THE WHITE-TAILED SEA EAGLE *HALIAEETUS ALBICILLA* AND THE OSPREY *PANDION HALIAETUS* IN THE VOLOGDA LAKE DISTRICT AND SOUTHEASTERN ONEGO AREA

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The paper presents data on the current status of the Osprey and the White-tailed Sea Eagle populations in the northwestern part of the Vologda region and south-eastern Onego area. Field trips and studies at permanent plots done between 1988 and 2005 have demonstrated that the study area is inhabited by a uniform population of the White-tailed Sea Eagle, the main distinctive feature of which is the tendency to form compact settlements on the shores of large bodies of water in the forest zone. Its total abundance is ca. 100 pairs. About a third of the population (30–35 pairs) lives on the Rybinsk impoundment reservoir in the Darwin strict nature reserve, forming the largest source from which birds apparently dispersed to other large lakes of the region in the 1980s–1990s. Our estimate of the total Osprey population in the Vologda Lake District and south-eastern Onego area is 150–180 breeding pairs, of which 50–55 nest in the Darwin reserve and its buffer zone. Expeditions outside the area in question have shown that the population density of the species decreases towards all directions, their abundance being limited to occasional pairs. It is demonstrated that this source area with high abundance of the White-tailed Sea Eagle and the Osprey formed as the populations in the Darwin reserve increased in density in the 1950s–1970s. After that the species spread to lakes and reservoirs of the Vologda Lake District and southeastern Onego area, where the natural habitats are similar.

Key words: Osprey, *Haliaeetus albicilla,* White-tailed Sea Eagle, *Pandion haliaetus,* population, Vologda District, Onego area.

ОРЛАН-БЕЛОХВОСТ *(HALIAEETUS ALBICILLA)* И СКОПА *(PANDION HALIAETUS)* В ВОЛОГОДСКОМ ПООЗЕРЬЕ И ЮГО-ВОСТОЧНОМ ПРИОНЕЖЬЕ. Кузнецов А.В., Бабушкин М.В. Дарвинский заповедник, Вологодская обл, Россия; Московский государственный педагогический университет, Москва, Россия.

В работе приводятся данные по современному состоянию популяций скопы и орлана-белохвоста в северо-западной части Вологодской области и юго-восточном Прионежье. В результате экспедиционных и стационарных исследований, проведенных в период с 1988 по 2005 годы, было выяснено, что в пределах обследованной территории располагается единая популяция орлана-белохвоста, основной особенностью которой является склонность к образованию уплотненных поселений на побережьях крупных водоемов лесной зоны. Ее суммарная численность составляет около 100 пар. Примерно треть этой популяции (30–35 пар) обитает в Дарвинском заповеднике на Рыбинском водохранилище, образуя самый значительный очаг, из которого, по всей видимости, и происходило расселение птиц на другие крупные водоемы этого региона в 1980–1990 гг. Общая численность популяции скопы Вологодского поозерья и юго-восточного Прионежья по нашей оценке составляет 150–180 гнездящихся пар, 50-55 из которых гнездится в Дарвинском заповеднике и в его охранной зоне. Экспедиционные обследования, проведенные за пределами указанной территории, показали, что во всех направлениях плотность населения этих видов снижается, а численность их исчисляется отдельными парами. Показано, что этот очаг высокой численности орлана-белохвоста и скопы сформировался вследствие увеличения плотности их населения в Дарвинском заповеднике в течение 1950–1970 гг., из которого в 1980–1990 гг. происходило их дальнейшее расселение на сходные по природным условиям водоемы Вологодского поозерья и юго-восточного Прионежья.

Ключевые слова: скопа, орлан-белохвост, *Haliaeetus albicilla, Pandion haliaetus*, численность, Вологодская область, Прионежье.

INTRODUCTION

Our studies were made from 1988 to 2002 in a vast area between Volga and the cities of Rybinsk, Yaroslavl and Kostroma in the south, Lake Onego, Lake Vodlozero and upper reaches of River Onega in the north (fig. 1).

