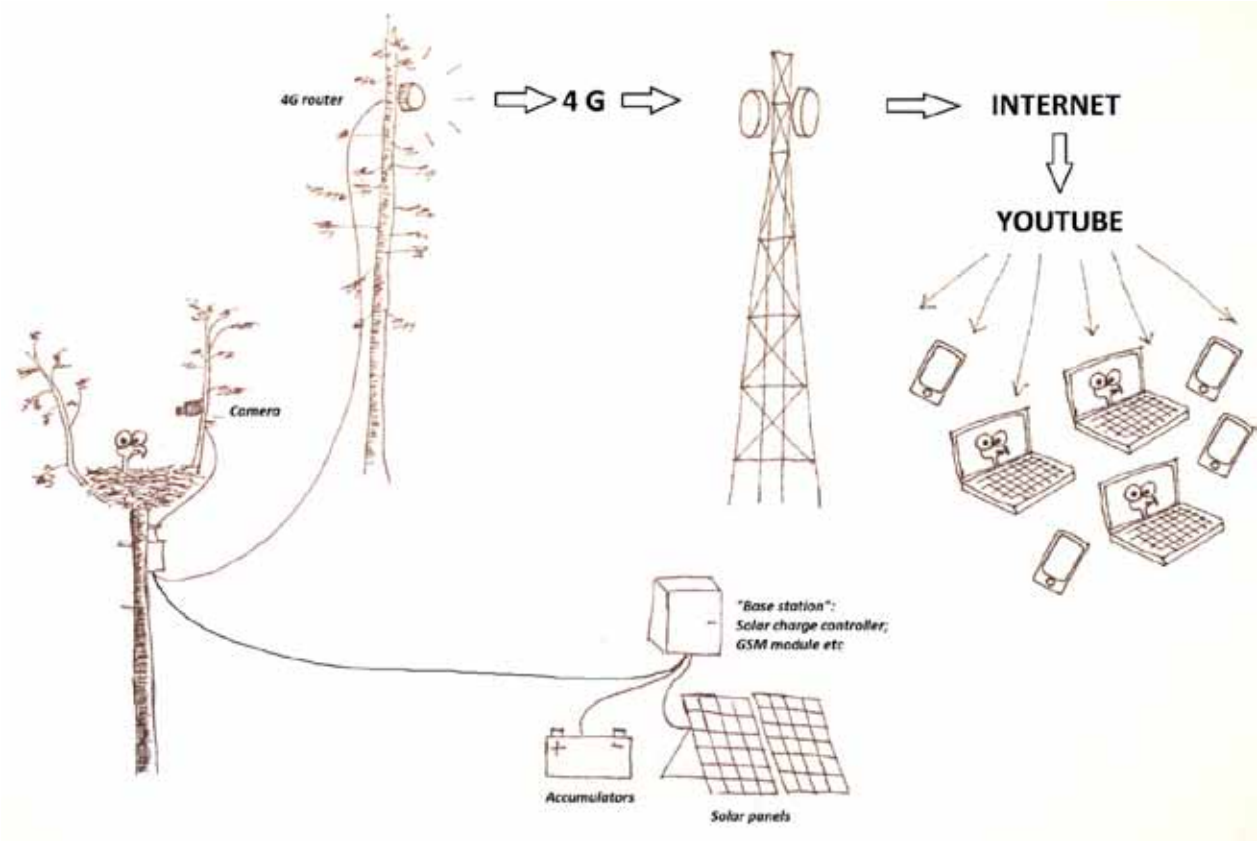
Watching of birds through webcams is possible not only during the breeding season – camera has been installed at winter feeding place of White-tailed eagles to record various aspects of

wintering as well as read the colour coded rings. In 2017 in Estonia 16 sets of web cameras were used, of those 8 nest cameras, while in Latvia 6 nest cameras were maintained by Latvian Fund for Nature and several more by other organizations. Why that all has been done? We can protect what we are familiar with. It is necessary to bring nature and understanding of natural processes closer to wide audience. The approach we have chosen is to familiarize large audiences to certain aspects of wildlife by showing it via high quality webcams for free. There are many natural objects that can't be observed easily by general public due to their elusiveness, but at the same time they need to be protected by posing restrictions to human activities. By getting more familiar with protected objects, those restrictions can be easier to understand and tolerate. Live translations from wildlife sites attract large audiences. The most interested watchers try to find special communities (like internet forums) to share the emotions and knowledge. That results in millions of people that can potentially influence the decision makers on various matters of nature conservation policy, developers on influencing nature values, or teachers (parents) influencing youth. As can be seen below, there is some potential:

How it works? It was a frequent question few years ago, but not so much anymore– so we can share our experience without any losses ;-)

Figure left: Finnish guys want to launch a WtE webcam and look for Estonian experience.

