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Conservation of birds of prey in Norway – Guidelines and management priorities

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Norsk ornitologisk forening

Conservation of Birds of Prey in Norway

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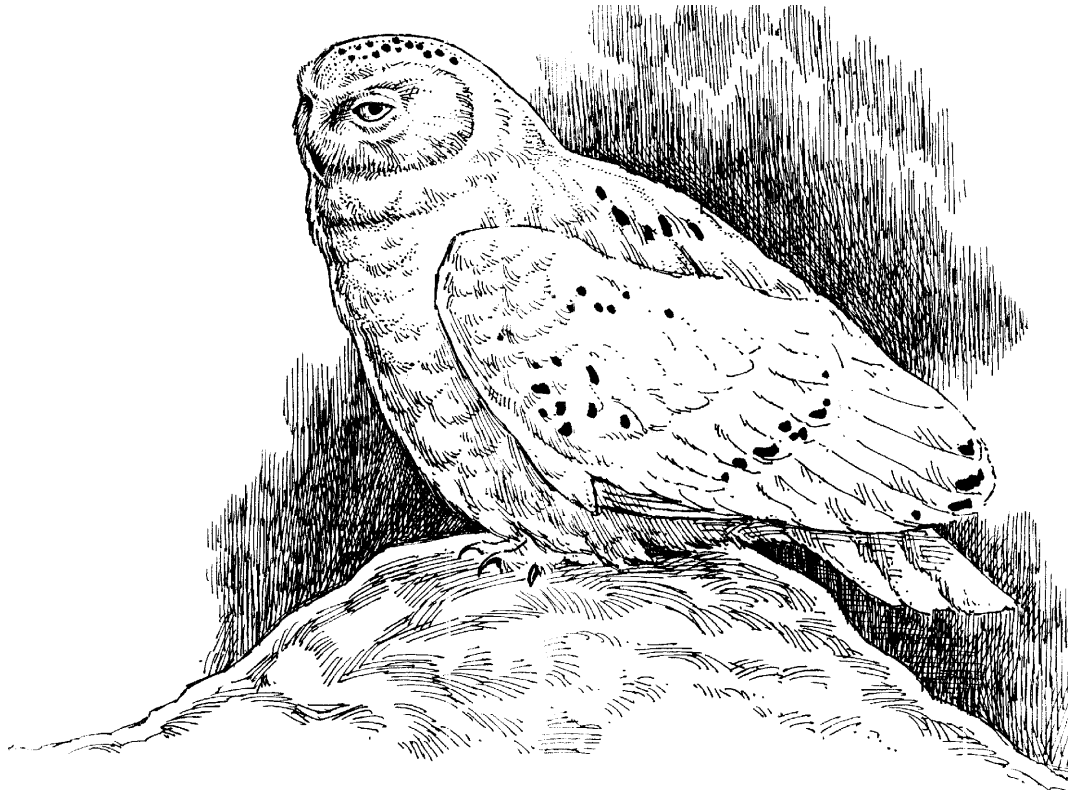

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Foreword by the Norwegian Environmental Agency

The Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptors MoU) was signed by Norway in October 2008 and entered into force on 1st November 2008. This agreement covers a huge geographical area, from Greenland and Africa through to Asia (except SE-Asia, Japan and the Korean peninsula). At present 61 out of 131 range states have signed the agreement. The Norwegian Environmental Agency hosted the most recent Meeting of the Signatories in Trondheim in October 2015 (MoS2). A coordinating office for the agreement has been established in Abu Dhabi, UAE.

A key part of the agreement is Paragraph 12 of the agreement text, which states that Signatories will aim to prepare and submit to the coordinating unit as appropriate a national or regional strategy or equivalent documents, e.g. single species action plans for Category 1 species and where appropriate Category 2 species in Table 1 in the agreements Action plan.

Conservation of raptors in Norway is manifold and intrinsic in development of national strategies for environmental conservation across the sectors. A good knowledge base is paramount for prioritization of action related to raptors. Therefore, the Norwegian Environmental Agency commissioned the national BirdLife partner to produce a status update on raptors in Norway (BirdLife Norway Report 1-2014: Conservation status of birds of prey and owls in Norway). This report was the first step for the preparation of the Norwegian national strategy for raptors under the Raptors MoU, as presented here.

In the present report the Norwegian BirdLife partner presents both recommended best practices and priorities applicable for all raptors. Norway do not hold any Category 1 species (globally threatened or near threatened). While for Category 2 four species of diurnal birds of prey (raptors) and three species of owls are regularly present in the country.

Both reports from BirdLife Norway identifies important factors affecting populations of raptors and as such they will contribute across the sectors towards improved conservation management through the identified and suggested priorities. The two BirdLife partner reports on raptors will therefore contribute towards both national priorities and continued compliance with the intent of the Raptors MoU.

Øystein Størkersen

National Focal Point for the Raptors MoU

Norwegian Environment Agency

NORWEGIAN ENVIRONMENT AGENCY

Executive Summary

The Norwegian Strategic Approach to Raptor Conservation fulfils the aim of Paragraph 12 of the Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptors MoU) to prepare a national strategy or an equivalent document. The report summarises main threats to raptors in Norway and defines national objectives and relevant activities to obtain and maintain a favourable conservation status for all species regularly breeding in, or migrating through, Norway. Important habitats and sites are designated. The national strategy reviews the status of fifteen species of diurnal birds of prey (raptors) and ten owl species regularly breeding in Norway, as well as fourteen raptor species and two owl species that fall into the category passage migrants or vagrants. Of the regularly breeding species, none are Category 1 species in the Action Plan of the CMS Raptors MoU (Annex 3; globally threatened or near threatened species according to the latest IUCN Red List). Four raptors and three species of owl are included under Category 2. Additionally, eight raptor species and three owl species are designated as CMS flagship species for Norway (cf. Table 2).

Most birds of prey populations in Norway are stable, and some are still recovering after heavy persecution during the early 20th century, as well as from environmental pollutants causing eggshell thinning during the 1960s and 1970s. However, Norwegian birds of prey face several threats causing population declines in some species. These can be broadly categorised as follows: habitat loss and degradation, loss of nest sites, forestry, human disturbance, infrastructure (incl. new energy utility structures), collision risk, persecution, lack of food, overgrazing, environmental pollutants, climate change and a general lack of knowledge about important sites among decision makers. Norwegian bird of prey experts rank habitat loss and fragmentation, forestry and human disturbance as the threats of greatest importance (Annex 2).

Priority conservation actions are proposed with a timeframe for implementation. Actions are based upon the major threats identified, and the ones considered of most importance include the following:

1) Habitat conservation and sustainable management – Priority measures include the surveying, maintenance and restoration of natural habitats of greatest importance to birds of prey, and the protection of 10 % of productive forest habitats in Norway. The promotion of establishment of tranquillity zones in important breeding areas as well as taking the needs of conservation and protection of birds of prey and their habitats more into account in land use and management are also activities considered to be of high importance.

2) Protection and management of important sites and flyways – To survey, identify and conserve key breeding and wintering sites, and to designate sites of national or international importance as protected areas are the activities with highest priority under this point. Proper Environmental Impact Assessments (EIAs) should always be undertaken for projects potentially impacting sites holding significant populations of Category 1 and 2 and flagship species, including organized recreation and recreational activities. Strengthening environmental surveillance to prevent disturbance is also an activity considered of high importance.

3) Improvement of legal protection – Of highest priority are the strengthening of legal requirements to protect nests and roost sites from damage and deliberate disturbance. A

review of relevant legislation to ban the use of chemicals causing significant mortalities is also highly important. The identification of gaps in Multilateral Environmental Agreements to improve bird of prey protection and conservation is also important. Finally, all relevant national legislation should be reviewed in order to make sure that it is in accordance with international agreements.

4) Reduction of infrastructure mortality – Of highest priority is to ensure that all new power lines are constructed to avoid electrocution risk and risk of collisions. The development of wind power plants should be prevented at important sites for migration, staging or breeding.

