

THE WHITE-TAILED SEA EAGLE *HALIAEETUS ALBICILLA* AND THE COMMON EIDER *SOMATERIA MOLLISSIMA* IN THE GULF OF KANDALAKSHA, WHITE SEA

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In the past several decades, mortality of Common Eider clutches and incubating females due to predation has increased notably in the Kandalaksha strict nature reserve sites in the Gulf of Kandalaksha. At present, predation by the White-tailed Sea Eagle is the main factor undermining Eider reproduction success in reserved areas. The impact of other raptors, corvids, and predatory mammals is less significant, although it has also grown lately.

Key words: White-tailed Sea Eagle, diet, predation, Common Eider, reproduction, Gulf of Kandalaksha, White Sea, *Haliaeetus albicilla*, *Somateria mollissima*.

**ОРЛАН-БЕЛОХВОСТ *HALIAEETUS ALBICILLA* И ОБЫКНОВЕННАЯ ГАГА *SOMATERIA MOLLISSIMA* В
КАНДАЛАКШСКОМ ЗАЛИВЕ, БЕЛОЕ МОРЕ. Корякин А.С., Бойко Н.С.** Кандалакшский государственный
природный заповедник.

На участках Кандалакшского заповедника в Кандалакшском заливе в последние десятилетия значительно возрос отход кладок обыкновенной гаги и, одновременно, увеличилась гибель насиживающих самок из-за хищничества. В настоящее время хищничество орланов – основной фактор, снижающий успешность воспроизводства гаг на заповедных участках. Влияние других видов хищных птиц, врановых, хищных млекопитающих менее значимо, но и оно также выросло в последние годы.

Ключевые слова: орлан-белохвост, питание, хищничество, обыкновенная гага, воспроизводство, Кандалакшский залив, Белое море, *Haliaeetus albicilla*, *Somateria mollissima*.

The White-tailed Sea Eagle *Haliaeetus albicilla* is the most noticeable raptor in the Gulf of Kandalaksha area. The species is red-listed in the Russian Federation and the Murmansk region (category 3 – rare species).

Data on the ecology and abundance of the White-tailed Sea Eagle in the Kandalaksha strict nature reserve in the 1950s–1980s were published by Blagosklonov (1960), Flyorov (1970), and Kohanov & Bianki (1986).

The paper presents materials on the species's abundance thereafter and information about the White-tailed Sea Eagle impact on another red-listed species, the Common Eider *Somateria mollissima* (species subject to biological surveillance in the Russian Federation and the Murmansk region). The paper is based on data contained in the Kandalaksha reserve Nature Chronicles for years 1978–2005. Data on the White-tailed Sea Eagle abundance come from direct observations over breeding and nest site occupancy control by the reserve research staff, as well as from accidental contacts registered by any staff working in the field. Material on the species diet is limited to observations of actual hunting activity and information about prey re-

mains found during annual counts of breeding seabirds on islands in the reserve (see study area map in fig. 1). Data on the abundance and breeding success of the Eider were also obtained during these counts.

Data for the Nature Chronicles were gathered by researchers from the reserve, V. Bianki, N. Boyko, A. Koryakin and E. Shutova (areas at the head of the Gulf of Kandalaksha), V. Kohanov and A. Panarin (Vachev Archipelago, Lake Velikoye area, Kemludy Archipelago), F. Shklyarevich and N. Panarina (Porja Guba Bay area), as well as by reserve rangers, of whom the most valuable observations were made by V. Voshchikov. Students from various higher educational institutions and schoolchildren from young naturalist groups took part in seabird counts. The authors would like to thank all of them.

The White-tailed Sea Eagle abundance in the Gulf of Kandalaksha area has been growing rapidly since the mid-1980s, as clearly indicated by accidental registrations (fig. 2; see fig. 3 for total distribution of contacts by months). The number of breeding pairs started to increase later, in the early 1990s (tab. 1; minimal abundance estimates are given). The distribution of nest areas (fig. 1) changed little,

Table 1. Number of breeding pairs of the White-tailed Sea Eagle *Haliaeetus albicilla* on the Gulf of Kandalaksha, 1978–2005.