In general the system works in following way:



Surveillance camera with low energy consumption and small size of visible body, powered by solar energy station/accumulators and data transferred via WiFi or GSM data upload. Everything else is the fine tuning of above mentioned and timing of actions carried out (according the species to be watched). If to concentrate on WtE, we suggest to pay attention to following aspects:

– timing of works. In February it is usually late already and in daytime eagles may watch you working up in the tree. It is always better to work during the night time, but that is not easy when working high above the ground;

Figure above: Working in night time may be not easy, but no disturbance to the eagles.

- everything artificial needs to be carefully camouflaged, but it is difficult to camouflage the lens. Choose the camera with smallest lens possible (smallest area of glass);
- if possible, install solar panels further away from the nest tree (200-300 meters would be appropriate);
- first year we recommend to install camera further away from nest then you would possibly like it, accommodate birds to the equipment and maybe later get it closer (although you may like also wider view);
- avoid additional visits to the area, even if camera needs the repair. Postpone it to the ringing time.

What knowledge we got of WtE cameras in ESTONIA/LATVIA to share?

- It is possible to install camera on WtE nest, but it needs experience and following some rules (above);
- chances of seeing breeding birds in coming season are difficult to estimate, eagles renew the nest usually in autumn and may visit it throughout the winter;
- even in nests that are not occupied by the permanent pair, adult and subadult birds can be seen on regular bases ;
- human caused disturbance is a serious problem for WtE, after ringing of chicks adults may return to the nest late (even after several days);
- WtE is one of favoured species for audience behind screens (highest user numbers, up to 12M per season);
- large amount of scientifically valuable material - refined fenology data, documentation of nesting behaviour and food items (it is recommended to save the full stream);
- many of watchers who got familiar to the WtE nesting life share their documentation of events on nest, photos or videos, and make them available in internet forums – that is a valuable material for those who can't watch it live;
- free access is important to address large audiences.

Future perspectives of web cameras:

- Quality data about nest life, contact-free monitoring, valuable material for interpretation of classic field observations;
- citizen science (public using of data);
- raising of public (and specialist) awareness;
- fully free access to the material and wide involvement of public;
- further improvements in quality of broadcasts (4K resolution?);

- humans have less free time, watching of wildlife may disturb them from working or other activities. But cameras may also improve the working environment in fully artificial work place, for example in EU/EC offices in Brussels;
- live streaming replaces ordinary TV and prepared broadcasts (canned information) if transmission quality will be good enough... Probably not so far future anymore!

NEW DATA ON THE NESTING BIOLOGYS OF WHITE-TAILED EAGLE (*HALIAEETUS ALBICILLA*) ON THE TERRITORY OF ULYANOVSK REGION

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The white tailed eagle is a rare nesting species, on the territory of Ulyanovsk region it is met on the banks of the Kuibyshevsky reservoir and Saratovsky reservoir and is listed in the Red Book.

The white-tailed eage is closely connected with water, that's why the main place of living is near the water bodies full of fish. White-tailed eagles mainly nest not far from the water basin and the choice of nest is defined by the availability and amount of food.

The white-tailed eagle is a typical polyphage and it does not stick to one type of food. Depending on the conditions the food source might vary, it feeds on carrion as well. The feeding flexibility allows the eagle to occupy an advantageous place from the trophage point of view.

In the current work we discuss the results of the observation of the white-tailed eagle which were obtained during the 2016 and 2017 nesting periods. On the nesting territory of the pair there were several nests and all of them were built up within the forest shelterbelt.

The first nest was found by the author accidentally in the forest shelterbelt while driving past March 31, 2016. When observing the nest from the road though the binoculars the nesting bird with the laid eggs was clearly seen. Later the nest was visited two more times one month later after the finding and in July after the birds had left. The nest was made at the distance of 7 kilometres from the water reservoir and 300 metres away from the busy highway. That nest location is not unusual for the region, from the literature source the cases of the nesting are known near the same reservoir at the distance of 4,5 kilometres but farther away from the roads and human habitation.

Bird ringing on the nest found in 2016 was not possible due to the fragility of the construction so it wasn't done. The following visit after the birds had left the nest, the gathering of the food leftovers and pellets was made.

At the beginning of 2017 there was a prior observation of the nest to check if it was inhabited. When observing though the binoculars it was clearly seen that the nest had not been renewed that year, also the adult birds were not found anywhere nearby. Several weeks later the nest was dropped on the ground, probably by strong wind.

On the same day the observation of the tree nests which had been spotted earlier by Dmitry Trofimov was made. One of them was inhabited and there were two downies seen in it.

