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A preliminary overview of monitoring for raptors in Sweden

Predhodni pregled monitoringa populacij ptic roparic na Švedskem

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Swedish diurnal raptor and owl monitoring is to a large extent based on species specific projects with long-standing traditions, migration counts at specific migration hot-spots, and a nation-wide bird survey. The best-known and long-lived projects are the Peregrine Falcon *Falco peregrinus* and White-tailed Eagle *Haliaeetus albicilla* projects, which continue to make important contributions to the knowledge about effects of environmental pollutants in wild birds. For many diurnal birds of prey, trend estimation is based on the long time series (1973–) of migration counts at Falsterbo in southernmost Sweden, whereas possibilities to detect population trends in most owl species are still relatively low. New protocols, however, are being developed to better incorporate night active-birds such as owls in the Swedish Bird Survey. Much raptor monitoring data is being collected by volunteers. Sweden has several valuable networks for bird monitoring in general, although special efforts could be directed towards better coordination and publication of the on-going raptor work within a common framework. Potential threats (e.g. forestry, wind power development, train collisions, declining prey populations, pollutants) and their effects on raptor populations should preferably also be included in monitoring protocols to a higher extent than at present.

Key words: diurnal raptors, owls, monitoring, Sweden, Falsterbo, Swedish Bird Survey, Swedish Society for Nature Conservation, environmental pollutants
Ključne besede: ujede, sove, monitoring, Švedska, Falsterbo, Švedski popis ptic, Švedsko društvo za varstvo narave, okoljska onesnažila

1. The raptor fauna of Sweden

The Swedish raptor fauna consists of 18 regularly breeding species of diurnal raptors (Falconiformes) and 11 species of owls (Strigiformes). 18 additional raptor species (the term raptors includes both diurnal raptors and owls in this paper) have been recorded in Sweden, but do not breed in the country. The most common birds of prey are Sparrowhawk *Accipiter nisus*, Buzzard *Buteo buteo* and Goshawk *A. gentilis*, whereas the commonest owl species are Tengmalm's Owl *Aegolius funereus*, Pygmy Owl *Glaucidium passerinum* and Tawny Owl *Strix aluco* (Ottosson *et al.* 2012; see Table 1 for population estimates).

2. Main players

Monitoring for raptors in Sweden is conducted by several actors, ranging from government agencies to volunteer-based interest groups. Environmental monitoring on a national level is coordinated by the Swedish Environmental Protection Agency (SEPA) and is used to assess the status of the environment, more specifically 16 environmental quality objectives. The national monitoring is divided into 10 programme areas, with three sub-programmes containing raptor monitoring. The White-tailed Eagle *Haliaeetus albicilla* population along the Baltic Sea coast is included in the sub-programme *Marine top*

predators in the "coasts and seas" programme area. The two other sub-programmes that include raptors are *Falsterbo bird migration counts* and the *Swedish Bird Survey*, both in the "landscape" programme area. The Swedish Red List is compiled by the Swedish Species Information Centre (ArtDatabanken) and serves as the basis for specific action plans that involve monitoring funded by SEPA.

The Swedish Society for Nature Conservation (SSNC) has played an important role by initiating long-term projects for White-tailed Eagle (Helander 1975 & 1983) and Peregrine Falcon *Falco peregrinus* (Lindberg 1975). The Swedish Ornithological Society (SOF) regularly organizes nation-wide surveys of selected species. Some organizations have a species-specific focus, such as "Kungsörn Sverige" (Golden Eagle Sweden; Birkö 2011). Kungsörn Sverige is a new national interest group that coordinates the regional (county-wide) Golden Eagle monitoring groups, and communicates with organizations and administrators. In addition, a symposium is held yearly with contributions from the Nordic countries. Highly coordinated and structured initiatives such as Kungsörn Sverige are valuable for effective management and conservation, and might be a good example to follow.