Year	Areas of the Kandalaksha reserve					Karelian Coast	Kandalaksha Coast	Total
	Oleniy Archipelago	Severnyi Archipelago	Tarasikha Archipelago	Kovdskiy Peninsula	Velikiy Island			
1978				2		2	n/d	4
1979				2	1	2	n/d	5
1980				1	2	2		5
1981				2	1	1	1	5
1982		1		1	1	1	1	5
1983		1		1	1		1	4
1984				1	2	1	1	5
1985		1		1	2			4
1986		1			2		1	4
1987		1			2		2	5
1988				1	1		2	4
1989		1			2		2	5
1990					2	1	1	4
1991					2	1	1	4
1992		1			2		3	6
1993	1	1			2		3	7
1994	1	1			3		3	8
1995	1	1		1	2		3	8
1996	1	1		1	2		2	7
1997	1	1		1	1		2	6
1998	1	1		1	1		2	6
1999	1	2		1	1		2	7
2000	1	2	1	1	2		2	9
2001	1	3		1	2		1	8
2002	1				1		1	3
2003		2		2	1	2	1	8
2004	1	3		1	1		1	7
2005	1	3		2	2	2	2	12

Note: empty cell = 0; n/d = no data

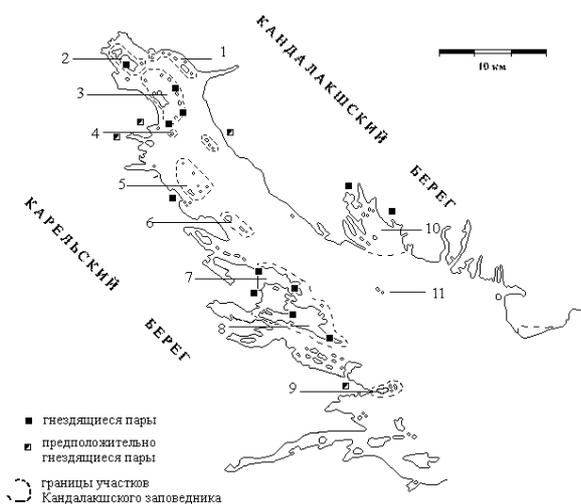


Figure 1. Distribution of nest areas of the White-tailed Sea Eagle *Haliaeetus albicilla* in the Gulf of Kandalaksha, 2005 (black – verified breeding).

1 – Luvenga Archipelago, 2 – Oleniy Archipelago, 3 – Severnyi Archipelago, 4 – Knyazhegubskaya Sedlovataya Island, 5 – Tarasikha Archipelago, 6 – Vachev Archipelago, 7 – Kovdskiy Peninsula, 8 – Velikiy Island, 9 – Kemludy Archipelago, 10 – Porja Guba Bay, 11 – Sredniye Ludy Archipelago.

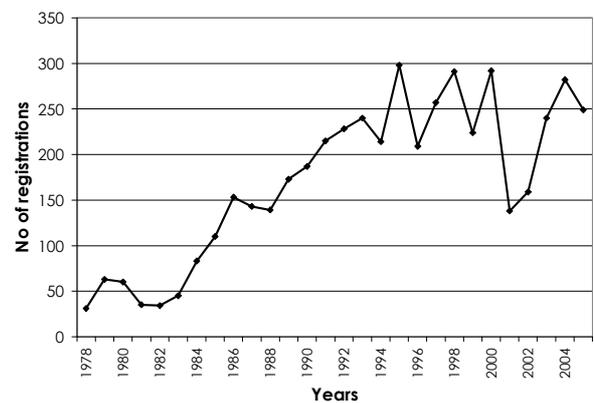


Figure 2. Number of registrations of the White-tailed Sea Eagle *Haliaeetus albicilla* in the Gulf of Kandalaksha, 1978–2005 (n = 4792).

most of them known since the 1950s–1970s (Flyorov 1970, Kohanov & Bianki 1986), but the nest occupancy rate increased, this being particularly obvious from the very top of the Gulf (Oleniy and Severnyi archipelagoes), where direct evidence is available for most breeding attempts (tab. 2).