Two weeks later on April,14 we ringed two small birds on the inhabited nest, made the check of the food leftovers. Also while deeper observation of the reserve nests in the neighbouring forest shelterbelts we found out another nest that had fallen down together with the tree.

The analysis of food leftovers showed that during the small birds feeding the main food source was not fish but the carrion taken from the territory of the nearest animal burial site and crows's juveniles. In addition to this, some bone leftovers of the cattle and other mammals were found. From all mentioned above, it is possible to make a conclusion that being a polyphage the white-tailed eagle can easily turn to other more widespread and available food source.

During one of the winter check-ups of the white-tailed eagle at large gathering we observed the mating behaviour: it was flying with a branch in its claws and passed it to another bird. That all took place some 5-6 kilometres away from the nests described above. We would venture to suggest that the couple could have paired up during wintering on this territory.

CHALLENGES OF PRESERVING A SMALL AND ISOLATED SEA EAGLE POPULATION

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White-tailed Eagles *Haliaeetus albicilla* were abundant in Iceland in the early 19th century, but declined drastically from the 1880s on due to direct persecution and poisoned fox baits. When Iceland became the first nation to grant Sea Eagles legal protection in 1914 there were less than 40 pairs remaining. Their numbers continued to decline for the next decade but remained relatively stable at 22-25 pairs through the 1960s. Increased restoration efforts, including a ban on fox baits in 1964 and reduced nest disturbance led to a slow and relatively steady population increase from 1970 to this day. In 2017 the population was estimated at 76 territorial pairs.

The low genetic diversity of Greenland and Iceland White-tailed Eagles and the occurrence of a unique haplotype strongly suggest that these populations have been isolated for a long time from other White-tailed Eagle populations. Furthermore, there is no indication of eagle movements between Iceland and Greenland or Iceland and Europe. Thus, Icelandic eagles presently form an isolated population and no reinforcement may be expected from other areas.

Eagle habitats in Iceland are relatively pristine and many historical nesting territories remain unoccupied. Hence, the Icelandic eagle population can be expected to increase considerably in the future and expand to deserted breeding areas in North, East and South Iceland. Most of the recruitment to the breeding population involves pairs either settling in historical territories in the core breeding area in West Iceland or the subdivision of occupied territories.

Despite a vast improvement in the White-tailed Eagle conservation status in Iceland, breeding rate (<70 per cent of the pairs breed annually), breeding success (<0,5 young/territorial pair/year) and rate of population increase (2.4 per cent per annum) is considerably lower in Iceland than most other recovering populations with no apparent long term trend in the past 30 years. Typically, nest success is lowest in cold springs, but anthropogenic factors, such as human disturbance and pollutants have effect in some territories. In addition, small populations are more susceptible to genetic drift and inbreeding which may affect population viability.

The viability of the White-tailed Eagle in Iceland will be discussed in relation to the above factors and the ongoing research and monitoring.

WHY ARE EAGLES FALLING FROM THE SKY? THE FIGHT AGAINST BIRD CRIME TO SAVE THE EAGLES OF HUNGARY

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Both the White-tailed Sea Eagle (*Haliaeetus albicilla*) and the Imperial Eagle (*Aquila heliaca*) are among the most emblematic species of the rich Hungarian avifauna. Population sizes are approximately 300 and 165 pairs, respectively, thus contributing significanly to their regional cohorts. Despite tremendous conservation efforts, many factors threaten these vulnerable populations. Habitat loss, disruption of breeding sites, poaching, electrocution and illegal poisoning are considered the main threats to these species, with deliberate poisoning ranking highly on the list. The Budapest Zoo was a stakeholder in a LIFE Plus project between 2012 and 2016, which – amongst other tasks - tried to deal with the cases of illegal poisoning.

Unfortunately most of the affected birds are found dead and detailed autopsies and toxicological examinations are carried out consequently. A minority of these eagles are brought into the Rescue Centre at the Budapest Zoo alive, where a physical examination and radiographs are performed promptly along with emergency care, immediately following the arrival of the patient. If the typical clinical signs (clenched talons, neurological signs, vomiting, a distended crop, bradycardia) of organochlorine intoxication are seen, an antidote, atropine is administered straightaway at a dose of 1 mg/kg im. BID. In some cases atropine has provided quick relief, but re-occurrence of the symptoms took place. The administration of atropine at this dosage is safe and effective even in emaciated birds. The most commonly found agent is carbofuran, a pesticide banned in the EU since 2008. Nevertheless, this substance is still commonly used in other parts of the world and very often found as a toxin in poisoned birds (Elliott et al., 1996; Kupper et al., 2007).

