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The Food of the White-tailed Sea Eagle (*Haliaeetus albicilla*) at Lake Baikal, East Siberia

Potrava orliaka morského (*Haliaeetus albicilla*) na jazere Bajkal, východná Sibír

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Abstract: A long-term study (1991–2001) of the food of White-tailed Sea Eagles in the Svâtoj Nos wetlands at Lake Baikal, North-eastern Russia, revealed that these eagles feed predominantly on water birds, mainly ducks. Anecdotal data from the Selenga Delta in Southeastern Lake Baikal indicate that White-tailed Sea Eagles generally prefer birds as their prey in the Lake Baikal area.

Abstrakt: Dlhodobý výskum (1991–2001) potravy orliaka morského v mokradiach na úžine Svjatoj Nos v severovýchodnej časti jazera Bajkal ukázal, že sa títo orliaci živia predovšetkým vodnými vtákmi, najme kačicami. Obmedzené údaje z delty rieky Selengy v juhovýchodnej časti jazera Bajkal naznačujú, že orliaci morskí preferujú vodné vtáky ako svoju korisť na celom Bajkale.

Key words: White-tailed Sea Eagle, *Haliaeetus albicilla*, food, Lake Baikal, Buryatia, Siberia

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Introduction

White-tailed Sea Eagle *Haliaeetus albicilla* (Linné, 1758) is a widespread, though rare Palearctic raptor (Ferguson-Lees & Christie 2001). Its food is well known in the Western Palearctic (Fischer 1970, Cramp & Simmons 1980, Mizera 1999, Ferguson-Lees & Christie 2001), but data on its diet in Siberia is scarce, relevant studies being limited to Yakutia (Labutin et al. 1965, 1988) and Buryatia (Mlíkovský 1992, 1996). Our knowledge of the diet of White-tailed Sea Eagles at Lake Baikal, east Siberia, is summarized below, adding new data obtained in the Svâtoj Nos wetlands, North-eastern Baikal, in 2001.

Material and methods

Study area

Lake Baikal is a large continental lake lying north of Mongolia between 51.3° – 55.5°N and 103.4° – 110.0°E at an altitude of ca. 460 m. It is ca. 640 km long, up to 80 km wide and has an area of ca. 31 500 km^2. At suitable places, mainly in the deltas of large river flowing into Lake Baikal, large wetlands are formed, which offer suitable habitats for breeding and migrating water birds (Mlíkovský et al. 2002). Lake Baikal is frozen during winter, usually from January to May, although patches of free water remain at the Angara outflow and some rapid brooks falling into Lake Baikal from surrounding mountains. Spring starts approximately two to three weeks later at the northern end of Lake Baikal than on its southern end, whilst autumn comes there earlier.

The study of the diet of White-tailed Sea Eagles presented was carried out in the Svâtoj Nos wetlands, which cover much of the isthmus connecting the mainland with the Svâtoj Nos Peninsula (Fig. 1). See Mlíkovský et al. (1992) for their detailed description.

The species

The White-tailed Sea Eagle is a rare species at Lake Baikal, with breeding occurrence limited to large and medium-sized wetlands (Gusev 1976, Kel'berg & Prokop'ev 1988, Râbcev & Sonin 1993, Râbcev 1997, Popov 2004).

Fig. 1. Location of studied nests of White-tailed Sea Eagles (red squares) in the Svâtoj Nos wetlands, Lake Baikal. The village of Usť-Barguzin is located at 53.41°N, 109.03°E.
Obr. 1. Poloha študovaných hniezd orliaka morského (červené štvorčeky) v mokradiach Svjatoj Nos, jazero Bajkal. Súradnice dediny Usť-Barguzin sú 53.41°N, 109.03°E.

It leaves Lake Baikal for winter, although rare attempts at wintering have been reported (Râbcev 1997, 1998, Popov 2004). White-tailed Sea Eagles return to Lake Baikal in late March or early April. They usually lay eggs in late April and stay with their young near nest until late August or early September, when they disperse and then migrate to the south (Gusev 1976, Kel'berg & Prokop'ev 1988, Râbcev & Sonin 1993, Râbcev 1997).

Food collection and analysis

Food remains were collected under eagle nests at the end of or after the breeding season. Three nests were studied (see Fig. 1 for their location). Food remains were collected under nest A on 12 August 1991, under nest B on 9 August 1991, 11 September 1994 and 26 June 2001, and under nest C on 9 August 1991. Bones were manually cleaned and identified in the field or brought to Prague, Czech Republic, and identified using the author's comparative osteological collection. Voucher specimens are held in the author's collection in Prague.