Volunteers make important contributions to raptor monitoring in various ways, e.g. by reporting observations to the Species Gateway (http://www.artportalen.se), a web-based reporting system operated by the Swedish Species Information Centre. It should be acknowledged that virtually all large-scale monitoring programmes for raptors in Sweden involve important contributions made by a large number of volunteers. Further, about 160 people in Sweden have ringing licenses covering raptors (see Table 1).

3. National coverage

Sweden lacks a national network for raptor monitoring. Therefore, monitoring for raptors is shared between the national monitoring programme, action plans and species-specific projects. Traditionally, monitoring in Sweden has focused on rare species and there is therefore less information available from breeding areas on more common species.

The Swedish Bird Survey, national representative of the Pan-European Common Bird Monitoring Scheme, coordinated by Department of Ecology at Lund University, is a volunteer-based system with standard routes that cover most of Sweden. Data collected by the Swedish Bird Survey is used e.g. to calculate EU Bird Indices, with results published in yearly monitoring reports (e.g. Lindström & Green 2013) and scientific papers (e.g. Jiguet *et al.* 2013, Lindström *et al.* 2013). The number of observed raptors on the standard routes is low, so assessment of raptor population trends is complemented by migration counts from Falsterbo bird observatory. The migratory bird counts at Falsterbo started in the 1940s, and have been carried out with standardized methodology since 1973 (Kjellén & Roos 2000).

Overall, quantitative information on population trends and status is much better for diurnal raptors than for owls. For 18 regularly breeding diurnal raptor species, data quality is generally good if all available sources are taken into account (Ottvall *et al.* 2009). But for several owl species, virtually no data are available for trend estimation.

4. Key species and key issues

Key projects that survey the majority of the geographical distribution with national coordination by SEPA and the county administration boards concern White-tailed Eagle (Helander *et al.* 2003), Golden Eagle *Aquila chrysaetos* (Birkö 2011), and Peregrine Falcon (Lindberg 2009). Montagu's Harrier *Circus pygargus* (Rodebrand 1996), Osprey *Pandion haliaetus* (e.g. Odsjö & Sondell 2001) and Gyrfalcon *F. rusticolus* (Falkdalen *et al.* 2011) are monitored within the framework of one or several projects in either restricted areas or without national coordination. The first four mentioned species currently have an action plan, where conservation actions and monitoring are important components (Helander 2009, Hjernquist 2011, Lindberg 2011, Rodebrand 2011). An action plan is not a legal document and only serves as a recommendation for conservation and monitoring administrators. As per 2013, all action plans including raptors (except for Montagu's Harrier) have been down-prioritized by SEPA, and the county administrations therefore have limited possibilities to work with the existing raptor action plans.

Much attention has been paid to effects of environmental pollutants on reproduction and population recovery in White-tailed Eagle (Helander *et al.* 2002 & 2008) and Peregrine Falcon (Lindberg 1983 & 2009). The time series of White-tailed Eagle brood size and proportion of successful breeding attempts are the only bird series in Sweden's Official Statistics (Naturvårdsverket 2013), which demonstrates the importance of this species as an environmental sentinel. Among owls, substantial

Table 1: List of raptor species breeding in Sweden; eight bird of prey and five owl species are listed in the Swedish national red list. Population estimates (point estimates with range) are from Ottosson *et al.* (2012). The numbers of active ringers and ringed nestlings are also compiled for each species in the 2000–2010 period (for White-tailed Eagle *Haliaeetus albicilla* and Peregrine Falcon *Falco peregrinus*, the ringing license is issued to the project leader, but ca. 10 ringers contribute as helpers).

Tabela 1: Seznam ptic roparic gnezdečih na Švedskem; osem vrst ujed in pet sovjih vrst je uvrščenih v švedski Rdeči seznam. Ocene njihovih populacij (točkovne ocene z intervali) so prikazane po Ottosson *et al.* (2012). Za obdobje 2000–2010 je zbrano tudi število aktivnih obročkovalcev in obročkanih mladičev (za belorepca *Haliaeetus albicilla* in sokola selca *Falco peregrinus* je bilo dovoljenje za obročkanje izdano vodji projekta, kakih 10 obročkovalcev je bilo pomočnikov).