X-rays are extremely helpful to exclude foreign bodies and possible lead poisoning in these cases. Eagles are quite often shot, but shrapnel or bullets are frequently not related to the acute onset of the clinical signs described above. Nevertheless, radiography has an important role in the forensic and legal procedures.

A summary of the intoxicated eagle cases between 1998 and 2015 is shown in Table 1. The high numbers clearly indicate the huge impact on these bird species and the threatening trend, which is finally improving due to the coordinated conservation efforts.

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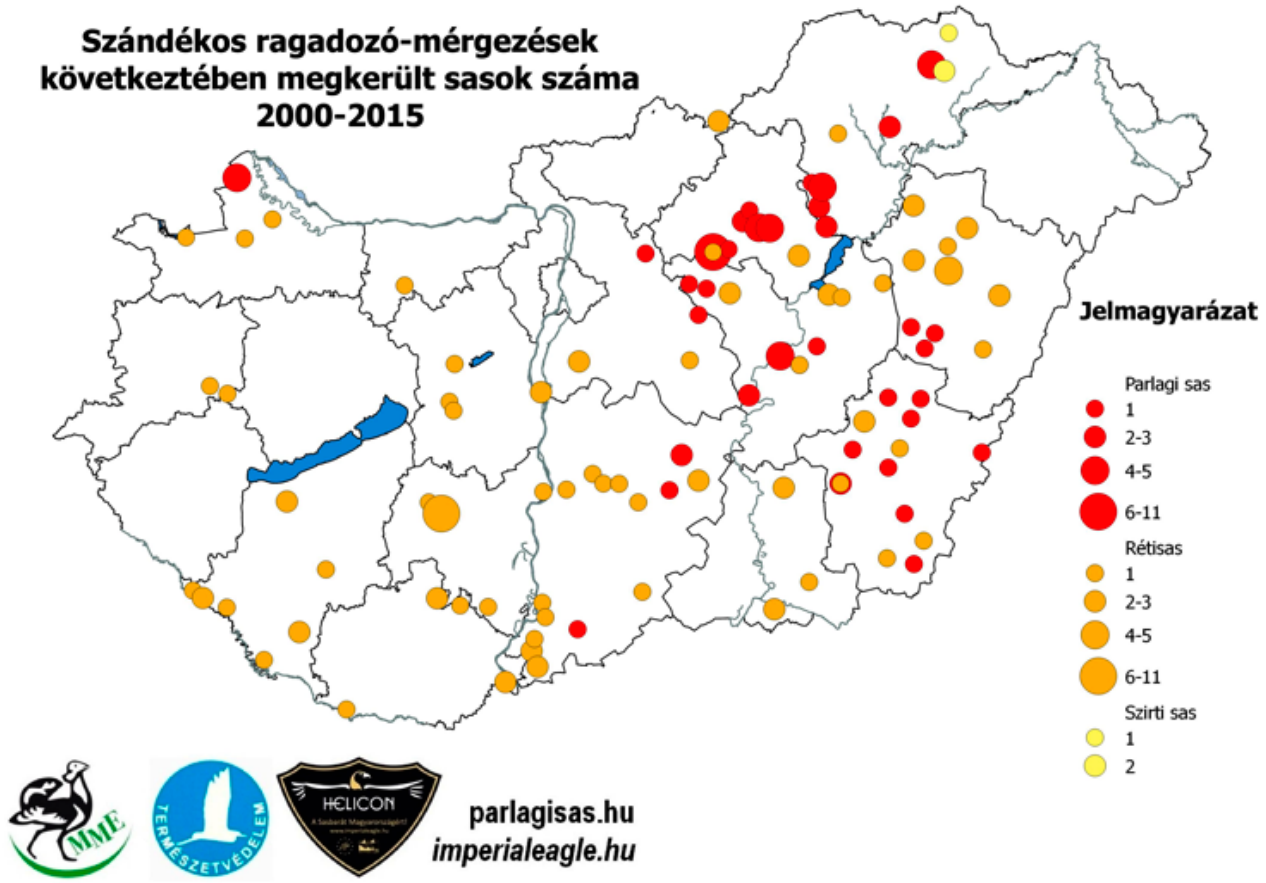

Table 1. Intoxicated eagle cases in Hungary between 1998 and 2015. (szirti sas = Golden Eagle, retisas = White-tailed Sea Eagle, parlagi sas = Imperial Eagle).

THE WHITE-TAILED SEA EAGLE IN FINLAND – NUMBERS AND ACTIONS

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ABSTRACT

The breeding success parameters of the White-tailed Sea Eagle (WTSE) in Finland are annually monitored by visiting all known nest sites and searching for new nests and territories. The field work is carried out by volunteer field workers organized in regional working groups supported by WWF Finland since 1973. In northern Finland Metsähallitus (the State Forest Enterprise) is responsible for the monitoring.