5) Prevention of poisoning – Considered of highest importance is the reduction of pesticide use, incl. rodenticides and insecticides, and to uphold the ban on carbofuran and similar chemicals. Banning the use of lead ammunition for hunting purposes should also be of high priority for the conservation of species like the Golden Eagle.

6) Prevention of illegal persecution – The extent of persecution on birds of prey in Norway is largely unknown and should be investigated further. To prevent and discover persecution incidents environmental surveillance should be strengthened. Finally, to ensure proper routines and agreements to prevent the spreading of sensitive information, e.g. about nest sites, should be of highest priority.

7) Monitoring and research – To enable targeted conservation and protective measures, monitoring and research is usually a prerequisite. Therefore, field research, surveys and monitoring of selected species must be of high priority. This also includes studies on home range, movements and migration, as well as threats such as energy infrastructure, overgrazing and pollutants.

8) Conservation of selected species – Of high priority is the preparation of a single Species Action Plan for the Snowy Owl, as well as the implementation of conservation programs (e.g. action plans) for rare and threatened species such as Northern Goshawk and Gyrfalcon

9) Raising public awareness

10) International cooperation – The listing of all threatened birds of prey to CMS Appendix I must be of high priority. In this and other matters, the participation of Norway in the Raptor MoU Signatory meetings is of vital importance. We also recommend that single- or multispecies international action plans for all globally threatened birds of prey should be developed and extended. Of high importance is also the continuation of Norwegian initiatives such as the International Snowy Owl Working Group (ISOWG).

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1. INTRODUCTION

The Norwegian Strategic Approach to Raptor Conservation fulfils the aim of Paragraph 12 of the Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptors MoU) to prepare a national strategy or an equivalent document. By "birds of prey" we refer to the following taxonomic orders: *Accipitriformes* (vultures, eagles, hawks), *Falconiformes* (falcons) and *Strigiformes* (owls). The former two orders are often referred to as diurnal raptors. Birds of prey is a particularly important group of birds. Being at the top of food chains, they are generally good environmental indicators, serving as important early warning signals to environmental threats. Monitoring of birds of prey benefits many other species, by identifying factors in the environment further down the food chain. Migratory species face multiple threats during migration and wintering, and their conservation therefore requires international cooperation.

1.1 International context

Many migratory raptors and owls in the African-Eurasian region show rapid or long-term population declines. This was emphasised in a yearlong study commissioned by the United Kingdom Department for Environment, Food and Rural Affairs (DEFRA) and presented to the 8th Conference of Parties (COP8) to the Convention on the Conservation of Migratory Species of Wild Animals (CMS – Bonn Convention) in Nairobi, Kenya in November 2005. It was concluded that 50 % of migratory birds of prey populations in the region had poor conservation status. The study provided a foundation for the development of an international instrument under the CMS. Parties were urged to evaluate whether a future CMS instrument would be beneficial towards the conservation of migratory birds of prey in Africa and Eurasia (Convention on the Conservation of Migratory Species of Wild Animals (CMS) 2012).

The new Memorandum of Understanding (MoU) on the Conservation of Migratory Birds of Prey in Africa and Eurasia (AEBOP) was concluded and signed by 28 nations on 22nd of October 2008 in Abu Dhabi, United Arab Emirates, as a part of the CMS. It came into effect on 1 November 2008. The general aim of the agreement is to "ensure that all populations of African-Eurasian migratory birds of prey (including owls) are maintained in, or returned to, Favourable Conservation Status within the meaning of Article 1(c) of the Convention". Assignments for each nation are specified with three main objectives in an action plan that was agreed simultaneously to the MoU (Convention on the Conservation of Migratory Species of Wild Animals (CMS) 2008):

- Population declines of globally threatened (Critically Endangered, Endangered and Vulnerable) and near threatened birds of prey should be halted or reversed, and threats to them should be alleviated so that they are no longer threatened.
- Population declines of other birds of prey within Africa and Eurasia with an Unfavourable Conservation Status should be halted or reversed, and threats to them should be alleviated so that they return their populations to Favourable Conservation Status.
- Potential and emerging threats to all bird of prey species should be anticipated or reduced, so that long-term decline in populations of any species is prevented.

The species are assigned within one of three categories according to their population size and to what degree they are threatened. Category 1 includes globally threatened or near threatened species according to the most recent IUCN Red List (Red List status: EN (endangered), VU (vulnerable)

or NT (near threatened). Species assigned within category 2 are considered to have Unfavourable Conservation Status at a regional level within a defined area (listed in Annex 2 of the MoU), while category 3 includes all other migratory species.

1.2 National context

According to the Raptors MoU, signatories are committed to adopt and implement conservation measures for migratory birds of prey and their habitat. As a part of this, a report on the conservation status of birds of prey in Norway was prepared by BirdLife Norway (Heggøy & Øien 2014). The present report provides general guidelines and management priorities for the conservation of birds of prey in Norway. The implementation of a Norwegian national strategy under the Raptors MoU is coordinated by the Norwegian Environment Agency, which is responsible for acquiring knowledge and implementing measures to preserve biodiversity.

1.3 Goal and objectives

The main goal and objectives of these strategic guidelines to the conservation of migratory birds of prey in Norway is to address important threats and priorities to improve their conservation and maintain a favourable conservation status for all species regularly breeding in, or migrating through, Norway.

The main goal and of these strategic guidelines is to address important threats and priorities to improve the conservation of migratory birds of prey in Norway and to maintain a favourable conservation status for all species regularly breeding in, or migrating through, the country. Listed as “Vulnerable” on the Global Red List, the Snowy Owl is one of the breeding species of high conservation concern. Photo: Ingar Jostein Øien

2. GENERAL INFORMATION

National contact points and main contributors are specified in Table 1.

Table 1. General information.

Date of entry into force of the CMS Raptors MoU in Norway:	Norway [October 2008]
Period covered by the guidelines:	[2020 – 2035]
Territory to which this document applies	Norway
Designated National Contact Points: Norwegian Environment Agency (1) Øystein Størkersen/(2) Arild Robert Espelien P.O. Box 5672 Torgarden, 7485 Trondheim Tel: +47 7358 0500 E-mail (1): oystein.rune.storkersen@miljodir.no E-mail (2): arild.robert.espelien@miljodir.no	**Appointment to the CMS Scientific Council:** Norwegian Environment Agency Øystein Størkersen P.O. Box 5672 Torgarden, 7485 Trondheim Tel: +47 7358 0500 E-mail: oystein.rune.storkersen@miljodir.no
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Date of Completion	05.10.2020

The Long-eared Owl is one of three owls breeding in Norway listed in Category 2 in the Action Plan of the CMS Raptors MoU (i.e. “Unfavourable Conservation Status at a regional level”). Photo: Eirik Nydal Adolfsen

2.1 National factsheet

The Kingdom of Norway is situated in northern Europe and comprises the western and northernmost part of the Scandinavian Peninsula, the island of Jan Mayen, and the Svalbard archipelago. The territory borders Sweden, Finland and Russia in the east, and is surrounded by sea in the north, west and south. The mainland territory covers a total area of 304,125 square kilometres. The altitudinal range is from sea level to the highest peak at Galdhøpiggen in Jotunheimen (2,469 m above sea level). The Norwegian mainland is commonly classified into four major biogeographic regions; the Atlantic, the Alpine, the Boreal and the Arctic regions (Figure 1). Neither the territory of Svalbard nor the territory of Jan Mayen hold any populations of raptors and owls.