Almost all bones could have been identified to genus, some to species. Minimum numbers of (prey) individuals (MNI) were calculated from numbers of identified specimens (NISP) according to Grayson (1984). Multivariate statistics (cluster analysis using simple Euclidean distances) were performed using Statistica 8.

Linguistic note

Most toponyms and personal names were originally written in the Cyrillic script. They were transliterated using the system currently valid in Russia (GOST 2000), which meets with the ISO 9:1995 standard (see e.g. Mlíkovský 2009b, Pedersen 2009).

Results

Results of the analysis of food remains of the White-tailed Sea Eagles in the Svâtoj Nos wetlands are summarized in Table 1. The composition of diet showed only slight variation between nests in 1991 and between years in the case of the nest B (Fig. 2). Birds were invariably predominant in all food samples (Tab. 1). All recorded remains originated from adult or subadult birds. If chicks were taken as prey by the White-tailed Sea Eagles, they were swallowed whole and could not be recorded under nests. However, Sea Eagles were never observed hunting for ducklings or for chicks of other water birds at Lake Baikal. It is unknown how many prey individuals were caught alive and how many were collected as carcasses. On many occassions Sea Eagles were seen observed hunting for ducks at Lake Baikal (see also Skrâbin 1975), but never seen feeding there on carcasses. Hence, the proportion of hunted prey is probably high. On the other hand, both Baikal seals whose remains were found under nest B in 2001, were pups. Carcasses of dead seal pups were regularly found on the shores of the Barguzinskij Bay in summer (pers. obs.), where they could be easily collected by Sea Eagles. White-tailed Sea Eagles are not known as predators of seal pups at Lake Baikal (Pastuhov 1993). Regarding fishes species, only pikes were regularly taken, although fish are diverse and abundant in Lake Baikal (see Sideleva 2004).

Discussion

Food of White-tailed Sea Eagles at Lake Baikal

Birds were found to form the majority of the diet of White-tailed Sea Eagles in the Svâtoj Nos wetlands (Mlíkovský 1992, 1996 and this paper). Anecdotic data from the Selenga Delta (Mel'nikov & Šinkarenko 1991, Fefelov et al. 2001) and from Maloe More (Râbcev 1997) support this conclusion. Similarly, Skrâbin (1975) observed that White-tailed Sea Eagles preyed predominantly on birds at Lake Baikal, but did not specify in which parts of

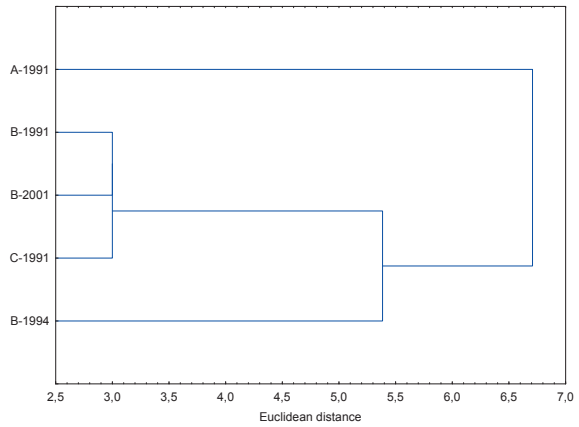

Fig. 2. Cluster analysis of prey samples collected in 1991–2001 under three nests of White-tailed Sea eagles in the Svâtoj Nos wetlands, Lake Baikal. Simple Euclidean distance was used. See Fig. 1 for the location of these nests and Tab. 1 for exact data.
Obr. 2. Klastrová analýza vzoriek koristi zbieraných v období 1991–2001 pod tromi hniezdami orliaka morského v mokradiach Svjatoj Nos, jazero Bajkal. Použitá bola jednoduchá Euklideovská vzdialenosť. Poloha hniezd je uvedená v Obr. 1, konkrétne údaje sú v Tab. 1.

Lake Baikal he made these observations. Gusev (1976) found fishes and birds in the diet of the White-tailed Sea Eagle at north-eastern Lake Baikal, but presented no quantitative results.

Among birds, the preferred prey were ducks from the genera *Anas* and *Aythya*, which are abundant at Lake Baikal, particularly in its wetlands (Skrâbin 1975, Mlíkovský 2009b; see also Heyrovský et al. 1992, Fefelov et al. 2001). Of particular note are records of muskrats (*Ondatra zibethicus*), as these mammals were introduced to Lake Baikal only in the late 1930s (Švecov et al. 1984, Lâmkin 2004).