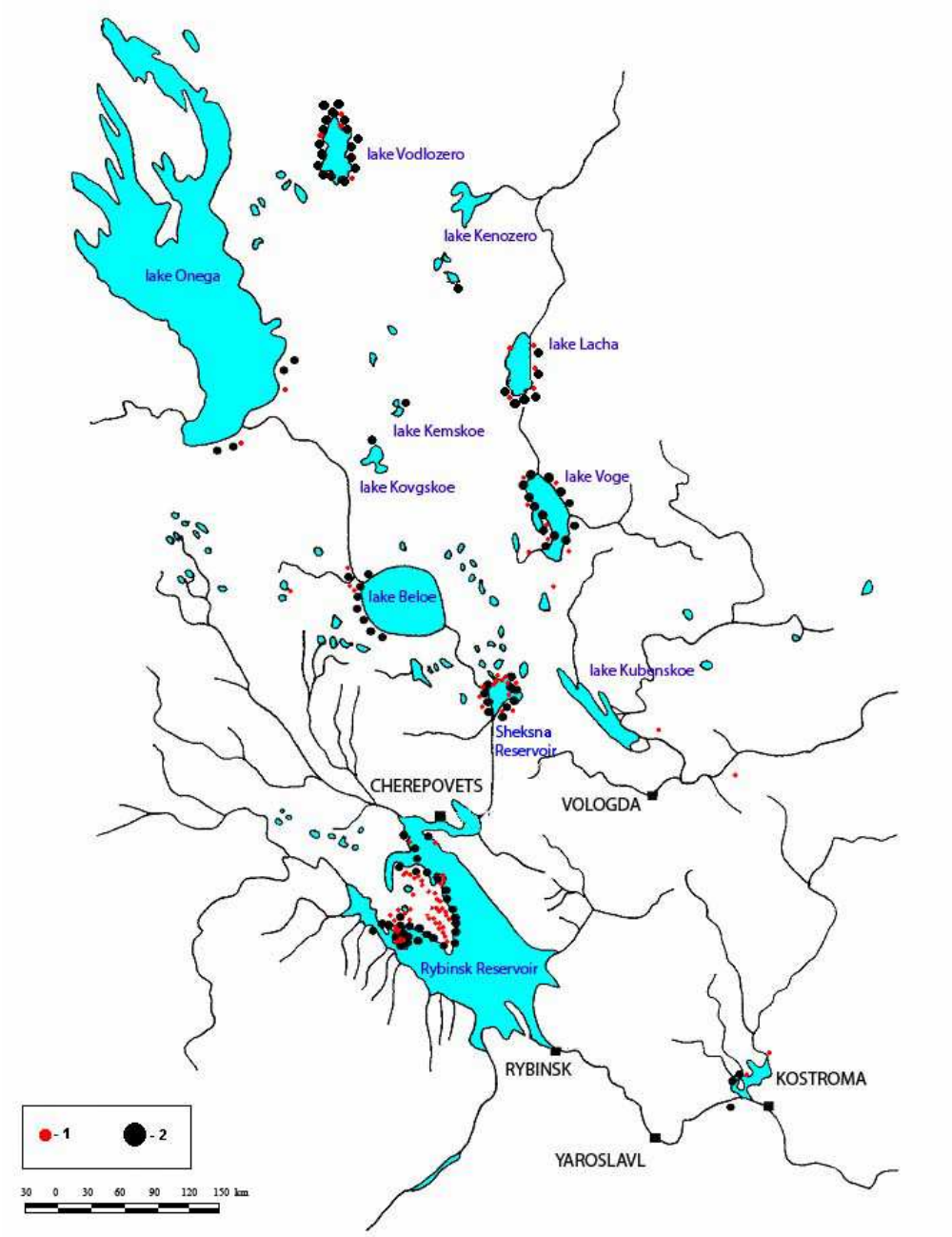

Figure 1. Distribution of White-tailed Sea Eagle (2) and Osprey (1) nests in the Vologda Lake District and southeastern Onego area.

The area belongs to southern and middle taiga and is covered by a dense network of river systems with numerous lakes, the largest ones being Onego, Beloye, Vozhe, Lacha, Vodlozero, Kubenskoye, Kenozero, Lekshmozero, Kovzhskoye and several others. The Volga-Baltic water system includes also two large impoundment reservoirs, Rybinsk and Sheksna. In the very southeast of the area, within the Yaroslavl region Volga area, there is another artificial reservoir, the Kostroma pond of the Gorkovsky reservoir.

Most of the territory belongs to the Vologda Lake District (Poozerje), an area occupying westernmost parts of the Vologda region. The area clearly resembles glaciolacustrine landscapes of Fennoscandia and is their southeastward extension terminating in the Mologa–Sheksna lowland. In the north, the study area covers southern and eastern Onego area including the Prionezhje lowland with the Megra lake group, Vodlozero area, Kenozero area and Vozhe–Lacha lowland. Vast spaces north of the Cherepovets–Vologda gradient are occu-

pied by large forest and mire areas, and human population there grows much sparser, being less than 2–3 persons per square kilometre in northwestern parts. These environments are exceptionally favourable for the life of rare raptors, first of all fish-eating species, the Osprey and the White-tailed Sea Eagle.

Our studies aimed to determine the abundance and spatial distribution of rare raptor species in the area and to find out the measures required for their conservation.

MATERIAL AND METHODS

Summer bird counts were made during expeditions using portable motorboats and kayaks, transported from one water-body to another by an off-road vehicle. River and lake waterways being abundant, surveys were mostly made from water. Radial routes were walked in stopover sites. In winter, the same vehicle was used to transport a snowmobile, from which vast riparian and shoreline forests and mires that are difficult to access in summer were inspected for raptor nests. In addition, the Vologda Lake District was several times surveyed from a helicopter (1993, 1999, 2002). Owing to the use of technical means we significantly raised the efficiency of field activities, managed to cover vast spaces and find dozens of nests within a short time period.

In addition to field trips around the Vologda Lake District and adjacent areas, we surveyed permanent plots in SW parts of the region, Darwin reserve and Cherepovets surroundings.

1. The Darwin Strict Nature Reserve, the total area of which is 1126 km^2 ("Zapovednik" research station), is situated in the northwest of European Russia, in upper reaches of the Volga River, in the northwestern part of the Rybinsk reservoir. The reserve occupies the SE tip of the lowland peninsula in the former Mologa and Sheksna water divide (fig. 2). Most of the peninsula is under raised bogs alternating with pine and mixed forests growing on ridges. Oligotrophic bogs (60–65%) and paludified pine forests prevail in the vegetation of the reserve. Minor areas are occupied by spruce and mixed-spruce forests, meadows and fens (Isakov 1949, 1953, Leontiev 1957).

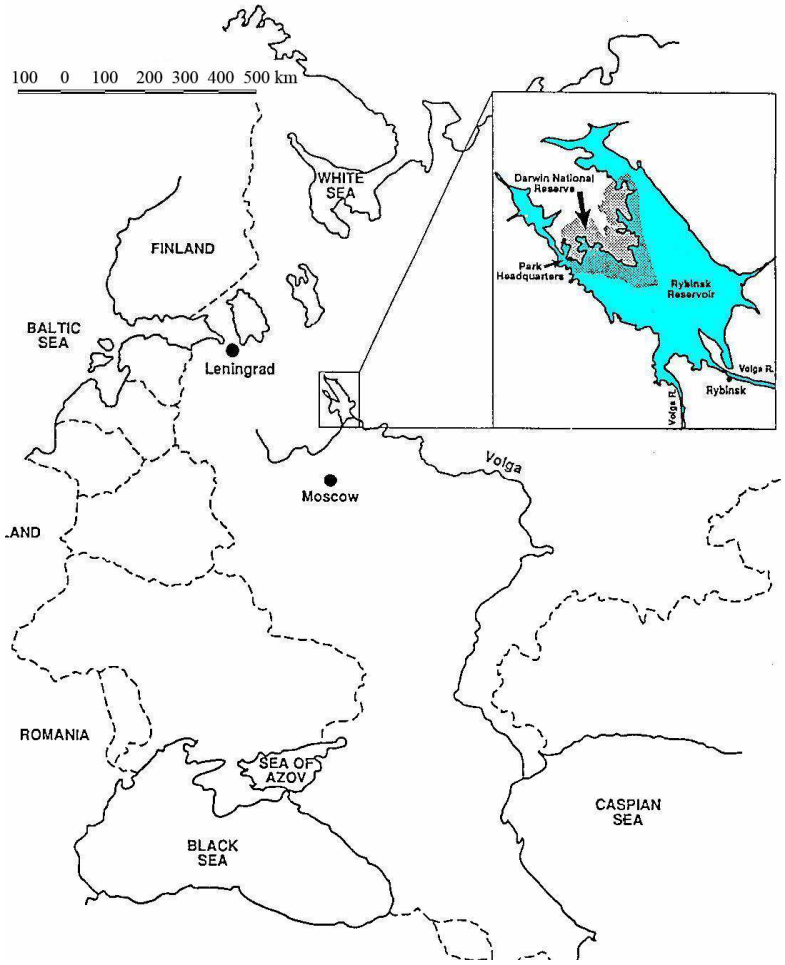

Figure 2. Location of the Darwin reserve in European Russia.