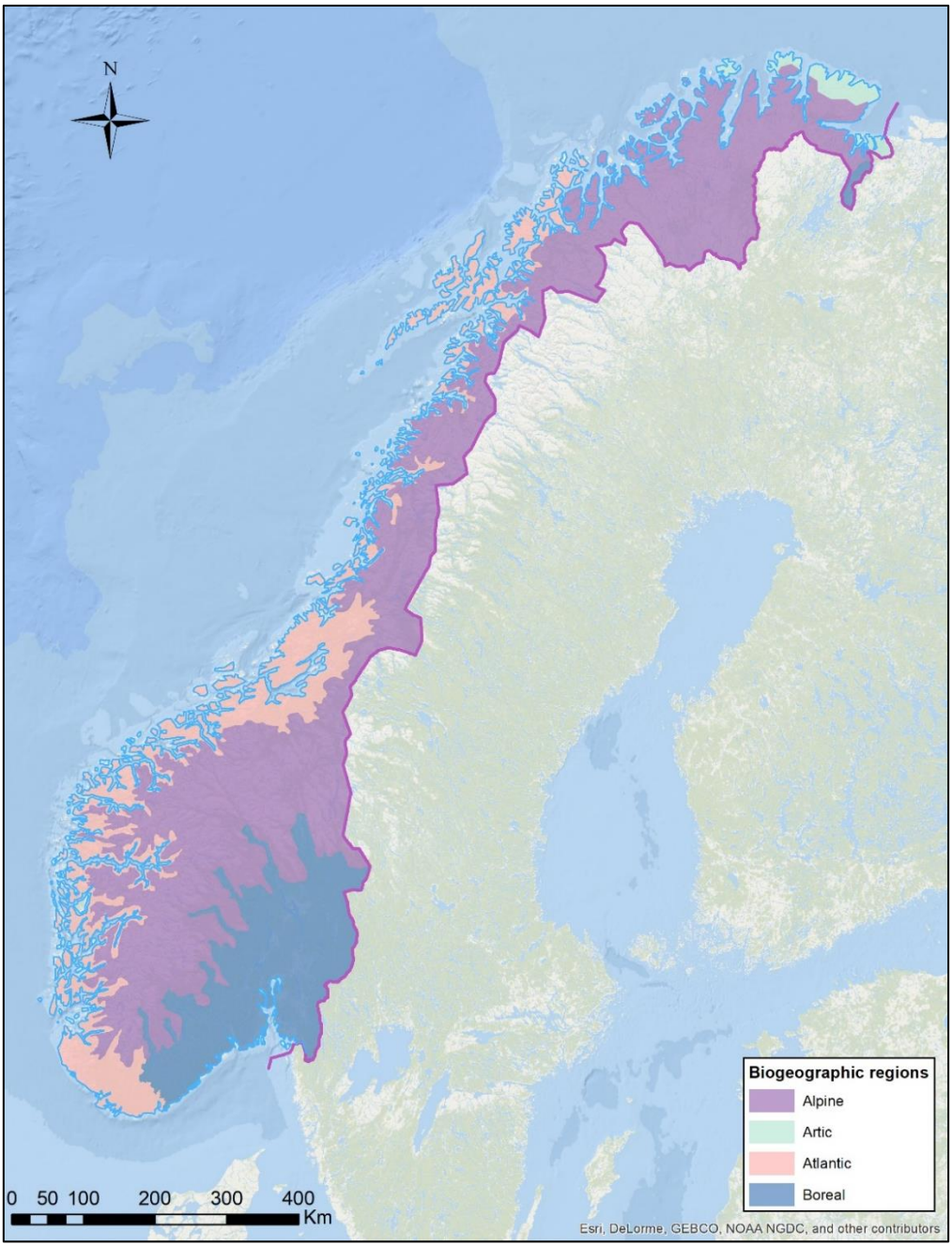

Figure 1. Biogeographic regions of Norway (source: Norwegian Environment Agency).

2.1.1 Geography

Almost 25 % of the terrestrial area of mainland Norway is characterized as “productive land”, of which 21.6 % is productive forest and 3.4 % agricultural land. Mountains, unproductive forest, water bodies and glaciers, wetlands, settlements including cities and infrastructure cover most of the remaining area.

A rocky, hilly coastline characterizes the western coast, broken by deep fjords, some of them penetrating far into the country. To the east from here the landscape is generally rising, in the south reaching above the tree line at an altitude of a few hundred to 1,000 m. Mountains make up almost 45 % of the Norwegian mainland, and the mountain chain of Langfjella divides Southern Norway into a western and an eastern part. Mountains in the western and northern parts of the country are generally more alpine than the mountains further east. To the north, the tree line creeps down to lower altitudes compared to the south, and in the far north the tundra reaches the coast. In Southern Norway, the high mountain plateau of Hardangervidda covers an area of 8,000 km^2. Finnmarksvidda, another mountain plateau, lies in the far north, covering a total area of more than 22,000 km^2.

The south-eastern part of the country is dominated by flat or gently undulating landscapes covered by forests and agricultural land. The westernmost part of the boreal forest stretches into Norway in the east. The boreonemoral zone follows the coast from Oslofjord north to Ålesund in southern Norway, where deciduous forests dominate. Some inland regions in the south, as well as coastal areas further north, belongs to the southern boreal zone. Here conifer forests are widespread and usually dominate. The middle boreal zone dominates most of southern, eastern and middle Norway, and vegetation is characterized by coniferous and alder forest, often with large bogs and fens. Birch forest and lowland coniferous forest dominates the northern boreal and the subalpine zones, which covers large areas in the north and areas below the alpine zone in the south.

The middle boreal zone dominates most of southern, eastern and central Norway, and vegetation is characterized by conifer and alder forest, often with large bogs and fens. Golden Eagles breed across this zone. Photo: Børre Østensen

2.1.2 Natural resources

The most important natural resources for Norway are oil and gas, water, fish, wood and industrial rocks and minerals. Principal economic businesses are the petroleum industry, trade in goods, industry, construction and building and financial services.

2.1.3 Climate

The Gulf Stream has a significant influence on the Norwegian climate, which is warmer than might be expected given the country's northerly latitude. In the southern and western coastal areas the climate is humid-temperate and dominated by south-westerly winds. Further north the climate is cooler, but still relatively mild near the coast in the west. To the east, the climate is less humid (continental), with warmer summers and colder winters. In Southern Norway, the Langfjella mountain chain acts as a climatic barrier. Topography and rather considerable altitudinal differences, however, lead to significant local variations. Annual mean temperature along the west coast is about 8^{o} C, and in the central mountainous region at an altitude of 750 – 1000 m about 0^{o} C, generally decreasing by 0.6^{o} C per 100 m altitude. In the far north of the mainland, even coastal areas experience annual means below 0^{o} C. January and February are generally the coldest months, whereas July and the beginning of August are the warmest. Mean precipitation is ca. 1,400 mm per year, but this varies between more than 3,000 mm in some southwestern regions and only 300 mm in some eastern inland regions. Autumn is normally the wettest season, whereas late winter and spring are the driest. July and August are the wettest months in some inland regions.

2.2 National legal framework for the conservation of raptors and owls

According to the Nature Diversity Act all Norwegian bird species are protected, including birds of prey (Ministry of the Environment 2009). Except for the Snowy Owl and Eurasian Eagle Owl, all Norwegian owls have been protected nationwide since 1930. In 1951, some species of raptors achieved legal protection in the breeding period, although several were still hunted throughout the year. The Osprey was protected by law in 1962, and the Snowy Owl was protected by law in 1965. The Golden Eagle and the White-tailed Eagle received protection in 1968, and in 1971 the Eurasian Eagle Owl finally received legal protection (Heggøy & Øien 2014).

2.5.1 Protected areas

In Norway, protected areas are designated under the Nature Diversity Act. Section 35 states that "large areas of natural habitat that contains distinctive or representative ecosystems or landscapes and where there is no major infrastructure development may be protected as national parks. No activity that has a lasting impact on the natural environment or cultural heritage is permitted (…)". However, pedestrian access or passage in accordance with the provisions of the Outdoor Recreation Act is usually permitted without limitations. In most cases, hunting of game species and fishing is also permitted here too. According to Section 36, protected landscapes are «landscapes that are important in ecological or cultural terms». «No projects may be initiated which may substantially alter the nature or character of the landscape». According to Section 37, Nature Reserves are areas that «contain endangered, rare or vulnerable species, communities, habitats or landscape types, represent a specific type of habitat, are otherwise of particular importance for biological diversity, comprise a distinctive geological feature, or are of special scientific interest.» In these areas, nothing that reduces the conservation value of an area is permitted. Nature reserves «may be given absolute protection from all activity, projects and access or passage», and constitute the strongest form of site

protection in Norway. §§ 38 and 39 concerns the establishment of Habitat Management Areas and Marine Protected Areas, respectively. A habitat management area «has or may have special importance because it fulfils specific ecological functions for one or more specified species». Restrictions on activity and access or passage may be given.