Table 2. Number of breeding pairs of the White-tailed Sea Eagle *Haliaeetus albicilla* on the Oleniy and Severnyi archipelagoes, Gulf of Kandalaksha, 1978–2005.

Year	Oleniy Archipelago	Severnyi Archipelago			Total
	Oleniy Isl.	Malaya Demenikha Isl.	Malyi Lomnishnyi Isl.	Kruglyi Isl.	
1978					0
1979					0
1980					0
1981					0
1982			1		1
1983				1	1
1984					0
1985				1	1
1986				1	1
1987				1	1
1988					0
1989				1	1
1990					0
1991					0
1992			1		1
1993	1		1		2
1994	1			1	2
1995	1			1	2
1996	1			1	2
1997	1			1	2
1998	1			1	2
1999	1	1	1		3
2000	1	1	1		3
2001	1	1	1	1	4
2002	1				1
2003		1		1	2
2004	1	1	1	1	4
2005	1	1	1	1	4

Note: empty cell = 0

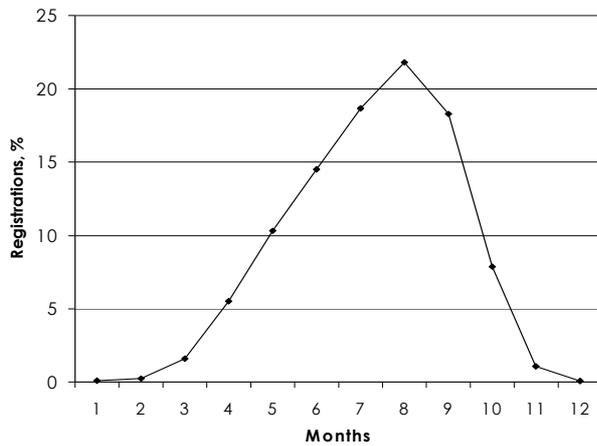


Figure 3. Distribution of the White-tailed Sea Eagle *Haliaeetus albicilla* registrations in the Gulf of Kandalaksha by month, 1978–2005 (n = 4792).

The diet of the White-tailed Sea Eagles in the Gulf of Kandalaksha area is known to include dozens of bird, mammal and fish species (Flyorov 1970). Judging by the remains of birds taken by Sea Eagles on islands (1996–2005; combined data on Severnyi, Kibrinskiy, Tarasikha archipelagoes and Knayzhegubskaya Sedlovataya Island), the species preys

mostly on incubating Eiders (males contribute no more than 1–2%), which account for 50–90% (78% on average) of the total number of all prey (tab. 3). Variations among years are related first of all to changes in the proportion of Herring Gull *Larus argentatus* and Common Gull *L. canus* chicks in the ration. Clear preference for incubating Eiders is seen also when the spatial aspect of the data is analysed: the proportion of Eiders drops sharply only when there is plenty of even more easily taken and vulnerable prey – large chicks in the Great Cormorant *Phalacrocorax carbo* colony on Sredniye Ludy islands (tab. 4).

The information above concerns Sea Eagle hunting on islands during the breeding season of abundant seabird species. Observations of actual hunting of Sea Eagles over water yield a similar picture – 66% of all prey is Common Eider females and yearlings (tab. 5).

Naturally, the predation impact on prey species populations increases alongside with the White-tailed Sea Eagle population growth. As the frequency of Sea Eagle occurrence in the Gulf of Kandalaksha area increased, the amount of Eider remains found during surveys on islands started growing as well (fig. 4, 5). An overwhelming majority of the birds were killed for sure by the White-tailed Sea Eagle.

Table 3. Diet (% , no. of individuals) of the White-tailed Sea Eagle *Haliaeetus albicilla* in the head of the Gulf of Kandalaksha determined from prey bird remains, 1996–2005.