2. The Cherepovets research station area (125 km^2), where *Falconiformes* were studied from 1999 to 2005, is situated in the immediate vicinity of the city of Cherepovets, on the left-hand (SE) shore of the Sheksna branch of the Rybinsk reservoir. The station is NE of the reserve, 15 km away from its boundary. Most of the area is under mixed forests where conifers (pine, spruce) prevail. Raised bogs occupy ca. 35% of the research station territory (Babushkin 2003, 2006).

Between 1999 and 2002, eight expeditions covering an area from Kostroma and Yaroslavl in the south to Vodlozero and Kenozero in the north took place (Kuznetsov 1999, 2000a, 2002, Kuznetsov & Babushkin 2003). In 1999, a winter and a summer expedition to the Sheksna reservoir, and an aerial survey of the Vologda Lake District from the Rybinsk reservoir to the southern Onego area were carried out. In 2000, the Yaroslavl part of the Volga area, the Kostroma lowland and Lake Vozhe were surveyed. In 2001, a summer and a winter expeditions to Lake Vozhe, as well as a survey of the southern Onego area and Vodlozero area, were implemented. In 2002, there was an aerial survey of the Rybinsk and Sheksna reservoirs and an expedition to Lake Lacha and Kenozero area, within which the territory from Lake Beloye to Lake Kenozero was investigated.

Thus, within a short time period we surveyed nearly all large- and medium-size lakes in the vast northern part of the forest zone, finding dozens of nests and nesting areas of the Osprey and the White-tailed Sea Eagle.

RESULTS AND DISCUSSION

The studies have demonstrated that the Osprey and White-tailed Sea Eagle in the study area form high-density source areas around large lakes and impoundment reservoirs. The largest source area with high abundance of the species is on the Rybinsk reservoir in the Darwin reserve and its buffer zone. There now live up to 35 pairs of Sea Eagles and up to 55 pairs of Ospreys.

Since the reserve designation some 60 years ago, the abundance of both species has grown notably. Several factors have played the key part in that.

The first one is the presence of a large, fish-rich body of water, the Rybinsk reservoir, since its impoundment. The next factor is the availability of convenient breeding and hunting grounds. Upon impoundment, the central, paludified parts of the drainage divide drew closer to the reservoir coastal zone. This fact had a significant effect on the Osprey. An essential factor for the White-tailed Sea Eagle was the presence of old high forests along the shore, because it is there where most of the nests of this soecies were located (Kuznetsov 1998, 1999, Kuznetsov & Romanov 2001, Kuznetsov & Reif 1998). The wilderness regime was particularly important for the formation of Osprey and White-tailed Sea Eagle populations. Where the combination of the first two factors made the existence of the two species in the Mologa–Sheksna interfluve feasible, the absence of the disturbance factor enabled them to reach the highest possible abundance in the settlings (Kuznetsov & Nemtsev 1998, 2000).

Prior to impoundment, occasional Osprey pairs nested in mires near large lakes in the least disturbed parts of the Mologa-Sheksna interfluve. Some of these nesting areas are still in use (Kuznetsov 1997). No data are available concerning breeding of the White-tailed Sea Eagle in the territory prior to impoundment (Isakov 1949, Nemtsev 1953, 1988).

In the first decade upon the reserve designation (1945–1955) there were singular pairs of the Osprey and White-tailed Sea Eagle breeding in flooded forests (fig. 3).

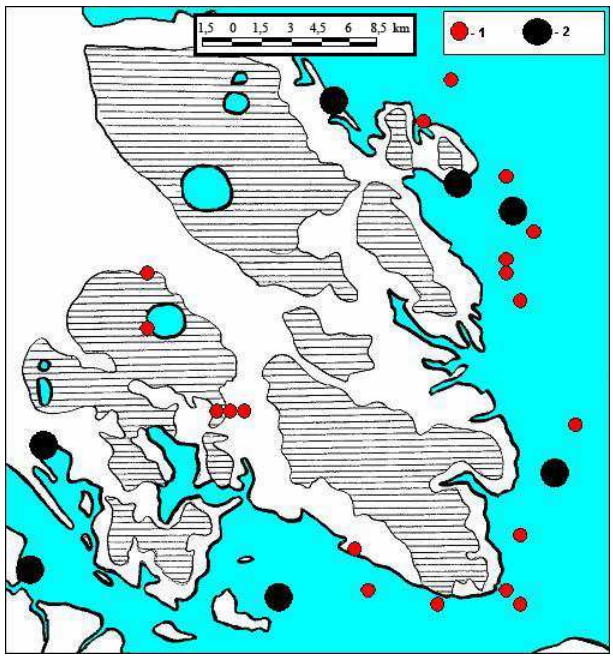

Figure 3. Distribution of White-tailed Sea Eagle (2) and Osprey (1) nests in the Darwin reserve in 1945-1955.

As the forests died, the nests of both species gradually moved closer to the shores, the White-tailed Sea Eagle now nesting on live trees in shoreline forests.

In the following decade (1956–1965), some Osprey nests were situated on mires already, since the flooded forest was dying but still close to the reservoir shoreline. As the Osprey was colonizing mires, its abundance increased. In the same time period, the White-tailed Sea Eagle started nesting on large trees on edges of forests growing on ridges along the shore, also gradually leaving flooded forests (fig. 4).