In total 17.4 % of the mainland is currently protected (Norwegian Environment Agency 2019a). Only 3.1 % of the territorial marine waters are currently protected. More than 3 000 protected areas have been designated. National parks cover 9.8 % of the mainland and 1 % of the marine areas. Landscape Protected Areas cover 5.3 % of the mainland and 0.7 % of the marine areas. In total 2.2 % of the mainland and 1.1 % of the marine areas are protected as Nature Reserves (Norwegian Environment Agency 2019a). Mountains make up most of the total protected area in Norway. Lowland areas, including productive forest, bogs and marshes, coastal and marine areas, make up a small part of the total protected area. About 3.8 % of all productive forest in Norway is protected (Norwegian Environment Agency 2019a), despite the fact that the Norwegian Parliament agreed in 2017 on a goal to protect 10 % of the Norwegian forests. Several of the national parks and protected landscapes are important breeding areas for birds of prey, holding significant parts of the national population of some species. However, very few areas have been protected in Norway due to the presence of birds of prey alone.

2.5.2 National legal framework

The **Act relating to the management of biological, geolocical and landscape diversity**, recognized as the ***Nature Diversity Act*** (Naturmangfoldloven)***,*** aims to protect biological, geological and landscape diversity and ecological processes through conservation and sustainable use, and in such a way that the environment provides a basis for human activity, culture, health and well-being, now and in the future, including basis for Sami culture. According to the Act, all wildlife is protected unless otherwise stated in the law (Section 15), and no unnecessary harm or suffering should be caused to free-living animals or their nests, lairs or dens. Section 8 ensures that all governmental resolutions that influence nature shall be based on scientific knowledge about the environment. Section 5 aims to maintain species and their genetic diversity for the long term and to ensure that species occur in viable populations in their natural ranges, and the precautionary principle is central. This implies that areas on which the species depend are also to be maintained, including feeding and roosting areas and migration routes. Populations of species on which one species depends (e.g. prey) should also be maintained, and disturbance should be avoided during the breeding season.

Other important public interests may, however, require that the objective is reached in alternative ways (Section 14). Section 17 concerns “general provisions regarding removal of wildlife”, etc., and is commonly referred to as “the self-defence clause”. It states that “wildlife may be killed in circumstances where this is considered necessary to eliminate an immediate and significant risk of injury to persons”, and that “the owner, or a person acting on behalf of the owner, may kill a wild animal making a direct attack on livestock or domesticated reindeer”, with no exceptions. Access to, and passage through, uncultivated land is regulated by Section 22, to prevent damage or disturbance to plants and animals. Examples of activities with relevance to this Section include major events, nature study and photography. The Act also regulates the introduction of foreign species, including trees for forestry purposes. Two regulations under the Act concerns the management of predators (including Golden Eagle) and compensation for livestock or domesticated reindeer *Rangifer tarandus* killed or injured by predators, respectively.

The ***Wildlife Act*** (Viltloven) sets some regulations regarding hunting, killing, keeping, introduction and handling of dead animals (incl. taxidermy). The Norwegian Environment Agency determines hunting seasons for each species. The use of trapping devices is illegal (Section 24), and no wildlife shall be kept in captivity unless otherwise stated by law or with authority in law (Section 7). Use of chemicals or poison for killing of wildlife other than small rodents or reptiles is illegal (Section 25). Introduction of wildlife to Norway or to areas where the species does not normally occur is illegal (Section 47). According to Section 48a, no one can keep, offer for sale or sell protected wildlife or eggs without permission, and taxidermists shall be authorised (Section 49).

According to the Regulation relating to killing of wildlife that cause damage or reduce the reproduction of other species, the County Governor may give landowners or users permission to kill Golden Eagle, Northern Goshawk and Eurasian Sparrowhawk. The Regulation requires alternative measures to be implemented before killing as a derogation takes place, and then only as a last resort. Nationally such derogations are guided by the Bern Convention.

A new regulation under the Wildlife Act/Nature Diversity Act concerning the killing of wildlife that cause damage, the handling of dead wildlife as well as the breeding and keeping of wildlife in captivity was passed in 2020. The general provision for killing of wildlife that cause damage (Section 3-3) opens both for killing following economic damage and killing *prior to* damage in cases where economic damage (e.g. on crops) is expected, provided that precautionary measures have been carried out. Another condition is that the killing is appropriate for stopping the damage. The regulation also opens for killing of wildlife in outlying fields (not only home fields, as previously stated). In connection with the new regulation, the Norwegian Environment Agency recommended to establish mandatory reporting and registration routines related to killing of wildlife that cause damage. However, the regulation was passed without any such requisitions.

The County Governor may give landowners or users permission to kill Golden Eagle, Northern Goshawk and Eurasian Sparrowhawk that cause damage or reduce the reproduction of other species in Norway, provided alternative measures have been implemented before killing as a derogation takes place. Photo: Børre Østensen

The intention of the ***Animal Welfare Act*** (Lov om dyrevelferd) is to "promote good animal welfare and respect for animals". Section 4 states that "anybody who discovers an animal which is obviously sick, injured, or helpless, shall as far as possible help the animal", and further: "If it is obvious that the animal will not survive or recover, the person who discovered the animal may kill it at once". Ot.prp. nr. 15 (2008–2009) suggests that special considerations should be taken before the killing of threatened birds of prey.

The public right of access to, and passage through, uncultivated land is a fundamental right in Norway, regulated by the ***Outdoor Recreation Act*** (Friluftsloven)***.*** The purpose is that everyone should have the opportunity for outdoor recreation, to promote healthy and environmentally sound activities. According to Section 15, in areas with great number of visitors municipalities may, with consent from the landowner or the user, set conditions on behaviour with the aim to maintain peace and order, protect plants and animals and promote health measures and sanitary conditions.

The purpose of the ***Forestry Act*** (Skogbruksloven) is to "promote sustainable management of forest resources in Norway". Section 4 makes the forest owner responsible for having adequate knowledge about environmental values in his own forest and observe them when carrying out activities. This Section confers to the Regulation concerning sustainable forest management, which shall promote sustainable forest management to secure environmental values, active reforestation and good health of the forest. Forest owners shall make sure that necessary consideration is taken regarding biodiversity (Section 3). Forestry is only to occur where environmental values have been catalogued, and if such registration is not carried out the logging shall be based on the precautionary measures stated in the "Living Forest" (PEFC) standards (Levende Skog 2008, Ministry of Agriculture and Food 2006). If the logging is in conflict with the Act (i. e. has negative consequences for environmental values), the local municipality has the authority to refuse logging or set terms for how it should be carried out.

The ***Act relating to governmental nature surveillance*** (Lov om statlig naturoppsyn) is adopted to ensure national environmental values and prevent environmental crime. According to this, the King may establish a regulatory body to control that the purpose of the Outdoor Recreation Act, the Act relating to motor traffic on uncultivated land and in watercourses, the Wildlife Act and the Natural Diversity Act are complied with. The supervision is meant to provide advice and information, in addition to carry out management, recording and documentation, and is pledged to secrecy according to Section 13 of the Public Administration Act. Scientists are also included under the same section. In Norway, this regulatory body is the State Nature Inspectorate (SNO), established in 1997.

The ***Planning and Building Act*** (Plan- og bygningsloven) regulates land planning in Norway and is thus a central Act in environmental management. The purpose of the Act is to promote sustainable development for the good of the individual, society in general and future generations. The connection and interaction between the Planning and Building Act and the Nature Diversity Act is important to protect nature, and especially protection and management of priority biotopes. The principal rule concerning environmental impact assessment is that all regional plans and all municipal plans with guidelines or framework for future development shall be risk-assessed to evaluate potential influences on the environment and the community. In addition, all development plans that may have potential influence on the environment or to society shall be risk assessed. There is also a general prohibition of measures close to the sea or along watercourses (< 100 m), according to the Act (Section 1-8), with some exceptions.