The numbers of half-grown nestlings have increased with the rising numbers of reproductive pairs. In the 1970's the Finnish population was close to extinction but has grown steadily in later decades (table 1).

Decade	**1970–79**	**1980–89**	**1990–99**	**2000–09**	**2010–16**
Average number of nestlings	8,4	29,6	98,7	246,8	407,6

Table 1. Average annual number of observed half-grown White-tailed Sea Eagle nestlings in Finland in each decade in 1970-2016.

The annual numbers of occupied territories (at least nest construction observed) are still growing which is manifested by the numbers of occupied territories in the ten-year period of 2007-2016. In 2007, we found 283 and in 2016 490 occupied territories (73 per cent more than in 2007).

A new period of freshwater territories started in 1977 when the first nest was found by a reservoir in northern Finland. Earlier there were some sporadic nests known in northern Finland. In 2016, the number of freshwater territories in northern and north-eastern Finland was 72. In southern Finland, the first freshwater territories were found not until 1996 in south-western Finland. In 2016, 31 freshwater territories were known in southern and central Finland.

The population structure of the WTSE has been studied in Finland from DNA samples using feathers taken from nestlings. The WTSEs in Finland can genetically be divided into two sub-populations: 'the Baltic sub-population' of coastal and southern freshwater breeders and 'the northern freshwater sub-population' of northern and north-eastern breeders.

There seems to be a shift in nest site selection over time. In the 1970s, after several decades of heavy persecution, the nests were mostly well hidden in remote forests in the archipelagos. Nowadays new WTSE nests are regularly found near water, in solitary trees in logging areas, on navigation marks or even on the ground on treeless islets. The breeding success does not differ in different kinds of forests.

Species protection has been the key purpose in the monitoring activities. Till the 1990s the best protection of the few known nests was thought to be to conceal the knowledge of the breeding places. On the other hand, plans to protect the breeding places and their surroundings were produced for the environmental authorities already since the 1970s and in some parts of the breeding area co-operation with forestry actors started to avoid unintentional disturbance of breeding eagles. In the beginning of the new millennium we started to create a database of all known nests and territories nationwide. This database is now an important tool in the open cooperation with authorities responsible for land use to take the WTSE nests into account in land use planning and forestry activities. Hence, the former secretive protection gave way to the open cooperation with land use authorities. We present three recent examples of protective measures taken together with other actors in the society.

(1) All WTSE nests are protected by law in Finland since the 1920s. Annually we provide the land use authorities with the exact coordinates of all nests that still are potential for breeding. Consultants and other land use planners get the information they need for their reports from the environmental authorities.

(2) In 2010 WWF Finland published directions how to take the WTSE into account when planning where wind turbines could be located. The directions were updated in 2015. The main messages to wind power planners are that wind turbines can be built beyond a 2 km range from WTSE nests, and that WTSE flights between nests and primary hunting grounds up to a 10 km distance from nests should not become unsafe.

(3) Electrocution is an important cause of death of WTSEs and other big birds of prey. After a pilot project in the Åland Islands in the 1990s the Finnish Energy in 2009 published instructions how to make power line poles safe for WTSEs and other big birds that frequently use poles as a perch. This guide was prepared together with WWF Finland. The main construction is a second beam above the power line pole construction so that birds can only land on the second beam without contacts to the power lines.

Although the numbers of WTSEs now are higher than anyone could imagine in the many decades characterized by persecution or environmental toxins we still see worries. We present two examples of worries.

(1) In the 1960s the breeding Eider *(Somateria mollisima)* population started to increase and in a few decades the Eider became the most abundant breeding bird species of the Baltic. The great majority was breeding on small, often treeless, islets in the outer archipelagos. Factors allowing the population growth were at least (a) the ban of spring hunting of Eiders along the migration route in Sweden in the 1950s; (b) an almost total lack of the top predator WTSE, and presumably (c) eutrophication of the Baltic improved the feeding possibilities of Eiders.

From food studies we know that Eider females are the main breeding time prey of WTSEs breeding in the outer archipelagos. In addition, young non-breeding WTSEs hunt both incubating Eider females and chicks. Other important predators include large gulls consuming chicks and several mammal predators. E.g. the Mink *(Mustela vison)* is known to kill also incubating Eiders. After 1990s the Eider population in many parts of the outer archipelagos has collapsed and the increasing predation pressure caused by the WTSEs is obviously one important factor among other factors such as the possible deficiency of vitamin B1 (thiamine).

Now there is a genuine concern for the Eider among hunters, researchers, and laymen. Especially on the Åland Islands, where spring hunting on Eider males still is allowed, we see some hunters' public opinions that the numbers of WTSEs are too high.