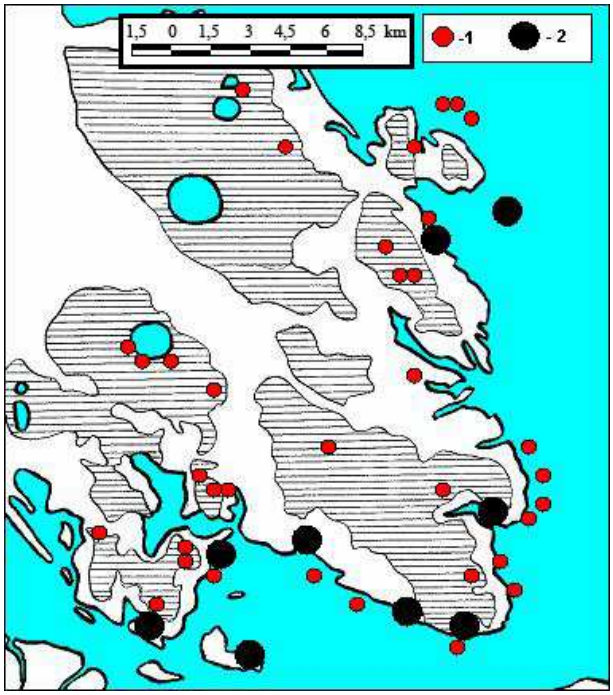

Figure 4. Distribution of White-tailed Sea Eagle (2) and Osprey (1) nests in the Darwin reserve in 1956-1965.

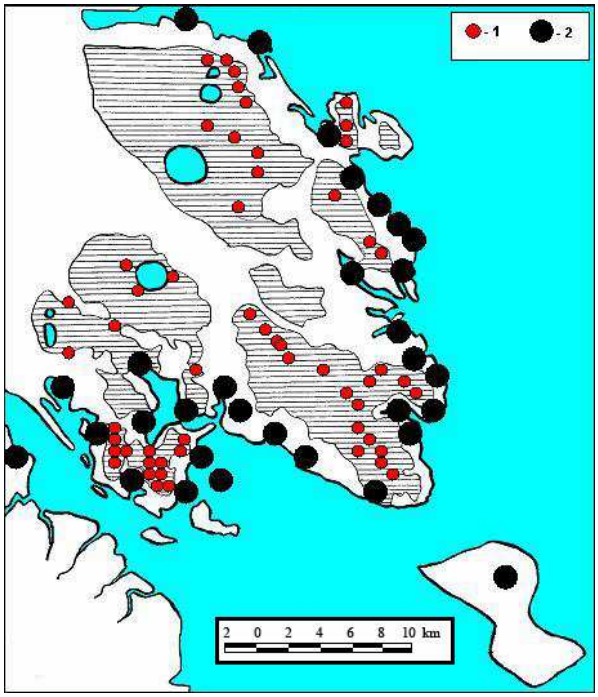

Figure 5. Distribution of White-tailed Sea Eagle (2) and Osprey (1) nests in the Darwin reserve in 2000.

In the 1970s, nearly all Sea Eagle nests were already along the shoreline, and most Osprey nests in raised bogs. There were only very few Osprey nests remaining along the shore (Kuznetsov & Nemtsev 2000). Meanwhile, the White-tailed Sea Eagles occupied all of the shore area, nest spacing being about even (3.5 km on average). The distribution of Sea Eagle nests began to resemble a string of pearls along the upper boundary of the temporarily flooded zone. The evenness of nest distribution along the upper edge of the temporarily flooded zone with nearly equal distances between nests indicates that the White-tailed Sea Eagle population density was close to the carrying capacity (Kuznetsov & Reif 1998). Figure 5 shows the distribution of the White-tailed Sea Eagle and Osprey nests in the reserve in 2000. The distance between the closest nests was from 1.5 to 7 km. The main nesting biotopes for the Sea Eagle in the reserve are areas of chiefly old-growth forest with a low canopy closure (60% on average), and a complex species composition of the tree stand: mixed pine-spruce-birch forests, as well as pine forests and spruce forests mixed with birch and aspen.

There are also some features in the nesting pattern that are common for Sea Eagles of the Darwin reserve and those nesting on Sheksna reservoir, Lakes Vozhe, Lacha and Vodlozero:

1) The capacity to densely populate suitable habitats, when the nests of neighbouring pairs are 2–3 km (sometimes even less than 1 km) apart. Such dense breeding populations of the Sea Eagle are not to be found elsewhere in Europe (northern coast of the Scandinavian Peninsula, Baltic Sea coast, northern Caspian coast, etc.). A notable fact is the lack of areas with closely situated Sea Eagle nests on the southern and western shores of Lake Onego which we have surveyed. Only individual occupied nests large distances apart from each other can be found there, although the Prionezhje lowland is very favourable for breeding of the White-tailed Sea Eagle. Apparently, the Sea Eagle population in the Onego area is mainly composed of local birds incapable of forming compact populations. Only 4 Sea Eagle pairs and 2–3 Osprey pairs were registered from the whole investigated stretch of the Onego shore from Svir to Lake Muromskoye.

2) Multi-year nest fidelity with no alternative nests present. E.g., some nests in the reserve have been occupied by Sea Eagles 10–15 or more years in succession.

3) Nest siting as close to the shore as possible, so that most nests are visible from water. The same peculiarities are characteristic of Sea Eagles from the Sheksna reservoir, Lakes Vozhe and Vodlozero. Sea Eagles inhabiting these areas appear to constitute a single population differing in a number of traits from the populations living on seacoasts and along large lakes such as Lake Ladoga and Onego.

The spatio-ethological structure of the Osprey population in the Darwin reserve established in its present-day form by the early 1990s. Its characteristic feature is the absence of nests in the shore area (not a single one). Osprey nests are arranged in several relatively compact groups, the smallest distance between occupied nests being 140 m, the

longest 4 km. Compared to data from previous years (Kuznetsov 2000b), the distribution of Osprey nests has changed somewhat from central parts of the peninsula towards coasts, the total numbers remaining the same. Since counts in recent years do not cover the whole reserve territory, only the part where counts were done in 2002–2005 is shown in the figure (fig. 6). Osprey nest groupings in mires form spatially linear structures arranged along the axes of peninsulas or between the reservoir shore and large inland lakes. We believe that such distribution of nests makes the birds more flexible in choosing hunting locations depending on weather conditions, first of all the wind direction. A probable reason for shifting nests from inland sites remote from the reservoir closer to the shore was a reduction in the reservoir fish production. Long flights for food in combination with a greater catching effort now caused inexpedient energy losses, wherefore pairs stopped nesting too far away from the shore. When in the 1990s Osprey nests were quite often situated 8–9 km away from the reservoir shore, the distance now is 3–4 km.