Chapter 5 of the act regulates public participation in planning. Anyone who presents a planning proposal shall facilitate public participation, and the municipality shall make sure that this requirement is met in planning processes carried out by other public bodies or private bodies (Section 5-1). Where the act provides that a planning proposal shall be circulated for public scrutiny, the proposal shall be sent to all central government, regional and municipal authorities and other public bodies, private organisations and institutions that are affected by the proposal for comment within a stipulated time limit (Section 5-2). This enables the participation of NGOs and other conservation bodies in the planning process.

A draft on a legal amendment of the Planning and Building Act was sent out for public inquiry in 2020. If passed this will reduce the requirements for public participation in planning processes and facilitate dispensation of planning proposals.

The purpose of the ***Energy Act*** (Energiloven) is to ensure that the production, conversion, transfer, ratio, distribution and use of energy take place in a socially efficient way and consider public and private interests. The act is important as it regulates the development of infrastructure which may impose threats to birds of prey.

The ***Act relating to motor traffic on uncultivated land and in watercourses*** (Motorferdselloven) has the purpose to "regulate motorized traffic on uncultivated land and in watercourses on the basis of overall consideration of the public interest, with a view to protecting the natural environment and promoting public welfare". The Act gives some opportunities for motor traffic on uncultivated land, either directly or by dispensation from the local municipality. Priority toward outdoor un-motorized pursuits are one of the main reasons for restrictions.

The purpose of the ***Pollution Control Act*** (Forurensningsloven) is to "protect the outdoor environment against pollution and to reduce existing pollution, to reduce the quantity of waste and to promote better waste management". The Act summarises regulations concerning permits for any activity that may cause pollution, provisions relating to wastewater treatment, acute pollution, inspection and control measures, compensation, etc.

Access to data for sensitive species

According to the ***Constitution of Norway***, everyone has the right to access to information on the state of the environment and the effects of any intervention. In general, all information relating to biodiversity in Norway is openly available to the public. The ***Freedom of Information Act*** regulates access to case documents, logs and similar records. According to the ***Nature Diversity Act***, official decisions that may affect biodiversity shall be based upon scientific knowledge about the environment. Each individual case needs to be assessed separately to determine whether access should be given to data, and whether or not it is in the best interests for such information to be made available.

Some species are more prone to criminal activities or might be harmed due to a range of activities, these are classed as *sensitive species*. Exceptions may be made regarding access to data regarding for example nest sites for raptors, and restrictions may be made as to whom can gain access to such data. The Norwegian Environment Agency have prepared a list over which species data ought to only be publically available at an imprecise level (i.e. where the location is not precisely given, but is masked at an imprecise level of 4 x 4 km, 8 x 8 km, or 16 x 16 km. For such species, data on occurrence may be available at three levels – open access masked occurrence, precise data protected

by password, or restricted access to precise data on sensitive species. Access to sensitive species data may be limited to named persons, administrative bodies, or consultants on the understanding that data is not spread further.

2.3 National policy instruments

The most recent **Norwegian Red List of Birds** (2015) assesses the conservation status of 232 species of birds on the mainland (excl. Svalbard), including 25 species of birds of prey. Seven regularly breeding raptors and four owls are currently afforded the status of "Threatened" or "Near threatened" on the national Red List, the remaining species being evaluated as "Least Concern" (Kålås et al. 2015, Table 2). The first Norwegian Red List using the present IUCN red list criteria was published in 2006. Revised and updated versions were published in 2010 and 2015. The next revision is planned to be published in 2021.

The **Norwegian List of Species of Special Responsibility** designates species holding 25 % or more of their European population in Norway. The list includes five bird of prey species, namely White-tailed Eagle, Rough-legged Buzzard, Merlin, Gyrfalcon and Short-eared Owl.

The **Norwegian List of National Priority Species** designated threatened species of national priority under the Nature Diversity Act. Municipalities may help conserve species of national priority through information about their presence, management of established zones of special consideration for the species etc. Killing, harming or damage to species of national priority is prohibited, and for some there are specific rules to preserve their habitats. So far very few (13) species of national priority have been pointed out, and only two birds (Lesser White-fronted Goose and Black-tailed Godwit). In other words no raptors or owls are at present considered as national priority species.

2.4 Relevant International Conventions ratified by Norway

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

(Concluded in Washington, D.C., USA, 3.3.1973, date of ratification: 27.7.1976, entry into force in Norway: 25.10.1976). CITES aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival.

Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)

(Concluded in Ramsar, Iran, 2.2.1971, entry into force in Norway: 21.12.1975). The Convention's mission is the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world.

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)

(Concluded in Bern, Switzerland, 19.9.1979, date of ratification: 27.5.1986, entry into force in Norway: 1.9.1986). The Bern Convention aims to conserve European wild flora and fauna and their natural habitats, as well as to promote European cooperation in this field.

Several International Conventions for the conservation of nature and wildlife have been ratified by Norway. The mission of the Ramsar Convention is the "conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world", which may benefit species like the Western Marsh Harrier. Photo: Børre Østensen

Convention on Migratory Species (CMS, Bonn Convention)

(Concluded in Bonn, Germany, 23.6.1979, year of ratification: 1985, entry into force in Norway: 1.8.1985). The Bonn Convention intends to promote cooperation between Signatory States in order to conserve migratory species worldwide.

Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA)

(Concluded in The Hague, Netherlands, 15.8.1996, date of ratification: 1.9.2008, entry into force in Norway: 25.10.2008). The Agreement brings together Signatory States in an effort to establish coordinated conservation and management of migratory waterbirds throughout their entire migratory range.

Convention on Biological Diversity (CBD)

(Concluded in Rio de Janeiro, Brazil, 5.6.1992, date of ratification: 9.7.1993, entry into force for Norway: 29.12.1993). The objectives of the CBD are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources.

The Stockholm Convention on Persistent Organic Pollutants

(Concluded in Stockholm, Sweden, 22.5.2001, date of ratification: 11.7.2002, entry into force in Norway: 17.5.2004). The Convention is a global treaty to protect human health and the environment from chemicals that remain in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of humans and wildlife, and have harmful impacts on human health or on the environment.

The Convention on Climate Change (UNFCCC)

(Concluded in New York, USA 9.5.1992, entry into force: 21.3.1994, date of ratification: 9.7.1993, entry into force in Norway: 21.3.1993). The objective of the Convention is to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system."

The Convention on Environmental Impact Assessment in a Transboundary Context (EIA, Espoo Convention)

(Concluded in Espoo, Finland, 25.2.1991, entry into force: 10.9.1997, date of ratification: 23.6.1993). The Convention sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning, and obligate States to notify and consult each other on all major projects that are likely to have a significant adverse environmental impact across boundaries.

The World Heritage Convention

(Concluded in Paris, France 16.11.1972, date of ratification: 12.5.1977). The primary mission of the Convention is to identify and protect the world's natural and cultural heritage considered to be of Outstanding Universal Value.

The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR)

(Opened for signature in Paris, France, 22.9.1992, entry into force: 25.3.1998, entry into force in Norway: 25.3.1998). The OSPAR Convention replaces the Oslo and Paris Conventions, and aims to protect the marine environment of the North-East Atlantic.

Other conventions

Norway has also ratified other relevant international agreements including the Århus Convention, the Rotterdam Convention, the Basel Convention, the Minamata Convention on Mercury, the Convention on Long-range Transboundary Air Pollution (LRTAP), the Kyoto Protocol, the Protocol on Persistant Organic Pollutants, and the Montreal Protocol. All of these agreements are to a limited degree pertinent to the conservation of raptors and owls.