Species / Vrsta	Red List category/ Kategorija v Rdečem seznamu	Action plan/ Akcijski načrt	Estimated no. of breeding pairs/ Ocenjeno št. gnezdečih parov	Active ringers/ Št. aktivnih obročkovalcev 2000–2010	No. of ringed nestlings / Št. obročkanih mladičev 2000–2010
Honey Buzzard *Pernis apivorus*	VU		6,625 (5,180–8,070)	19	155
Black Kite *Milvus migrans*			10 (3–20)		
Red Kite *Milvus milvus*			2,054 (1,933–2,181)	4	173
White-tailed Eagle *Haliaeetus albicilla*	NT	2009–2013	533 (533–600)	1–10	3,191
Marsh Harrier *Circus aeruginosus*			1,498 (1,317–1,676)	34	1,003
Hen Harrier *Circus cyaneus*	NT		859 (690–1,025)	1	4
Montagu's Harrier *Circus pygargus*	EN	2011–2015	59 (45–74)	6	39
Goshawk *Accipiter gentilis*			7,600 (4,500–10,700)	36	1,281
Sparrowhawk *Accipiter nisus*			43,700 (21,750–65,800)	20	1,022
Buzzard *Buteo buteo*			31,100 (17,160–45,060)	43	1,827
Rough-legged Buzzard *Buteo lagopus*	NT		3,000 (1,700–5,200)	17	187
Golden Eagle *Aquila chrysaetos*	NT	2011–2015	682 (585–805)	27	1,191
Osprey *Pandion haliaetus*			4,060 (3,380–4,700)	40	3,522
Kestrel *Falco tinnunculus*			6,431 (4,495–8,367)	74	26,939
Merlin *Falco columbarius*			6,180 (4,567–7,893)	7	101
Hobby *Falco subbuteo*			2,335 (1,695–2,975)	13	71
Gyrfalcon *Falco rusticolus*	VU	In prep?	114 (80–136)	7	278
Peregrine Falcon *Falco peregrinus*	VU	2011–2014	282 (232–332)	1–10	1,928
Barn Owl *Tyto alba*	CR		10 (5–17)	2	28
Eagle Owl *Bubo bubo*	NT		474 (393–557)	53	1,350
Snowy Owl *Bubo scandiacus*	CR		0 (0–0)	0	0
Hawk Owl *Surnia ulula*			2,273 (1,125–13,510)	9	88
Pygmy Owl *Glaucidium passerinum*			19,340 (9,640–29,550)	23	880
Tawny Owl *Strix aluco*			17,750 (14,950–20,670)	84	10,422
Ural Owl *Strix uralensis*			2,680 (2,025–3,415)	24	3,385
Great Grey Owl *Strix nebulosa*	NT		402 (201–603)	16	759
Long-eared Owl *Asio otus*			8,625 (2,605–14,565)	26	128
Short-eared Owl *Asio flammeus*	NT		1,655 (755–4,702)	9	20
Tengmalm's Owl *Aegolius funereus*			32,125 (16,760–91,470)	42	2,305

effort has been devoted to restocking of the Eagle Owl *Bubo bubo* population with captive breeding.

The key threats currently addressed and discussed by monitoring in Sweden (not in any particular order of importance) are effects of pollutants, lead poisoning, forestry practices, wind power, wild bird crime, electrocution and power line collisions, vehicle collisions, human disturbance and changes in prey abundance (e.g. Helander *et al.* 2009a & 2009b, Ottvall *et al.* 2009, Rydell *et al.* 2011). Many of these topics are of such general importance that any networking activity within EURAPMON would benefit Swedish perspectives. Recently, location of wind farms has been viewed as a major problem in Sweden, and we currently lack sufficient planning for raptors (and other birds) in relation to location of

wind farms. Nest site protection is also a high-priority issue.