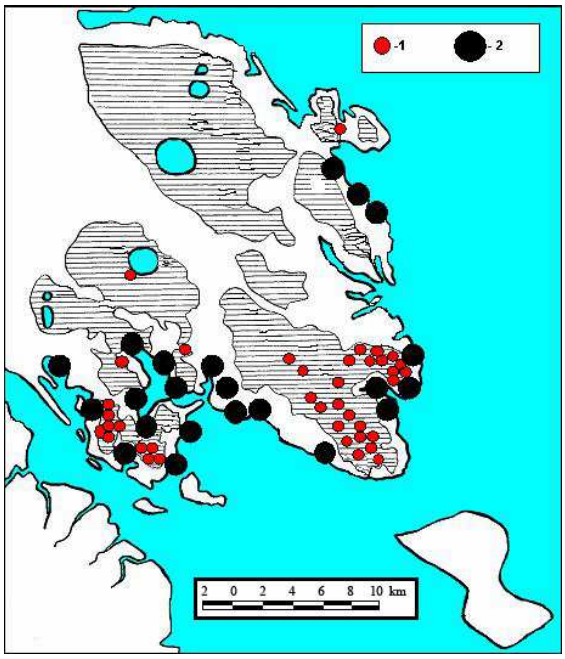

Figure 6. Current (2003–2005) distribution of White-tailed Sea Eagle (2) and Osprey (1) nests in the Darwin reserve.

The unique conditions that have been formed in the peninsula remaining from the former Mologa–Sheksna interfluve promoted a rise in the abundance of both species. There were few Osprey and White-tailed Sea Eagle pairs in the reserve in its early years, there now nest 40–45 pairs of the Osprey and 25–30 pairs of the Sea Eagle. Another 10–15 Osprey pairs and 5–10 Sea Eagle pairs nest outside the reserve, mainly in its buffer zone. The abundance of both species has not stabilized yet, since the numbers keep growing (fig. 7, fig. 8). The Osprey population density in the reserve is 70 breeding pairs per 1000 km^2 of land area at present. The value for the White-tailed Sea Eagle is 45 breeding pairs per 1000 km^2. Another 10–15 Osprey pairs and 4–5 Sea Eagle pairs nest in the parts of the peninsula adjoining the reserve. Only occasional Osprey and Sea Eagle pairs may occur in the rest of the Rybinsk reservoir coast. Thus, the Rybinsk reservoir Osprey population comprises 50–55 breeding pairs, and the White-tailed Sea Eagle population 30–35 breeding pairs. Nearly all nests are situated in the Mologa–Sheksna peninsula, the majority in the Darwin reserve.

By the mid-1980s – early 1990s, the abundance of the two species in the reserve reached a level when juveniles started dispersing actively from this high-density source area to colonize habitats similar to those in the reserve. Knowing data on breeding performance, we estimated the scope of the species dispersal. Breeding success was calculated for the total number of pairs with known breeding outcome and for successfully breeding pairs. Over the past 20 years, this parameter for the Osprey ranged from 1.12 to 2.45 young per a successfully breeding pair, the mean for 133 nests surveyed being 1.77 young per a successfully breeding pair. Osprey breeding success values have been increasing since 1986 (fig. 9). Thus, 40–45 successful nests now annually produce 50–55 juveniles, most of which start nesting outside the reserve. Similar calculations for the White-tailed Sea Eagle based on inspection of 179 nests show that the species breeding success per breeding pair varied among years from 0.54 to 0.82 young, the 20-year mean being 0.75 young per pair. Hence, ca. 20 young White-tailed Sea Eagles leave from 25 occupied nests in the reserve. Each successfully breeding Sea Eagle pair produced 1.22 to 2.00 young, the average being 1.51 fledglings. This steadily high breeding performance indicates a relative well-being of Osprey and White-tailed Sea Eagle populations in the Rybinsk reservoir area. In contrast to the Osprey, the White-tailed Sea Eagle breeding success, expressed as the number of young per a successfully breeding pair, has remained quite stable since 1986 (fig. 10).

The most detailed data on the dynamics of the Osprey and White-tailed Sea Eagle dispersal from the Darwin reserve were gathered in the 1980s–1990s from the Sheksna reservoir. Nowadays, it is the area with the natural habitat closest to those at the Rybinsk reservoir. Sheksna reservoir was formed in 1964 upon impoundment of the water-logged lowland situated where rivers Siz'ma, Slavyanka, Sosha, Lendoma and others emptied into Sheksna. Large forest and mire areas were then flooded. Since the reservoir appeared later than the Rybinsk reservoir, remains of flooded forests can still be found there. On Sheksna reservoir the Osprey nests mainly in flooded forests, as it used to do on Rybinsk reservoir. Like in the Darwin reserve, White-tailed Sea Eagle

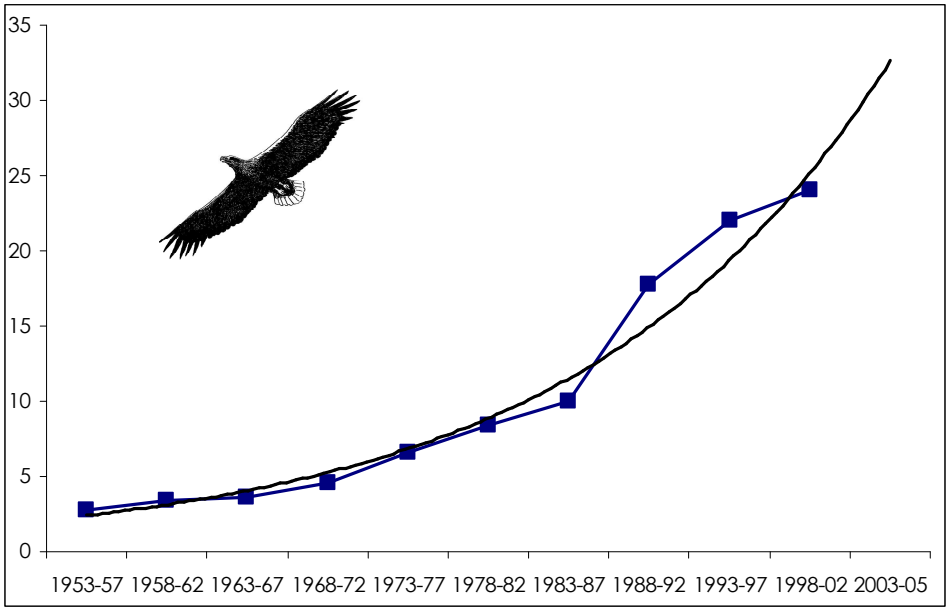

Figure 7. The number of the White-tailed Sea Eagle pairs in the Darwin reserve in 1953–2005 (5-year averages).