(2) One human-related mortality factor of WTEs is lead poisoning. The intoxicating lead, as far as we know, comes from lead shots and fragments of bullets and WTSEs get it mainly with food. Waterfowl may pick up and swallow lead shots from the bottom of the see or lakes or they can carry lead shots in their bodies after a poor hit in hunting. Since 1996 lead shots are banned in waterfowl hunting elsewhere in Finland but are still allowed in the Province of Åland. The WTSEs also take lead when, during the hunting season, they consume offal of hunted mammals or carcases of shot animals. In mammals the bullet splits to small fragments widely around the wound channel.

Considering the increasing population, the WTSE in Finland seems to sustain the additional mortality caused by human activities. This does not mean that we can ease protective measures neither stop monitoring.

SCOTTISH SEA EAGLES: WHERE ARE WE NOW?

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This presentation will provide an update on the reintroduced Scottish population. It will cover recent changes in population status at a national level covering both the longer established West coast population and establishing East coast population. There will also be a look towards the future drawing from the recently published Scottish Natural Heritage Commissioned Report 898: Population and future range modelling of reintroduced Scottish white-tailed eagles (*Haliaeetus albicilla*).

The presentation will also introduce policy context and approaches in Scotland to managing existing and potential constraints on the population, touching on the key topics of agricultural issues, forestry management, wind farms, persecution, competition with golden eagle and ecotourism.

IMPACT OF GROWING WHITE-TAILED EAGLE POPULATION ON DECLINING BLACK STORK POPULATION IN LATVIA

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The first information about possible interactions between the White-tailed Eagle (WtE) and the Black Stork (BS) in Latvia was collected at the turn of the 21st century - remains of an adult Black Stork were found among the prey items in a WtE nest, there were some direct observations of aerial conflicts between the two species and a suspected nest abandonment of Black stork due to a WtE settling in a close neighbourhood.

The population trends of the two species in Latvia in the 21st century are completely opposite. The numbers of WtE are constantly increasing while the breeding population of BS is decreasing. In 2017 for the first time ever the breeding population of WtE in Latvia has exceeded the number of breeding pairs of BS (90-140).

The first case when the WtE was suspected to be the nest predator killing all juveniles in BS nest happened in 2007. The number of such cases has grown significantly, particularly in the last years when we have much better possibilities to follow what is happening in many nests due to the use of technologies. We have used trail cameras to document breeding ecology and behaviour of Black storks since 2011. The processed data comprise more than 4000 camera days from 75 nests of BS, mostly from 2016 and 2017. One BS nest has been under permanent webcam surveillance since 2015. These new data among other things document 10 direct visits of WtE to Black Stork nests. We have confirmed information that WtE has been depredating both eggs and juveniles of BS and that its visit is causing change of nest site also when no direct physical harm has not been done (both adults alive and no egg taken).

In this presentation we analyse how the growing population of WtE has possibly affected current decline of BS. We hypothesise that the WtE has contributed to reduction of available range of BS by «pushing it out of former breeding sites». Part of the problem behind this may lie in the fact that most BS territories are very old so the nest sites were established well before the WtE presence there. This assumption is supported by the fact that most BS nests recently predated by WtE are very old ones. We analyse how the distances between the occupied nests of the two species have changed during the last 11 years (2007-2017). We discuss also what is the possible role of (forestry caused) changes of landscape (forest cover / forest quality) in current and future development of both populations in Latvia.

HISTORICAL AND MODERN CONDITION OF WHITE–TAILED SEA EAGLE IN AZERBAIJAN

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White-tailed Sea Eagle has distribution in the plains and foothill regions of Azerbaijan along rivers with gallery forests(tugay) and along the Caspian Sea coast. It is a breeding bird in Azerbaijan but has never been common or numerous. The number of birds in winter is higher than in the breeding season due to the arrival of migratory specimens from the north. Wintering birds arrive in September/October, mostly between mid-October early November and leave Azerbaijan sometime during March – beginning of April. During the wintering seasons of 1980s, also at the beginning of the 1990s, about 20 – 25 (up to 40) birds were wintering in the Gyzylagach State Nature Reserve, in the 1960s and 70s from 8 to 10 birds in the Aggol National Park, from the 1950s to the 1970s five-six(maybe more) along the Caspian Sea coast between Baku and the Bandavan cape (Shirvan National Park); they can be encountered on Gusar plane in North Zuvand Plateau in south also, etc. (Mustafayev, Gambarov, 1977, Patrikeev, 2000). Only one individual was encountered in 1991 in the Aggol National Park (Patrikeev, 2000).