5. Strengths and weaknesses

Two obvious strengths among Swedish raptor monitoring are the Peregrine Falcon and White-tailed Eagle projects that were initiated by the SSNC in the early 1970s, and remain unparalleled in Swedish nature conservation both in terms of longevity and success. Both projects are network projects with a large number of participants, primarily operating on a volunteer basis. The existing networks are indeed necessary to maintain the status and quality of these projects.

Further, the migration counts at Falsterbo are the longest available time-series for several species (Kjellén & Roos 2000, Kjellén 2012). Although annual numbers and proportion of migrants that funnel over the Falsterbo area vary between species, population changes can be assessed for ca. 14 raptor species. In addition to population trends, migration phenology and reproductive output is studied. However, the geographical origin of migrating birds is not known and the counts reflect a mixture of birds from different breeding sites and countries, thereby limiting the usefulness of migration counts for active management.

The Swedish Bird Survey has extensive spatial coverage, but the number of observations of raptors per route and year is low (e.g. Lindström & Green 2013), which results in low statistical power for trend analyses. However, the recent addition of night routes (Green 2010) will be an important tool for monitoring of common owl species (Pygmy Owl, Tawny Owl, Ural Owl *S. uralensis*, Long-eared Owl *Asio otus* and Tengmalm's owl).

There are thus some considerable gaps in Swedish raptor monitoring (Ottvall *et al.* 2009). The number of ornithologists decreases towards north, which coincides with an increase in habitat heterogeneity. Therefore, data on common raptors in northern Sweden is only locally available. On a national level, little is known regarding population trends in owls (Ottvall *et al.* 2009), which partly can be explained by the scattered distribution and cyclic breeding pattern of e.g. Snowy Owl *B. scandiacus*, Short-eared Owl *A. flammeus*, Hawk Owl *Surnia ulula* and Great Grey Owl *S. nebulosa*. But there is little information available on population trends also for well-known species with a southerly distribution (Tawny Owl), and for forest species (Ural owl and Tengmalm's owl). For migratory raptors, there is a lack of information on carry-over effects from wintering habitats and stop-over sites on e.g. body condition. The EURAPMON network could be important for mapping winter distribution and abundance of short-distance migrants, as well as collaborative efforts on long-distance migration.

A large proportion of bird monitoring in Sweden is based on surveillance monitoring, which provides weak inference about species that breed in low densities (Nichols & Williams 2006), such as most raptors. The current monitoring system should preferably be combined with a more scientific and hypothesis-driven approach towards explaining changes in population numbers. For instance, many diurnal raptor and owl populations are limited by food abundance and/or nest sites, and it should be possible to design and combine the existing (e.g. small mammal monitoring) survey protocols that link populations to these limiting factors.

Sweden will benefit from an increased collaborative effort within EURAPMON, both *for* and *with* raptors. Since Sweden lacks a comprehensive network for raptor monitoring, we could benefit from best-practice sharing on how to set up a large-scale monitoring system (see e.g. Saurola 2008, Wernham *et al.* 2008), where it is made clear to policy makers why raptor monitoring is a high-priority topic, and in the next step prioritize areas for monitoring. Increased understanding of pathways of environmental pollutants (e.g. brominated flame retardants, DDE, PCB) will further strengthen the use of raptors as environmental sentinels (Lindberg *et al.* 2004, Helander *et al.* 2008). Efforts to co-ordinate raptor surveys in northern Fennoscandia are essential for new information on several owl species, Golden Eagle, Gyrfalcon and Rough-legged Buzzard *B. lagopus*. A coordinated monitoring of Ospreys, a species for which Sweden has a high responsibility, would be valuable. There are several independent Osprey projects that could benefit from co-operation and international sharing with Finland in particular (Saurola 1997). Further, reporting of data, results and trends could be improved, as a large quantity of monitoring work (done e.g. by local projects and ringers) is rarely published in print.