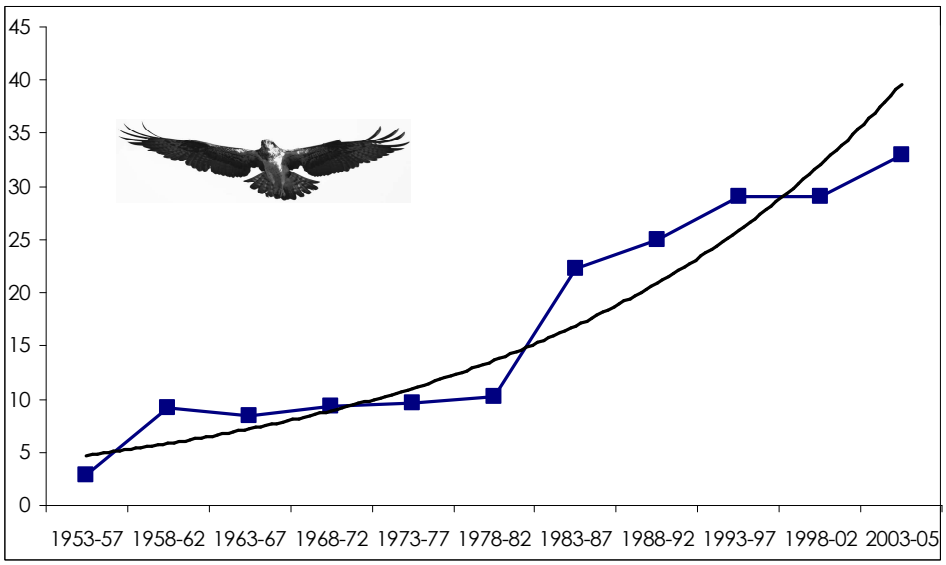

Figure 8. The number of Osprey pairs in the Darwin reserve in 1953–2005 (5-year averages).

nests are confined to the shoreline of the reservoir and its bays, and distributed quite evenly.

Aerial survey of the Sheksna reservoir was made in 1988, 1993 and 1999. Thus, in 1988 (Belko 1990), 3 Osprey nests and 3 White-tailed Sea Eagle nests were discovered (fig. 11). In 1993 there were already 6 Sea Eagle and 9 Osprey pairs nesting around the reservoir (fig. 12), and in 1999 surveys revealed 11 Sea Eagle nests and 13 Osprey nests (fig. 13). Sampling counts in later years proved that Osprey and Sea Eagle abundance did not decrease, but most probably even increased somewhat.

New Osprey nests have lately been found in the northern part of the reservoir, in mires along peninsula axes. This is happening because the flooded forests are dying back and the birds, like on Rybinsk reservoir, are forced to move their nesting areas to raised bogs. A substantial part of Osprey nests, however, still remain on dead standing trees in the flooded zone.

Similar abundance growth processes, most probably related to dispersal from the high-density source area in the Darwin reserve, were underway around other large bodies of water in the region.

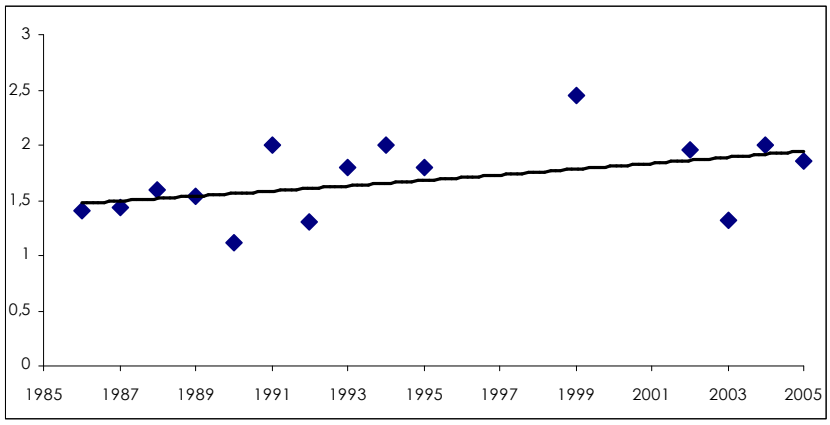

Figure 9. Osprey breeding success in the Darwin reserve (1986–2005). The number of young leaving the nest per a successfully breeding pair.

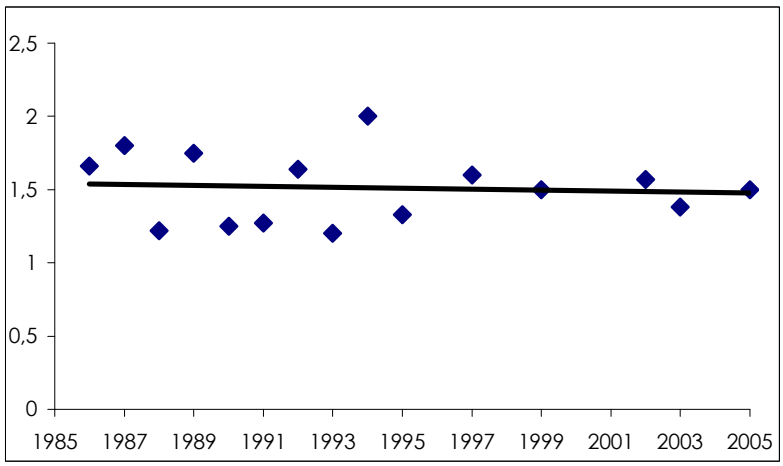

Figure 10. White-tailed Sea Eagle breeding success in the Darwin reserve (1986–2005). The number of young leaving the nest per a successfully breeding pair.