3 BIOLOGICAL ASSESSMENT – A NATIONAL OVERVIEW

3.1 Inventory of Species

Fifteen species of diurnal birds of prey (raptors) and ten owls regularly breed in Norway (Table 2). None of these are Category 1 species in the Action Plan of the CMS Raptors MoU (Annex 3; globally threatened or near-threatened species according to the latest IUCN Red List). However, the Snowy Owl is listed as "Vulnerable" according to the latest IUCN Red List and should become a Category 1 species during the next revision of the Action Plan. Four raptor species and three owl species breeding in Norway are Category 2 species, i.e. species considered to have an Unfavourable Conservation Status at a regional level. Eight raptor species and three owl species have been designated CMS flagship species for Norway, i.e. "popular, charismatic species that serve as symbols and rallying points to stimulate conservation awareness and action" (Heywood 1995). In addition to the regularly breeding species, fourteen raptor species and two owl species have been recorded in Norway to date (NSKF 2019; Table 2), most of them occurring irregularly or exceptionally. However, two Category 1 species may have attempted breeding in recent years (Pallid Harrier and Red Kite), and two Category 2 species are occurring rather regularly (Black Kite and Red-footed Falcon).

Table 2. Diurnal birds of prey and owls recorded in Norway. Norwegian Red List Category is given after common names for breeding species only: LC: Least Concern, NT: Near Threatened, VU: Vulnerable, EN: Endangered. MoU Category 1: Globally threatened and Near Threatened species (IUCN Global Red List). Category 2: Species considered to have Unfavourable Conservation Status at a regional level. Category 3: All other migratory species. F: designated flagship species for Norway. For exceptional occurrences, the number of accepted records is given (records accepted by the Norwegian Rare Birds Committee (NSKF).

English name	Scientific name	MoU Cat.	Occurrence	Migration Strategy
European Honey Buzzard **NT**	*Pernis apivorus*	2	Regular breeder	Migrant
Black Kite	*Milvus migrans*	2	Scarce passage migrant	Scarce migrant
Red Kite	*Milvus milvus*	1	Scarce passage migrant[1]	Scarce migrant
Pallas's Fish Eagle	*Haliaeetus leucoryphus*	1	Exceptional	1 record
White-tailed Eagle **LC**	*Haliaeetus albicilla*	3, F	Regular breeder	Resident
Egyptian Vulture	*Neophron percnopterus*	1	Exceptional	5 records
Short-toed Snake Eagle	*Circaetus gallicus*	3	Exceptional	1 record
Western Marsh Harrier **VU**	*Circus aeruginosus*	3	Regular breeder	Migrant
Hen Harrier **EN**	*Circus c. cyaneus*	2	Regular breeder	Migrant
	Circus c. hudsonius	-	Exceptional	1 record
Pallid Harrier	*Circus macrourus*	1	Scarce passage migrant	Scarce migrant
Montagu's Harrier	*Circus pygargus*	2	Scarce vagrant	95 records
Northern Goshawk **NT**	*Accipiter g. gentilis*	3, F	Regular breeder	Resident
	Accipiter g. buteoides	-	Unknown	Migrant
Eurasian Sparrowhawk **LC**	*Accipiter nisus*	3	Regular breeder	Resident/migrant
Common Buzzard **LC**	*Buteo b. buteo*	3	Regular breeder	Migrant
	Buteo b. vulpinus	-	Exceptional	8 records
Long-legged Buzzard	*Buteo rufinus*	3	Exceptional	3 records
Rough-legged Buzzard **LC**	*Buteo lagopus*	3, F	Regular breeder	Migrant
Greater Spotted Eagle	*Aquila clanga*	1	Exceptional	5 records
Booted Eagle	*Aquila pennatus*	3	Exceptional	1 record

English name	Scientific name	MoU Cat.	Occurrence	Migration Strategy
Golden Eagle **LC**	*Aquila chrysaetos*	3, F	Regular breeder	Resident/migrant
Steppe Eagle	*Aquila nipalensis*	1	Exceptional	9 records
Eastern Imperial Eagle	*Aquila heliaca*	1	Exceptional	1 record
Osprey **NT**	*Pandion haliaetus*	3, F	Regular breeder	Migrant
Lesser Kestrel	*Falco naumanni*	2	Exceptional	2 records
Common Kestrel **LC**	*Falco tinnunculus*	2	Regular breeder	Migrant
Red-footed Falcon	*Falco vespertinus*	1	Scarce passage migrant	197 records
Merlin **LC**	*Falco c. aesalon*	3, F	Regular breeder	Migrant
	Falco c. subaesalon	-	Unknown	Migrant
Eurasian Hobby **NT**	*Falco subbuteo*	2	Regular breeder	Migrant
Gyrfalcon **NT**	*Falco rusticolus*	3, F	Regular breeder	Resident/migrant
Peregrine Falcon **LC**	*Falco p. peregrinus*	3, F	Regular breeder	Resident/migrant
	Falco p. calidus	-	Scarce passage migrant	Migrant
Barn Owl	*Tyto alba alba*	-	Exceptional	10 records
	Tyto alba guttata	-	Exceptional	12 records
Eurasian Scops Owl	*Otus scops*	2	Exceptional	4 records
Eurasian Eagle Owl **EN**	*Bubo bubo*	-, F	Regular breeder	Resident
Snowy Owl **EN**	*Bubo scandiacus*	2	Regular breeder	Nomadic
Northern Hawk Owl **LC**	*Surnia ulula*	3	Regular breeder	Nomadic
Eurasian Pygmy Owl **LC**	*Glaucidium passerinum*	-	Regular breeder	Resident/irruptive
Tawny Owl **LC**	*Strix aluco*	-	Regular breeder	Resident
Ural Owl **VU**	*Strix uralensis liturata*	3	Regular breeder	Resident
Great Grey Owl **VU**	*Strix nebulosa lapponica*	3, F	Regular breeder	Resident/irruptive
Long-eared Owl **LC**	*Asio otus*	2	Regular breeder	Migrant
Short-eared Owl **LC**	*Asio flammeus*	2	Regular breeder	Migrant
Boreal Owl **LC**	*Aegolius funereus*	3, F	Regular breeder	Resident/irruptive

[1]: at least one confirmed breeding record 2010 – 2020

3.2 Migrants that occur regularly

Four raptor species are scarce passage migrants in Norway, although occurring regularly. Three of them are CMS Category 1 species (Red Kite, Pallid Harrier and Red-footed Falcon), and one is a CMS Category 2 species (Black Kite). The Pallid Harrier is the most regular of these, followed by the Red Kite. Pallid Harrier has been suspected as a breeding species on a couple of occasions, and at least one breeding record of Red Kite has been confirmed in Southern Norway in recent years. Black Kite and especially Red-footed Falcon are less frequent, but usually a few individuals are recorded annually.

3.3 Monitoring of raptors and owls

National and regional monitoring of raptors and owls in Norway are chiefly focusing on a few selected species, and for some the knowledge about population trends is limited. Most monitoring of birds of prey in Norway is in the form of breeding bird surveys. The Golden Eagle and Eurasian Eagle Owl are surveyed under annual single species national monitoring programs at selected sites (Heggøy et al. 2019, Tovmo et al. 2019), coordinated by the Norwegian Environment Agency. BirdLife Norway, the Norwegian Institute for Nature Research, and Agder Natural History Museum run the Norwegian

Snowy Owl Project. Breeding bird surveys are carried out annually through the Program for terrestrial monitoring (TOV), accomplished through a network of bird observers.

Counts during migration are not standardized, although systematic counts are carried out at a few sites, such as government-funded programs at bird observatories. There is a considerable gap in knowledge regarding the principal migration sites. Significant amounts of observation data from volunteers and professionals are reported via the online Species Observation System (www.artsobservasjoner.no).

Table 3. Monitoring and survey programs for raptors and owls in Norway. Governmental programs are in italic.