6. Priorities, capacity-building

There are several immediate possibilities for capacity-building in Sweden. Expertise based on work with rare species could be applied to more common species. A relatively small group of ornithologists are active as ringers, and it should be possible to coordinate

ringing activities within a broader framework. Ringers collect information on clutch and brood size, breeding phenology, sex ratio and dispersal – valuable data that can be used to study demography and effects of climate change on bird populations. There is a lack of demographic data, particularly survival, for many species. Based on ringing reports since 2000 (Table 1), it is evident that nestbox-breeders receive the most attention (Kestrel *F. tinnunculus*, Pygmy Owl, Tawny Owl, Ural Owl, Tengmalm's Owl). Special attention within EURAPMON should be paid to standardize methods and measurements (body measures and moult patterns).

Sweden should also improve its reporting on raptors. The Species Gateway is used to some extent for this, but it is evident that many observations and nests are not reported at all. The Species Gateway could be improved in some aspects with respect to raptor surveys (although it is not well suited for more vulnerable species such as the eagles and large falcons), and discussions with other countries within EURAPMON on how to secure, report and publish data are of high value.

Co-ordination of several action programmes and more effective monitoring should be prioritized. Monitoring of some raptors could also be coordinated with the national monitoring programme for small mammals (Hörnfeldt 2013). Volunteers and interest groups have always been important for monitoring, and the contribution made by volunteers should not be underestimated. However, there is a need for recruitment of new volunteers, and discussions should be made within EURAPMON on how to raise interest in raptors among e.g. university students.

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7. Povzetek

Švedski monitoring ujed in sov poteka večinoma v okviru projektov, ki se dolga leta že tradicionalno posvečajo določenim vrstam, štetju selivk na pomembnih selitvenih točkah in popisovanju ptic na nacionalni ravni. Najbolj poznana projekta z najdaljšo zgodovino na Švedskem zadevata sokola selca *Falco peregrinus* in belorepca *Haliaeetus albicilla*, ki še vedno pomembno prispevata k poznavanju učinkov okoljskih onesnažil na prostoživeče ptice. Ocenjevanje trendov mnogih ujed temelji na dolgoletnem (od leta 1973) štetju selivk pri Falsterboju na skrajnem jugu Švedske, medtem ko so možnosti za ugotavljanje populacijskih trendov pri večini sovjih vrst razmeroma majhne. Sicer pa so prav zdaj v pripravi načrti za boljše vključevanje nočno aktivnih ptic, kot so sove, v okvir švedskega popisovanja ptic. Za mnoge podatke, pridobljene na osnovi monitoringa, se je treba zahvaliti prostovoljcem. Švedska ima več dragocenih omrežij za splošni monitoring, vendar pa bi bilo treba vložiti več naporov v boljšo koordinacijo in objavljanje zdaj potekajočega dela na področju ptic roparic v skupnem okviru. Sploh pa bi se morali v načrtih za monitoring v veliko večji meri kot danes posvečati tudi potencialnim grožnjam (npr. gozdarstvo, razvoj vetrne energije, trki z vlaki, vse manj plena za te ptice, onesnažila) in njihovim vplivom na populacije ptic roparic.

8. References

Birkö, T. (2011): [The Golden Eagle in Sweden during ten years.] pp. 30–39 In: Bentz, P.-G. & Wirdheim, A. (eds): The Bird Year 2010. – Swedish Ornithological Society, Stockholm. (in Swedish)

Falkdalen, U., Hörnell-Willebrand, M., Nygård, T., Bergström, T., Lind, G., Nordin, A. & Warensjö, B. (2011): Relations between willow ptarmigan (*Lagopus lagopus*) density and gyrfalcon (*Falco rusticolus*) breeding performance in Sweden. pp. 171–176 In: Watson, R.T., Cade, T.J., Fuller, M., Hunt, G. & Potapov, E. (eds.): Gyrfalcon and Ptarmigan in a changing world. Vol. II. Proceedings of the Conference, 1–3 February 2011, Boise, Idaho. – The Peregrine Fund, Boise.