In the 1980s, new areas inhabited by the White-tailed Sea Eagle and Osprey began appearing at Lakes Vodlozero and Beloye. In the late 1980s, the Vodlozero population was estimated at 10 pairs (Sazonov 1995), in the early 1990s at 12–15 pairs (Zimin 1995), in 1995 15–16, and in 1998–1999 23 pairs (Sazonov et al. 2001).

The White-tailed Sea Eagle abundance around Lake Vozhe also started to increase in the late 1980s. We inspected Lake Vozhe shore from helicopter in 1993 and 1999. These reconnaissance surveys revealed the presence of quite a few rare raptor species, wherefore a specialized expedition was organized in the summer of 2000 to survey Lake Vozhe and adjacent lakes and mires.

A helicopter survey of Lake Vozhe shores in 1988 revealed 3 White-tailed Sea Eagle nests, 2 Golden Eagle nests and 1 Osprey nest (Belko 1990). Finds of the 2000 expedition to the lake and its surroundings included 11 breeding White-tailed Sea Eagle pairs and 9 Osprey pairs (fig. 14) (Babushkin et al. 2000).

Lake Beloye shore was surveyed from helicopter in 1988. One White-tailed Sea Eagle nest and 5 Osprey nests were detected (Belko 1990). In 1993, we managed to survey the western shore of the lake only, and sighted 6 breeding pairs of the White-tailed Sea Eagle and one Osprey pair. At present, 6–8 Sea Eagle pairs and 4–5 Osprey pairs nest along Lake Beloye.

Thus, a notable rise in the abundance of the Osprey (by 4.6 times on average) and of the White-tailed Sea Eagle (4.0 times on average) at the Sheksna reservoir, Lakes Vozhe and Beloye was recorded in the 1990s.

In May–June 2001, an expedition was made to southern and eastern parts of the Onego area. We surveyed the Megra River stretch from the Megrsky pogost to the Onego canal, the Onego bypass from Urmozero to Lake Zhabinskoye, and lakes

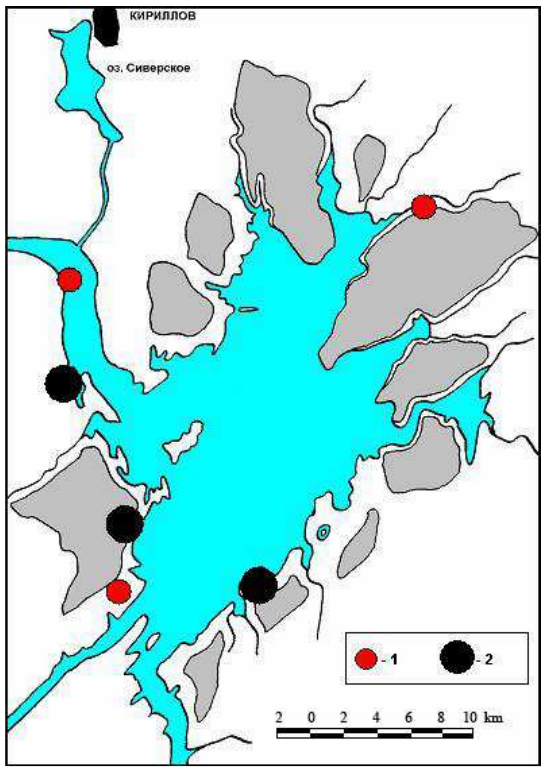

Figure 11. Distribution of White-tailed Sea Eagle (2) and Osprey (1) nests around Sheksna reservoir in 1988, after Belko (1990).

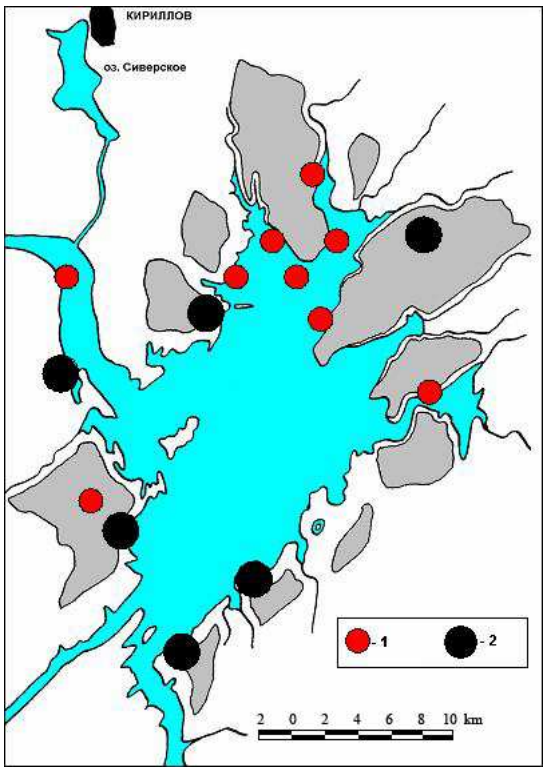

Figure 12. Distribution of White-tailed Sea Eagle (2) and Osprey (1) nests around Sheksna reservoir in 1993.

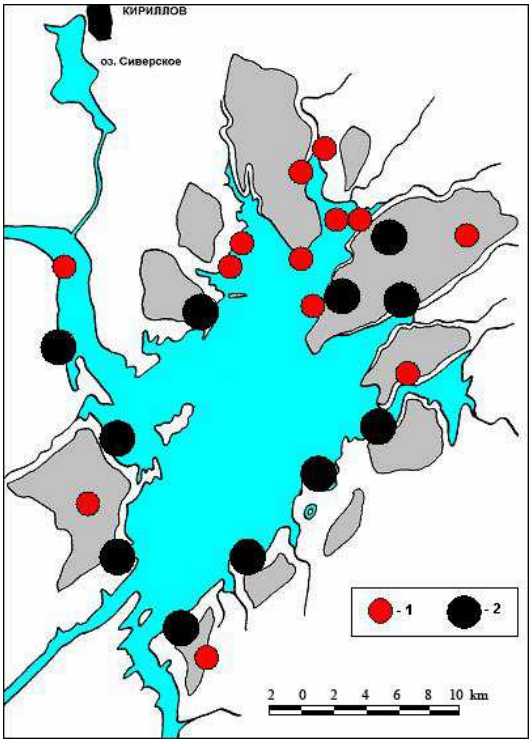

Figure 13. Distribution of White-tailed Sea Eagle (2) and Osprey (1) nests around Sheksna reservoir in 1999.