According to our data from January and February 1996 only six birds were encountered in the Gyzylagach SNR and three birds in the Shirvan National Park (Paynter et al., 1996), a specimen was registered on the lake Agzibir in the north of the country (Khanlar plot) in December 1996; 33 birds were counted in January-February 2006 (22 in Gyzylagach (official report of Gyzylagach SNR), and one on the lake Ajinohur, ten birds were counted in Aggol NP); 25 ind. were counted in January-February 2008 (22 in Gyzylagach (official report of Gyzylagach SNR), two on the lake Ajinohur and one on the lake Mahmudchala); 14 ind. were counted in 2012 (four in Samukh State Hunting Economy, one on lake Mahmudchala, seven in Gyzylagach SNR and two in Aggol NP; ten birds were counted in 2013 (in January-February five birds at the Araz water reservoir and one in Aggol NP, four individuals around Lesser Gyzylagach Gulf in March); in 2014 six birds were registered in the Absheron NP and two on the lake Mahmudchala in January-February.

Breeding of White-tailed sea eagle in Azerbaijan begins in February (the repair of old nest or the construction of new nest). Nest can be constructed on a tree or even on power transmission pole (Electric Pylon), in literature nesting on tamarisk bushes has been mentioned(Vinogradov, Chernyavskaya, 1965a; Butyev et al.1990 etc.). We have found nests of two type: on Electric Pylon in about 70 km from Baku city to south along Caspian Sea Coast (this nest was found in 1996 and existed no less than 15 years) and in tugay gallery forest in the Agjabedi district along the Kura river in 500 metres from a nest of Imperial Eagle (our data, May 2013). Egg-laying begins from the 2nd half of February. White-tailed eagle has from one to three egss eggs in clutch, two as a rule. Brooding takes over a month, nestlings leave the nest in 11-12 weeks of age. 15 shot

birds in Gyzylagach SNR (Vinogradov, Chernyavskaya, 1965) had in their stomachs little bustard, moorhen, coot, different ducks etc. In general birds were found in nine stomachs and fish was found in 5 stomachs. They also can eat dead fish and birds.

White-tailed Sea Eagle is included in the Red Data Book of Azerbaijan as Endangered species (National Conservation Category II.3, species with sharp decrease of number in the past and stable low number now). Last Red Data Book of Azerbaijan (2013) shows seven breeding pairs for all Azerbaijan. We can estimate it from five to ten pairs opposing the estimate by M. Patrikeev at two to three pairs (2000). We have found nests in regions where the literature has indicated no nestiing (tugay forests of the Kura river, the Caspian Sea coast to the south of Baku where birds can eat waterbirds in big concentration around the cape Alat during wintering and migration and gulls from nesting colonies of islands of Baku archipelago during breeding season and in summer). So we suppose that the real number of breeding pairs in Azerbaijan is higher than it seems from the first look.

Taking into account that White-tailed sea eagle was encountered really on all big wetlands of Azerbaijan, including the Kura river, we can maintain that the number of wintering birds had some decrease in the 1990s and then again increase in the 2000s and the 2010s. The main wintering sites are the Gyzylagach SNR (from 12-22 to up to 30-40 birds), the Aggol NP (up to 10-12 birds), the Absheron NP (six), the Araz water reservoir. (up to five), the Shirvan National Park (three) and other big wetlands have regular wintering of not less than one-two birds. In general we can speak about at least from 30 to 60 individuals wintering regularly and about from five to ten pairs breeding in Azerbaijan.

EFFECTS OF HUMAN-CAUSED MORTALITY OF WHITE-TAILED EAGLE (*HALIAEETUS ALBICILLA*) TO ITS REPRODUCTION SUCCESS IN VOJVODINA PROVINCE (SERBIA)

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Data on the mortality of White-tailed Eagle (*Haliaeetus albicilla*) in Serbia were gathered during the monitoring of nests of this species (own data of István Hám) and following an information of dead individuals from citizens (most of them landowners). Data were collected between 2008 and 2017. Most of the data originate from the territory of Province of Vojvodina, the nothern part of Serbia, where the majority of pairs are breeding (Hám et al., 2009a, b).

Each nest in which mortality of chicks was registered were observed prior to the detection of mortality and its contents were previously registered.

Causes of mortality were classified as follows:

1. poisoning by carbofuran (only if it was confirmed by the toxicological analysis or if symptoms of carbofuran poisoning were observed at carcass)
2. death of chicks in the nest as a result of death of at least one of their parents
3. electrocution
4. unknown cause.

Geographical distribution, period of year and cause of death of 44 cases of human-induced mortality of White-tailed Eagle in Serbia (number of dead birds: 68, found from 2008 to 2017) were analysed.