Green, M. (2010): [Night routes programme – short report for 2010.] – Naturvårdsverket/SEPA, Stockholm. (in Swedish)

Helander, B. (1975): [The White-tailed Eagle in Sweden.] – Swedish Society for Nature Conservation, Stockholm & Bohuslänningen AB, Uddevalla. (in Swedish, English summary)

Helander, B. (1983): Reproduction of the White-tailed Sea Eagle *Haliaeetus albicilla* (L.) in Sweden, in relation to food and residue levels of organochlorine and mercury compounds in the eggs. PhD thesis. – Department of Zoology, Stockholm University.

Helander, B. (2009): [Action plan for white-tailed eagle 2009–2013 (*Haliaeetus albicilla*).] – Naturvårdsverket/SEPA, Stockholm. (in Swedish, English summary) (available at http://www.naturvardsverket.se/Documents/publikationer/978-91-620-5938-5.pdf)

Helander, B., Olsson, A., Bignert, A., Asplund, L. & Litzén, K. (2002): The role of DDE, PCB, coplanar PCB and eggshell parameters for reproduction in the White-tailed Sea Eagle (*Haliaeetus albicilla*) in Sweden. – Ambio 31 (5): 386–403.

Helander, B., Marquiss, M. & Bowerman, W. (eds.) (2003): SEA EAGLE 2000. Proceedings from the international conference, 13–17 September 2000, Björkö, Sweden. – Swedish Ornithological Society, Stockholm.

Helander, B., Bignert, A. & Asplund, L. (2008): Using

raptors as environmental sentinels: monitoring the white-tailed sea eagle *Haliaeetus albicilla* in Sweden. – Ambio 37 (6): 425–431.

Helander, B., Axelsson, J., Borg, H., Holm, K. & Bignert, A. (2009a): Ingestion of lead from ammunition and lead concentrations in white-tailed sea eagles (*Haliaeetus albicilla*) in Sweden. – Science of the Total Environment 407 (21): 5555–5563.

Helander, B., Räikkönen, J. & Bignert, A. (2009b): [Analysis of collisions with eagles along State Rail 2000–2007.] – Swedish Museum of Natural History, Stockholm. (in Swedish, English summary)

Hjernquist, M. (2011): [Action plan for golden eagle 2011–2015 (*Aquila chrysaetos*).] – Naturvårdsverket/ SEPA, Stockholm. (in Swedish, English summary) (available at http://www.naturvardsverket.se/Documents/ publikationer6400/978-91-620-6430-3.pdf)

Hörnfeldt, B. (2013): [National Monitoring of Small Mammals.] (in Swedish) – [http://www.slu.se/sv/ fakulteter/s/om-fakulteten/institutioner/institutionen-for-vilt-fisk-och-miljo/personal/lista/birger-hornfeldt/ miljoovervakning-av-smagnagare], 19/6/2013.

Jiguet, F., Barbet-Massin, M., Devictor, V., Jonzén, N. & Lindström, Å. (2013): Current population trends mirror forecasted changes in climatic suitability for Swedish breeding birds. – Bird Study 60 (1): 60–66.

Kjellén, N. (2012): Migration counts at Falsterbo. – [http:// www.falsterbofagelstation.se/index_e.html], 19/6/2013.

Kjellén, N. & Roos, G. (2000): Population trends in Swedish raptors demonstrated by migration counts at Falsterbo, Sweden 1942–1997. – Bird Study 47 (2): 195–211.

Lindberg, P. (1975): [The peregrine falcon in Sweden.] – Swedish Society for Nature Conservation & Tryckeribolaget Svea, Stockholm. (in Swedish, English summary)

Lindberg, P. (1983): Relations between the diet of Fennoscandian peregrines *Falco peregrinus* and organochlorines and mercury in their eggs and feathers, with a comparison to the gyrfalcon *Falco rusticolus*. PhD thesis. – University of Göteborg.