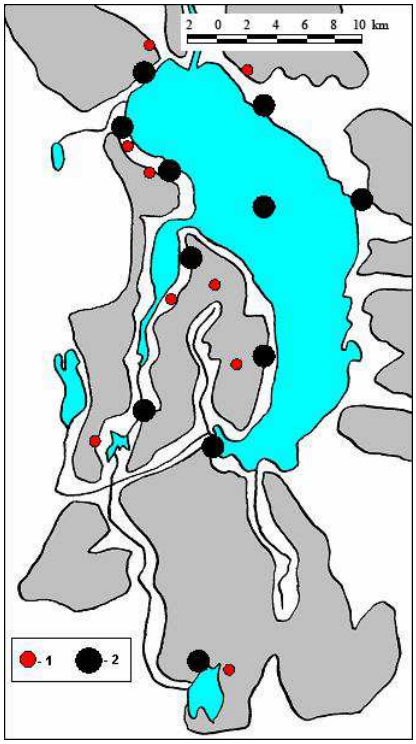

Figure 14. Distribution of White-tailed Sea Eagle (2) and Osprey (1) nests around Lake Vozhe in 2000.

Proezdnoye, Kirgozero, Urmozero, Chagozero, Kobylje, Megrskoye, Kedrinskoye, Vodlitskoye, Igumnovo, Karasevo, Zhabinskoye, Vehkozero, Muromskoye, Vodlozero and lower reaches of River Ileksa.

An 8 to 15 km wide belt comprising depressions and whole systems of residual lakes along Lake Onego shore from River Oshta to Lake Muromskoye is inhabited by no more than 4–5 White-tailed Sea Eagle pairs and 5–6 Osprey pairs. We found 2 occupied nests of the Osprey (one in a Sea Eagle nest) and 3 nesting areas of the species, as well as 2 occupied nests and 2 nesting areas of the White-tailed Sea Eagle.

The highest population density of the White-tailed Sea Eagle was recorded from the Vodlozero area, where we managed, with assistance of the Vodlozersky national park staff, to inspect 13 nests of the species, only 4 of which turned out to be occupied. Taking data from previous surveys (Sazonov 1995, Zimin 1995, Högmander et al. 2001, Sazonov et al. 2001) and data gathered by the national park staff into account, at least 20–25 White-tailed Sea Eagle pairs and 10–15 Osprey pairs nest around Vodlozero. The Vodlozero breeding group of White-tailed Sea Eagles is noted to a high population density and minimal, 3–3.5 km, distance between occupied nests. This feature makes Sea Eagles from the Vodlozero area similar to the birds living on other inland lakes of Northwest Russia (Lakes Beloye, Lake Vozhe, Sheksna and Rybinsk reservoirs).

In 2002, an expedition was held to Lake Lacha and the Kenozersky national park. Lakes of the area such as Druzhinnoye, Kovzhskoye, Lacha, Lekshmozero and Kenozero were surveyed. Only some breeding pairs of the Osprey and Sea Eagle were observed around the lakes. The largest breeding grouping of the species was on Lake Lacha, 7 Osprey and 5 White-tailed Sea Eagle pairs. Registrations from the Kenozero area included 5 breeding pairs of the Osprey and no Sea Eagle pairs. Lekshmozero area and Lake Kovzhskoye harboured 2 Osprey pairs and 2 Sea Eagle pairs each.

One should note that the White-tailed Sea Eagle and Osprey settle almost exclusively in those areas along the shore where the level of disturbance is quite low. Thus, the Sea Eagle is nearly absent from Lake Kubenskoye, from northern parts of the Lake Lacha area near Kargopol, from the northern, eastern and southern shores of Lake Beloye, i.e. from areas with a dense human population and, correspondingly, heavy disturbance. On the other hand, an occupied White-tailed Sea Eagle nest was found in the Cherepovets city green belt in 1999, and in 1998 an occupied Osprey nest was detected just 1.5 km away from the Cherepovets industrial zone (Kuznetsov & Babushkin 2003, Babushkin 2003). The phenomenon is apparently due to the vicinity of the Darwin reserve high-density source area.

The White-tailed Sea Eagle does not nest on small and even medium-size lakes, showing under the study area conditions obvious preference for larger water-bodies. This fact makes species counts much easier. The inland populations of the Osprey and White-tailed Sea Eagle that have formed in the Vologda Lake District and eastern Onego area are essential for the whole NW Russia as a high-abundance source from which juveniles of the species continuously disperse.

The main characteristic feature of the White-tailed Sea Eagle population in the study area is the tendency to form dense settlements along large inland water-bodies (lakes and impoundment reservoirs) in the forest zone. The population totals ca. 100 pairs. About a third of the population lives in the Darwin reserve on Rybinsk reservoir (30–35 pairs), constituting the biggest source from which birds have apparently dispersed to other large water-bodies of the region in the 1980s–1990s. The second largest source is the Vodlozero area, where 20–25 pairs breed. The breeding population at Sheksna reservoir is 10–12 pairs, at Lake Vozhe 10–13 pairs, along the western shore of Lake Beloye 6–8 pairs, at Lake Lacha 5–6 pairs, at the Kostroma pond of the Gorkovksky reservoir 2–3 pairs. One or two pairs were detected on each of Kovzhskoye, Lekshmozero and some other lakes of the region.

Similar tendencies were observed in the distribution of the Osprey, the population of which on the NW shore of the Rybinsk reservoir (Darwin reserve and its buffer zone) is denser than that of the White-tailed Sea Eagle. There breed 50–55 pairs of the Osprey. Including recent nest finds (D. Shitikov, unpublished), up to 20 pairs nest on Sheksna reservoir. On lakes like Beloye, Lacha, Vozhe and Vodlozero, Osprey abundance (4 to 10 breeding pairs) is far lower than that of the White-tailed Sea Eagle. On the other hand, some Osprey pairs nesting at small lakes and in mires near river banks remained outside the counts. Thus, we estimate the total abundance of the Osprey in the Vologda Lake District and south-eastern Onego area to be 150–180 breeding pairs, of which ca. 30% inhabit the Darwin reserve and its buffer zone.

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