Effects of human-caused poisoning have been strongly reflected in the nesting success and occupation of nests (in years after mortality). Nests have not been occupied by breeding White-tailead Eagles or succesiful breeding has not occured for 1 to 4 years (no. of cases in sample: 18; average period of abandonment of nest: 2.2 years) in 20 cases, after the poisoning of local breeding adults. It was suspected that abandonment of nests or lack of (succesiful) breeding in these ocasions was the death of adults that previously bred in it. In one case (Junaković Forest near Apatin), despite the fact that a carcass of adult male, presumably poisoned, was found below the nest on 12 May (in 2009), female of that pair succesifuly raised one juvenile.

Two cases were particulary illustrative. Near Svilojevo 11 birds of different ages were poisoned in total in March and April 2014. In Serbia there were 16 nests in the vicinity of poisoning site, eight of them being inactive or with failed clutch in 2014 breeding season (Figure 1; empty circles)

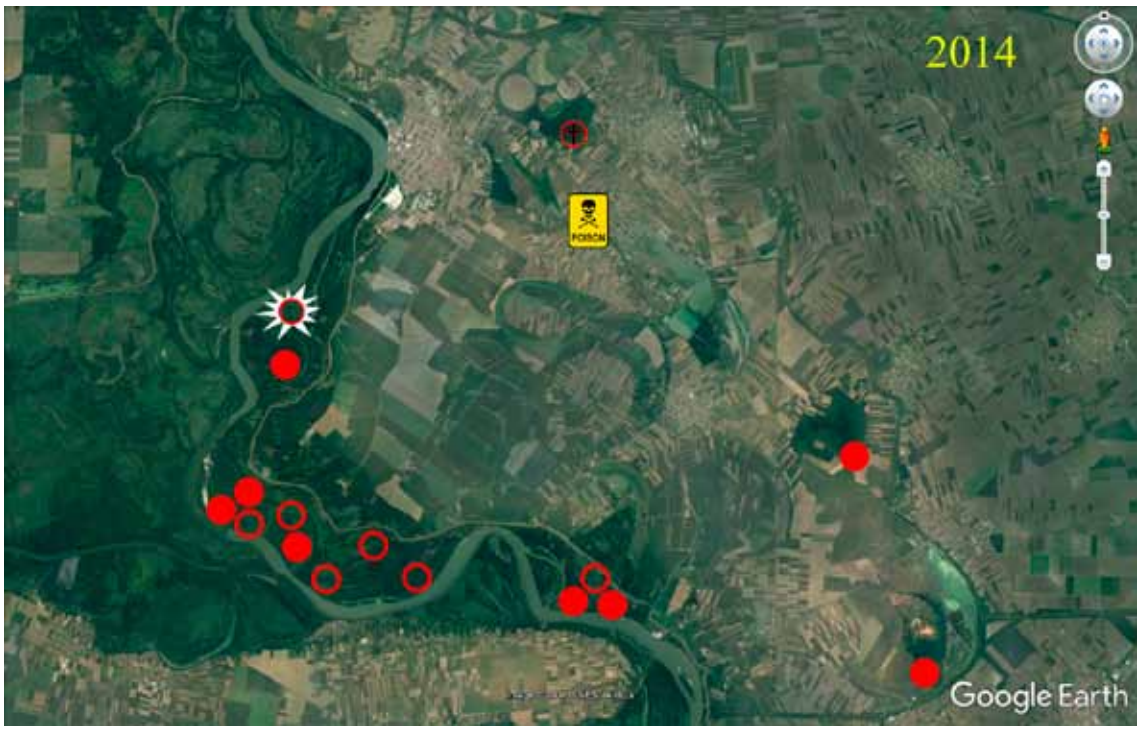

Figure 1: Presumed effects of poisoning of White-tailed eagle near Svilojevo on nearest nests: open circles – clutch/breeding atempt failed or was not ended; full circles: succesiful breeding.

Figure 2: Presumed effects of poisoning of White-tailed eagle near Sremska Rača on nearest nests: open circles – clutch/breeding atempt failed or was not ended; full circles: succesful breeding.

Near Sremska Rača 3 White-tailed eagles were poisoned between December 2015 and January 2016, with 4 out of six nearby nests being abandoned in that breeding season.

In the cases of poisoning, all analysed deaths, except two, have been the result of consumption of food with very high concentration of carbofuran. Carbofuran poisoning has occured after White-tailed Eagles have consumed parts of carcasses of domestic sheep, Golden Jackal (*Canis aureus*) and Red Fox (*Vulpes vulpes*). Most of the cases of poisoning were found on agricultural land, with smaller percentage in alluvial forests, which is in connection with the food which was the source of poisoning.

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