Species	Year												
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	1996–2005		
Goldeneye	<i>Bucephala clangula</i>	ad		0.5		0.9						0.2	
Common Eider	<i>Somateria mollissima</i>	♂ ad	1.8	0.5		0.6	1.3	1.9	0.9	1.0	2.9	1.2	
		♀ ad	83.7	70.4	89.4	90.5	64.5	80.6	52.4	74.7	92.6	80.9	
Common Scoter	<i>Melanitta nigra</i>	ad							0.5			0.0	
Willow Grouse	<i>Lagopus lagopus</i>	ad		1.0								0.1	
Capercaillie	<i>Tetrao urogallus</i>	ad		0.5					0.5			0.1	
Oystercatcher	<i>Haematopus ostralegus</i>	ad	2.3	2.5	0.6	2.2	2.1	3.0	0.9		0.5	1.1	
Herring Gull	<i>Larus argentatus</i>	ad	10.0	13.3	8.9	2.2	5.9	8.4	8.0	15.4			7.1
		juv		3.4			20.1	2.5	22.2	6.3		4.0	6.7
Common Gull	<i>Larus canus</i>	ad	2.3	7.9	1.1	4.5	5.9	4.2	5.2	1.4	0.5		3.4
		juv							9.4	0.5	5.4	11.2	2.8
Total		%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		n	221	203	180	179	338	237	212	221	203	277	2271

Table 4. Diet (% , no. of individuals) of the White-tailed Sea Eagle *Haliaeetus albicilla* in different localities on the Gulf of Kandalaksha determined from prey bird remains.

Species	Locality							Total		
	Severnyi Archipelago	Knyazhegubskaya Sedlovataya Isl.	Kibrinskiy Archipelago	Tarasikha Archipelago	Porja Guba Bay	Sredniye Ludy Archipelago				
Great Cormorant	<i>Phalacrocorax carbo</i>	juv						92.7	1.6	
Goldeneye	<i>Bucephala clangula</i>	ad	0.3						0.2	
Common Eider	<i>Somateria mollissima</i>	♂ ad	1.6	1.1	0.4	0.4	0.9		1.2	
		♀ ad	71.3	90.1	89.5	81.1	98.2	7.3	76.8	
Common Scoter	<i>Melanitta nigra</i>	ad	0.1						0.0	
Willow Grouse	<i>Lagopus lagopus</i>	ad	0.1						0.1	
Capercaillie	<i>Tetrao urogallus</i>	ad	0.1						0.1	
Oystercatcher	<i>Haematopus ostralegus</i>	ad	2.3		1.2	0.2			1.4	
Herring Gull	<i>Larus argentatus</i>	ad	7.5	3.3	6.6	7.3	0.9		6.6	
		juv	7.5	5.0		8.8			6.3	
Common Gull	<i>Larus canus</i>	ad	4.3	0.6	2.3	2.2			3.1	
		juv	4.7						2.6	
Total		%	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		n	1341	181	258	491	111	41	2423	
Study period			1996–2005	1996–2005	1996–2005	1996–2005	1996–2004	1996–1997		

Note: empty cell = 0.

Table 5. Diet of the White-tailed Sea Eagle *Haliaeetus albicilla* in the Gulf of Kandalaksha determined by visual observations of successful attacks, 1997–2004.

Species		N	%	
BIRDS				
AVES				
Great Cormorant	<i>Phalacrocorax carbo</i>	ad	1	1.5
Wigeon	<i>Anas penelope</i>	juv	1	1.5
Goldeneye	<i>Bucephala clangula</i>	ad	5	7.7
Common Eider	<i>Somateria mollissima</i>	♀	29	44.6
		juv	14	21.5
Goosander	<i>Mergus merganser</i>	ad	2	3.1
Oystercatcher	<i>Haematopus ostralegus</i>	ad	2	3.1
Herring Gull	<i>Larus argentatus</i>	ad	2	3.1
Herring Gull	<i>Larus argentatus</i>	juv	6	9.2
Common Gull	<i>Larus canus</i>	ad	1	1.5
Hooded Crow	<i>Corvus corone</i>		1	1.5
FISHES				
PISCES				
Cod	<i>Gadus morhua</i>		1	1.5
Total			65	100.0