Lindberg, P. (2009): The fall and the rise of the Swedish Peregrine population. pp. 137–144 In: Sielicki, J. & Mizera, T. (eds.): Peregrine Falcon Populations – status and perspectives in the 21st Century. – Turul Publishing & Poznań University of Life Sciences Press, Warsaw - Poznań.

Lindberg, P. (2011): [Action plan for peregrine falcon 2011–2014 (*Falco peregrinus*).] – Naturvårdsverket/ SEPA, Stockholm. (in Swedish, English summary) (available at http://www.naturvardsverket.se/Documents/ publikationer6400/978-91-620-6426-6.pdf)

Lindberg, P., Sellström, U., Häggberg, L. & De Wit, C. (2004): Higher brominated diphenyl ethers and hexabromocyclododecane found in eggs of peregrine falcons (*Falco peregrinus*) breeding in Sweden. – Environmental Science & Technology 38 (1): 93–96.

Lindström, Å. & Green, M. (2013): [Monitoring population changes of birds in Sweden. Annual report for 2012.] – Ekologiska institutionen, Lunds universitet, Lund. (in Swedish, English summary) (available at http:// www.zoo.ekol.lu.se/birdmonitoring/Publikationer.htm)

Lindström, Å. & Green, M. Paulson, G., Smith, H.G. & Devictor, V. (2013): Rapid changes in bird community composition at multiple spatial scales in response to recent climate change. – Ecography 36 (3): 313–322.

Naturvårdsverket (2013): Environmental Statistics A-Ö. – [http://www.naturvardsverket.se/Sa-mar-miljon/ Statistik-A-O], 19/6/2013. (search for "Havsörn", White-tailed Eagle in Swedish)

Nichols, J.D. & Williams, B.K. (2006): Monitoring for conservation. – Trends in Ecology & Evolution 21 (12): 668–673.

Odsjö, T. & Sondell, J. (2001): Population status and breeding success of osprey *Pandion haliaetus* in Sweden, 1971–1998. – Vogelwelt 122: 155–166.

Ottosson, U., Ottvall, R., Elmberg, J., Green, M., Gustafsson, R., Haas, F., Holmqvist, N., Lindström, Å., Nilsson, L., Svensson, M., Svensson, S. & Tjernberg, M. (2012): [Birds in Sweden – Numbers and distribution.] – Swedish Ornithological Society, Halmstad. (in Swedish, English summary)

Ottvall, R., Edenius, L., Elmberg, J., Engström, H., Green, M., Holmqvist, N., Lindström, Å., Tjernberg, M. & Pärt, T. (2009): Population trends for Swedish breeding birds. – Ornis Svecica 19 (3): 117–192.

Rodebrand, S. (1996): [The Montagu 's Harrier *Circus pygargus* in Öland, and Sweden.] – Calidris 25: 99–116. (in Swedish, English summary)

Rodebrand, S. (2011): [Action plan for Montagu's harrier 2011–2015 (*Circus pygargus*).] – Naturvårdsverket/ SEPA, Stockholm. (in Swedish, English summary) (available at http://www.naturvardsverket.se/Documents/ publikationer6400/978-91-620-6465-5.pdf)

Rydell, J., Engström, H., Hedenström, A., Kyed Larsen, J., Pettersson, J. & Green, M. (2011): [Effects of wind power on birds and bats. A synthesis report.] – Naturvårdsverket/SEPA, Stockholm. (in Swedish)

Saurola, P. (1997): The osprey (*Pandion haliaetus*) and modern forestry: a review of population trends and their causes in Europe. – Journal of Raptor Research 31 (2): 129–137.

Saurola, P. (2008): Monitoring birds of prey in Finland: a summary of methods, trends, and statistical power. – Ambio 37 (6): 413–419.

Wernham, C.V., Etheridge, B., Holling, M., Riddle, G., Riley, H.T., Stirling-Aird, P.K., Stroud, D., Thompson, D.B.A. & Wilson, J.D. (2008): The Scottish Raptor Monitoring Scheme: objectives, achievements in the first four years, and plans for future development. – Ambio 37(6): 460–465.

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