Breeding raptors	
Annual single species national monitoring	*Golden Eagle*, *Eurasian Eagle Owl*, Snowy Owl
Annual single species regional monitoring	White-tailed Eagle, Northern Goshawk, Rough-legged Buzzard, Osprey, Eurasian Hobby, Gyrfalcon, Peregrine Falcon, Eurasian Pygmy Owl, Tawny Owl, Ural Owl, Great Grey Owl
Other regional projects	Osprey, Honey Buzzard, White-tailed Eagle, Golden Eagle, Northern Goshawk, Eurasian Sparrowhawk, Rough-legged Buzzard, Common Kestrel, Eurasian Hobby, Gyrfalcon, Peregrine Falcon, Eurasian Eagle Owl, Pygmy Owl, Tawny Owl, Boreal Owl
Breeding Bird Atlas	All breeding species (1970 – 1989), EBBA2 (2013 – 2017)
Program for terrestrial monitoring (TOV)	Gyrfalcon, pollutants in bird of prey eggs
Timed Bird Surveys (TOV-E)	Several species (10), sample sizes generally too low for population monitoring
Occasional national surveys (Bird of the Year)	Northern Goshawk (1998), Rough-legged Buzzard (2014), Gyrfalcon (1993), Eurasian Eagle Owl (2008)
Colour-ringing projects	White-tailed Eagle, Northern Goshawk, Eurasian Sparrowhawk, Golden Eagle, Osprey, Peregrine Falcon
Other ringing activity	All breeding species
Migrating raptors	
Telemetry studies	White-tailed Eagle, Northern Goshawk, Rough-legged Buzzard, Golden Eagle, Osprey, Eurasian Eagle Owl, Snowy Owl, Ural Owl, Great Grey Owl, Tawny Owl
Site surveys (Lista BO, Jomfruland BO, Mølen BO)	Migrating species
Adjacent region: Falsterbo BO (Sweden)	A considerable number of raptors breeding in Norway pass this site in autumn
Important databases/institutions	
Rovbase.no	Golden Eagle, Eurasian Eagle Owl (+ other species)
"Sensitive Artsdata", site specific information of sensitive species	Honey Buzzard, White-tailed Eagle, Western Marsh Harrier, Hen Harrier, Northern Goshawk, Golden Eagle, Osprey, Eurasian Hobby, Gyrfalcon, Peregrine Falcon, Eurasian Eagle Owl, Snowy Owl, Ural Owl, Great Grey Owl
artsobservasjoner.no, casual observations from voluntary field observers	All species (Norwegian Biodiversity Information Centre)
Norwegian Bird Ringing Centre	All data of ringed birds of prey

3.4 Reintroduction programs

There are currently no reintroduction programs for birds of prey in Norway. Previously, reintroduction projects on Peregrine Falcon and Eurasian Eagle Owl have been carried out (Steen 2009). White-tailed Eagles from Norway have been used in reintroduction programs in Scotland and Ireland (Folkestad 1994, 2007, Nygård et al. 2010).

There are currently no reintroduction programs for birds of prey in Norway. A previous project contributed to the successful reestablishment of a strong Peregrine Falcon breeding population in Fennoscandia. Photo: Børre Østensen

3.5 Inventory of Sites

The most important breeding areas for birds of prey in Norway are largely well-known among experts. In contrast, there is a considerable knowledge gap concerning the principal migration sites. None of the protected areas are specifically designated for birds of prey, although several national parks and protected landscapes are important breeding areas for several species.

The BirdLife Secretariat develops and maintains a list of trigger species, which is a list of those species used during selection of IBAs. Thirteen Important Bird and Biodiversity Areas (IBAs) in Norway with birds of prey being among the trigger species have been designated (Table 4; Heggøy & Øien 2014). Four are exclusively designated for the presence of Osprey, and three are exclusively designated for the presence of White-tailed Eagle, Gyrfalcon and Eurasian Eagle Owl, respectively. Those sites are assessed as the most important in the country for these raptor species, which are considered to have an Unfavourable Conservation Status in Europe (Criterion B2). Three sites have been designated exclusively as they are known or believed to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome (Criterion A3), including selected species of raptors. Additionally, three sites have been designated for a combination of these two criteria (Table 4).

All the IBAs are considered important breeding sites, and most are protected by law. Currently, no sites have been identified as bottleneck sites for raptor migration under the IBA criteria. Norwegian IBAs are proposed by BirdLife Norway, and finally accepted by BirdLife International.

Table 4. Important Bird and Biodiversity Areas (IBAs) in Norway designated for birds of prey, and their IBA criteria. IBAs exclusively designated for the presence of single species are in italic.

	Trigger species										
IBA	White-tailed Eagle	Rough-legged Buzzard	Osprey	Gyrfalcon	Eurasian Eagle Owl	Snowy Owl	Northern Hawk-owl	Eurasian Pygmy Owl	Ural Owl	Great Grey Owl	Short-eared owl
Alta-Kautokeino watercourse				B2							
Ankerfjella			B2								
Dovrefjell		A3		A3, B2			A3				B2
Hardangervidda		A3		A3, B2							
Lake Vansjø			B2								
Nordre Øyeren & Sørumsneset			B2								
Øvre Anárjohka		A3		A3			A3				
Øvre Pasvik		A3					A3			A3	
Reisa		A3		A3			A3	A3	A3	A3	
Setesdal valley (southern part)			B2								
Smøla arichipelago	B2										
Solvær archipelago					B2						
Varanger Peninsula		A3		A3, B2		A3, B2					B2

3.5.1 Important migration sites

Raptor migration in Norway is best documented along the coastline of southern Norway. Little is known about important migration routes further north (Heggøy & Øien 2014). Many of the migrating raptors seen in the south are probably of local or regional origin, breeding in southern parts of the country. Those breeding further north are generally thought to follow more easterly routes, as documented for a few species by the use of satellite transmitters and from ring recoveries (Bakken et al. 2003, 2006, BirdLife Norway unpubl. data). Few bottlenecks for raptor migration have been documented so far, although some certainly exist. However, compared to Sweden and Denmark, numbers of migrating raptors at bottlenecks in Norway are small.

In spring, the main migration route follows coastal and lowland areas south-east of the Oslofjord, and then cross the fjord where it narrows. Concentrations of migrating raptors quickly disperse into smaller groups from here, although significant numbers are recorded annually migrating southwest along the coastline. Individuals and groups of individuals are also observed continuing north following arrival from the southeast, and these continue northwards along the major valleys. However, several species seem to reach Norway on a fairly broad front, some obviously crossing the Skagerrak and the North Sea. Autumn migration is more concentrated, with main migration routes along the western and southern coastlines, largely following the same routes as in spring in the southeast and continuing south into Sweden. Important bottleneck sites are indicated in Table 5 and Figure 2.

Table 5. Sites (and areas) with high densities of migrating raptors in Norway based on current knowledge. Differences in migratory behaviour leads to differences in susceptibility to infrastructure developments, such as wind power plants. No. refers to numbers in Figure 2. Daily migration numbers recorded on (single) sites – X: 100–1000 ind., x: 50–100 ind., (x): 10–50 ind.

Area name	County	Spring	Autumn	Susceptibility due to migrating behaviour
Varanger coastline	Troms & Finnmark	x	(x)	High
Lierne	Trøndelag	(x)	(x)	Medium
Agdenes	Trøndelag	(x)		High
Kyrkjefjellet	Vestland		(x)	High
Utsira	Rogaland		X	High
Revtangen/Orrevatnet	Rogaland	(x)	X	High
Høg-Jæren/Dalane coastline	Rogaland	(x)	X	High/medium
Flekkefjord incl. Mønstremyr/Lundevatnet	Rogaland/Agder	(x)	X	High/medium
Lista	Agder	(x)	X	High/medium
Lindesnes	Agder		X	High
Agder coastline	Agder	(x)	X	Medium
Breisand/Vinjestranda/Åby	Telemark & Vestfold	(x)	X	Medium
Jomfruland	Telemark & Vestfold	(x)	X	High
Langøytangen	Telemark & Vestfold	x	X	Low
Mølen/Nevlunghavn	Telemark & Vestfold	(x)	X	Medium
Klåstad/Sandefjord/Sundåsen	Telemark & Vestfold	X	X	Low
Store Færder	Telemark & Vestfold	(x)	X	Low
Tønsberg/Vallø	Telemark & Vestfold	X	X	Low
Borrevannet	Telemark & Vestfold	X	(x)	Medium
Outer Østfold	Viken	x	X	Medium

Figure 2. Migration routes for birds of prey in Norway. Spring migration routes are shown in green, autumn migration routes in red. Arrowhead size indicates relative importance of respective routes. Question marks indicate hypothesized migration routes. Due to a general lack of knowledge regarding migration of birds of prey in Norway, this map is not necessarily complete.