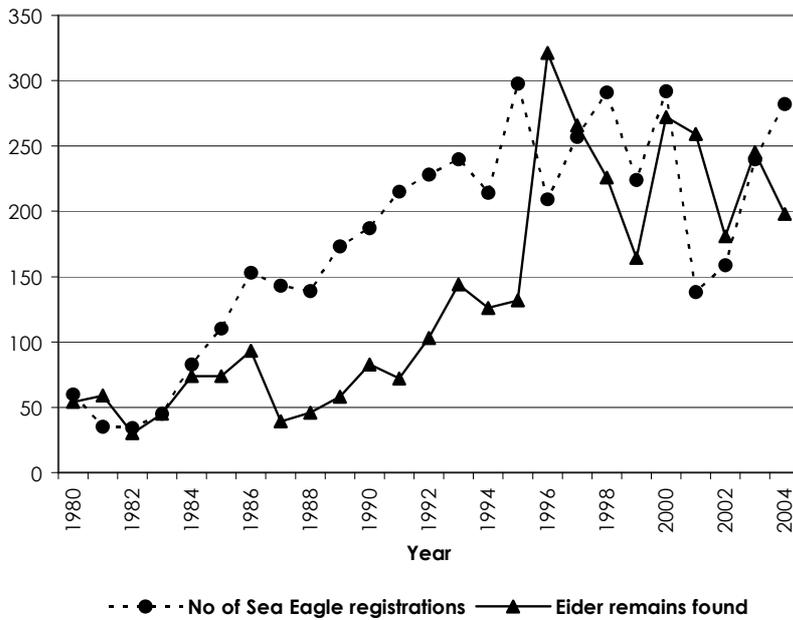


Figure 4. Changes in the number of the White-tailed Sea Eagle *Haliaeetus albicilla* registrations and number of Common Eider *Somateria mollissima* remains found on breeding islands in the Gulf of Kandalaksha, 1980–2004.

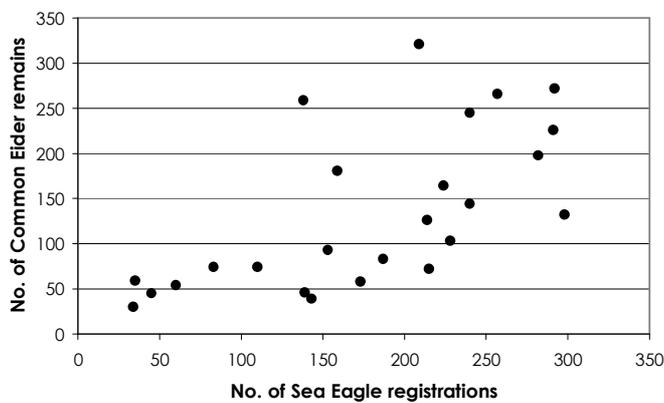


Figure 5. The number of White-tailed Sea Eagle *Haliaeetus albicilla* registrations related to the number of Common Eider *Somateria mollissima* remains found on breeding islands in the Gulf of Kandalaksha, 1980–2004 ($r = 0.64$; $p < 0.001$).

Other predators, namely the Goshawk *Accipiter gentilis*, mink *Mustela vison*, red fox *Vulpes vulpes*, and brown bear *Ursus arctos*, may also prey on Eiders, but the scope of their impact is markedly lower than that of the White-tailed Sea Eagle.

Another very significant consequence of Sea Eagle hunting in breeding colonies is an increase in the mortality of Eider clutches. During Sea Eagle hunts, many females leave their nests, and the clutches fall easy prey to Herring and Great Black-backed Gulls *Larus marinus*, Ravens *Corvus corone* and Hooded Crows *Corvus cornix*. As a result, not only the clutch of the female taken by the Sea Eagle but also neighbour ones are lost. The clutch mortality rate in the Eider has lately been growing parallel to the rate of female loss to predation by Sea Eagles (index used is the number of killed females per 1000 inspected nests, %; fig. 6, 7).