The data obtained from uneaten food remains collected under nests correspond well with the data on the food composition obtained at Lake Baikal from pellets of the White-tailed Sea Eagle (Mlíkovský 1992, Râbcev 1997), although the latter samples are small. Hence, low proportion of fishes in the diet of White-tailed Sea Eagles at Lake Baikal is not a methodical artifact (see also Watson et al. 1992), although it is well known that observed diet composition can be severely biased by methods of food collection and analysis (see e.g. Mlíkovský 1998). Also occasionally gathered observational data indicate that White-tailed Sea Eagles preferably hunt for water birds at Lake Baikal (Mlíkovský, unpub. results).

Tab. 1. Composition of the food of White-tailed Sea Eagles in the Svâtoj Nos wetlands, Lake Baikal in 1991, 1994 and 2001. Minimum numbers of individuals (MNI) are given (sensu Grayson 1984). Data from 1991 and 1994 were adopted from Mlíkovský (1992, 1996). See Fig. 1. for the location of the nests A, B and C.
Tab. 1. Zloženie potravy orliaka morského na mokradiach Svjatoj Nos, jazero Bajkal v rokoch 1991, 1994 a 2001. Uvádzaný je minimálny počet jedincov (MNI; sensu Grayson 1984). Údaje z rokoch 1991 a 1994 sú podľa Mlíkovský (1992, 1996). Poloha hniezd A, B a C je v Obr. 1.

food item / zložka potravy	A	B			C	∑	%
	1991	1991	1994	2001	1991		
Esox lucius	6	1	3	1	1	12	6.0
Perca fluviatilis			1	1		2	1.0
Carassius auratus		1		1		2	1.0
Gavia arctica					1	1	0.5
Gavia stellata			1		2	3	1.5
Podiceps cristatus		1				1	0.5
Podiceps auritus		2	3		2	7	3.5
Ardea cinerea		1				1	0.5
Tadorna ferruginea					3	3	1.5
Anas spp.	11	22	17	25	28	103	51.8
Aythya spp.		6	17	16	8	47	23.6
Mergus serrator					1	1	0.5
Mergellus albellus				1		1	0.5
Numenius arquata					1	1	1.0
Tringa sp.					1	1	1.0
Larus argentatus		2	2			4	2.0
Larus minutus		1				1	1.0
Sterna hirundo		1				1	1.0
Ondatra zibethicus			2		3	5	2.5
Phoca sibirica				2		2	1.0
Pisces	6	2	4	3	1	16	8.0
Aves	11	36	40	42	47	176	93.5
Mammalia	0	0	2	2	3	7	3.5
Total	17	38	46	47	51	199	100.0

Geographic variation of the diet of White-tailed Sea Eagles

White-tailed Sea Eagles feed mainly on fishes in much of the Western Palearctic (e.g. Fischer 1970, Glutz von Blotzheim et al. 1971, Cramp & Simmons 1980), but fishes seem to be of minor importance for White-tailed Sea Eagles elsewhere. Birds are the predominant food of these eagles at Lake Baikal (Mlíkovský 1992, 1996 and this paper), on locations in Yakutia (Labutin et al. 1965, 1988), at Black Sea (Pirogov 1991), on the Darß Peninsula, Germany (Schnurre 1956) and in the Gulf of Kandalaksha, Russia (Korâkin & Bojko 2005). The latter two sites are located at the North sea in the western

Palearctic, but the proximity of the sea does not explain the prevalence of birds in the prey of local White-tailed Sea Eagles in itself, because these eagles feed mainly on fish on ecologically similar habitats in southern Greenland (Wille & Kampp 1983) and in Estonia (Tuvi & Väli 2007). High proportion of birds in the diet seems to be constant over years in Svâtoj Nos wetlands (Tab. 1), which suggests that the preferrence of birds as prey does not represent a temporary adaptation to an abundant prey source. In fact, it seems that the diet preferences of White-tailed Sea Eagles vary geographically. However, relevant data on the diet of non-European White-tailed Sea Eagles are insufficient for analysing the geographic distribution of these preferences. Considering that geographic variation in behaviour is known to have considerable microevolutionary (e.g. Mlíkovský 1986, Foster 1999, Riechert 1999) and conservation implications (e.g. Moritz 1994, Crandall et al. 2000), further studies on the diet of White-tailed Sea Eagles are required to find the reasons causing the geographic variation in the diet composition of this bird species.

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