We are not considering long-term consequences of growing Sea Eagle predation for the status of the Eider population now. Let us just note that one must not neglect them. Today already, predation has a sure impact not only on the survi-

vorship of adult females, but also on the population's reproductive rate. In the 1930s, when the Kandalaksha reserve was designated, the population was undergoing a depression caused by persecution by humans, and the birds could breed successfully only on forested islands of the Severnyi Archipelago, where nests were mostly scattered around. By the 1980s, as a network of reserved areas has been established in the Gulf of Kandalaksha, Eiders recovered the breeding areas they had lost and started breeding in colonies on treeless islands in increasing numbers (Koryakin et al. 1989). The predation impact in the period was low, and the population was thriving. In the 1990s, the total predation pressure started to increase. The number of foxes and bears staying on forested islands in summer increased. They hardly ever take adult birds, but destroy accessible clutches instead, thus inducing, first of all, redistribution of Eiders within breeding areas. So far, their impact at the Gulf level is of local scope.



Figure 6. Changes in female mortality rate in the Common Eider *Somateria mollissima* due to predation by the White-tailed Sea Eagle *Haliaeetus albicilla*, and in Eider clutch mortality rate in the Gulf of Kandalaksha, 1980–2004.

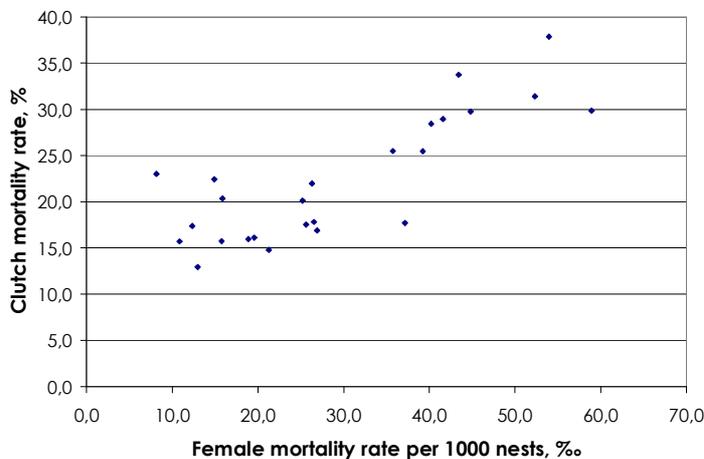


Figure 7. Female mortality rate in the Common Eider *Somateria mollissima* due to predation by the White-tailed Sea Eagle *Haliaeetus albicilla*, and Eider clutch mortality rate in the Gulf of Kandalaksha, 1980–2004 ($r = 0.81$; $p < 0.001$).

A new phenomenon that has appeared at the head of the Gulf in the past decade is predation by the American mink, which is capable of taking an adult Eider and destroying clutches. This predator's impact is now insignificant, although it may seriously destabilize the situation on some islands. Luvengskiy and Oleniy archipelagoes, which adjoin human settlements, feature a notably increased abundance of corvids, which raise clutch mortality significantly, especially if incubating Eiders get flushed. Corvids prey predominantly on forested islands since treeless islands usually have breeding colonies of gulls, which can drive both Hooded Crows and Ravens away. All the predators mentioned above, with an addition of the relatively rare Goshawk *Accipiter gentilis*, have promoted the tendency for the shift of Eider breeding grounds to the safer treeless islands. In total, the activity of predators, including large gulls, normally causes a loss of 15–20% of Eider clutches and no more than 1% of incubating females. White-tailed Sea Eagles hunt mostly on treeless islands, where most Eiders still nest. The raptor causes the death of another 15–20% of clutches and 5–10% of breeding females. It takes also large chicks. Thus, the Sea Eagle predation impact on the Common Eider population is now greater than the combined impact of all the other predators.

Let us note in conclusion that the rise in the abundance of the White-tailed Sea Eagles in the Gulf of Kandalaksha is probably related to changes in the circumstances in their wintering grounds in southwestern Europe. Cessation of persecution of raptors all around Europe, stepwise resolution of the

pesticide pollution problem, and effective conservation of overwintering waterfowl concentration sites in western Europe could not but tell positively on reproduction of raptors, including the White-tailed Sea Eagle.

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