3.5.2 Important breeding areas

Important breeding sites and important breeding areas can be designated for at least nine species of raptors and owls in Norway (Table 6). Other important breeding areas include Smøla, Hitra and Frøya and the adjacent mainland in Mid-Norway (White-tailed Eagle), and the area from Bodø north to Steigen (White-tailed Eagle) (Christensen-Dalsgaard et al. 2010).

Table 6. A selection of important breeding areas for birds of prey in Norway. -: population estimates lacking

Species	County	Sites	# Pairs
European Honey Buzzard	Telemark & Vestfold	Gjerspensdalen/Bjørkedalen	30-50
Hen Harrier	Innlandet	Fokstumyra-Kongsvoll-Grimsdalen	5-15
	Innlandet/Trøndelag	Einunndalen-Orkelsjøen	0-10
Western Marsh Harrier	Østfold	Low-laying wetlands	10-20
	Rogaland	Jæren	10-20
Rough-legged Buzzard	Troms & Finnmark	Reisa watercourse	-
	Troms & Finnmark	Alta-Kautokeino river valley	10-20
	Troms & Finnmark	Tverrelvdalen	10-25
	Troms & Finnmark	Porsanger coastline	-
	Troms & Finnmark	Sør-Varanger	200-300
Golden Eagle	Troms & Finnmark	Karasjok	15-20
Common Kestrel	Innlandet	Trysil*	-
	Troms & Finnmark	Reisa watercourse	-
	Troms & Finnmark	Alta-Kautokeino river valley	10-20
Merlin	Troms & Finnmark	Reisa watercourse	-
	Troms & Finnmark	Alta-Kautokeino river valley	20
Eurasian Hobby	Viken	Kongsberg/Øvre Eiker/Modum	>50
	Innlandet	Southern Hedmark	
Gyrfalcon	Innlandet/Trøndelag	Dovrefjell	19-25
	Vestland/Buskerud/Telemark	Hardangervidda area	30-50
	Troms & Finnmark	Alta-Kautokeino river valley	5
Eurasian Eagle Owl	Rogaland	Høg-Jæren	20-30
	Vestland	Øygarden	15-20
	Innlandet/Trøndelag	Østerdalen/Femunden	20-30
	Trøndelag	Hitra-Frøya	20-30
	Nordland	Solvær archipelago	40-50
Snowy Owl	Troms & Finnmark	Finnmark	0-40
	Troms & Finnmark	Troms	0-40
	Nordland	Børgefjell and other	0-10
Ural Owl	Innlandet	Finnskogen*	0-15
Great Grey Owl	Innlandet	Southern Elverum	20-80
	Troms & Finnmark	Øvre Pasvik	0-5
Short-eared Owl	Innlandet-Trøndelag	Dovrefjell	0-50
	Nordland	Andøya	-
	Troms & Finnmark	Sekkemomyran	0-20
	Troms & Finnmark	Skrøytnes	-
	Troms & Finnmark	Øvre Pasvik	-
	Troms & Finnmark	Varanger Peninsula	-

*: nesting box project

3.6 Inventory of habitats

The habitats used by breeding raptors in Norway are many and varied, including habitats as diverse as woodland (boreal forest, subarctic forest, temperate forest), subarctic shrubland, plantations, open land (tundra, subarctic grassland, arable land, pastureland), mountains (alpine cliffs and rocky areas), marine coastal habitats, wetlands and urban areas. The various breeding habitats for the different species are listed in Table A2 of Annex 1. The dominance of different habitats is an important determinative factor in the distribution and abundance of breeding birds of prey across Norway. For instance, several marginal species find suitable habitat in the temperate habitats of south-eastern Norway but are absent from other parts of the country. Arctic species preferring tundra and similar habitats are however restricted to the northern parts of the country or the high mountain plateaus further south.

The Eagle Owl has its strongholds in the southwestern and central parts of Norway, as well as in the Solvær archipelago, Nordland, Northern Norway. Photo: Børre Østensen

4 THREAT ASSESSMENT

Raptors and owls in Norway face a wide variety of threats, even though all species are protected by law and several of these species breed within protected areas such as national parks. Threats considered of importance are summarised in this section.

4.1 Habitat loss and fragmentation

Habitat loss is one of the single most important threats to breeding and migrating birds of prey in Norway. Human threats to important habitats include development of infrastructure, settlements, cabins, industry, power plants, agriculture and some forestry regimes. The degradation and fragmentation of habitats by small but numerous development operations in sum probably represents an important threat to several species.

Degradation and fragmentation of habitats may reduce important factors such as prey diversity and prey abundance. In addition, nest sites near developed areas may become unsuitable for species vulnerable to human disturbance. The establishment of holiday cabins is of relevance, affecting several breeding sites for birds of prey (e.g. Jelstad 2014). Such developments usually involve new infrastructure as well as increased human activity in the environment. Agricultural and silvicultural intensification may reduce habitat quality and prey density following land drainage and increased mechanisation, e.g. from mowing and logging operations, as well as the use of pesticides and fertilizers (e.g. Aschwanden et al. 2005, Grande et al. 2018, Heggøy & Eggen 2020). Abandonment of rural areas combined with lower utilisation of grazing resources following the agricultural rationalisation cause vegetational succession of former pastures and grazing land, and a loss of biodiversity and hunting areas for species depending upon open land (Norwegian Environment Agency 2019b). Planting of trees in former treeless areas could also lead to loss of hunting habitat for certain species, with negative effects on breeding success (Watson 2010). Logging activities and the loss of virgin and mature forest causes habitat loss for some species, and the loss of nesting trees for several (e.g. Opheim & Høitomt 2019, Steen 2012, Tornberg et al. 2006). Forestry practices may also lower the abundance of prey available (Tornberg et al. 2006, Widén 1997).

Climate change involves dramatic changes in habitats, including a northward expansion of temperate forest and an altitudinal expansion of birch forest into mountain regions (Austrheim et al. 2015, Evans & Brown 2017, Johansen & Østlyngen 2011). However, some of the expanding birch forest recorded during the last decades may partly be attributed to the revegetation of areas cleared during a period of intensive mountain livestock farming during the 19th and early 20th century (Austrheim et al. 2015). Thus, grazing regimes are also of major importance to maintenance of birds of prey habitats (Chapter 4.8).

Building projects, road construction, developments such as wind power plants, agricultural activities and other infrastructure development cause fragmentation of habitats. Although birds of prey are rather mobile and can move or adapt provided there is still some suitable habitat, fragmentation of suitable habitats may lead to a deterioration in prey quantity and/or quality and hereby a reduction in bird of prey populations.

Species affected:
Category 1 species: *all*
Category 2 species: *all*
Further species: *all*

4.2 Loss of nest sites

Logging is probably the primary cause of loss of nest sites for birds of prey in Norway (BirdLife Norway unpubl. data). European Honey Buzzard, White-tailed Eagle, Northern Goshawk, Common Buzzard and Golden Eagle all prefer robust nesting trees in mature forest which may be vulnerable to logging (Selås 1997a, Steen 2012), and species like Great Grey Owl prefer to reuse old nest platforms of these species. Although the Norwegian forestry business have official guidelines on how to protect nest sites of birds of prey (Søgnen 2011), there are no formal regulations controlling this activity. Lack of knowledge of the fauna present is often also a problem (e.g. Steen 2012). Boreal Owl and Ural Owl are dependent on available nesting holes, usually also found in mature forest. Other species such as the Eurasian Eagle Owl are also vulnerable to the loss of nest sites due to logging, although overgrowing of former open areas due to the absence of grazers or traditional burning practice are probably of greater importance (Øien et al. 2014, Thorvaldsen et al. 2017).

Declining populations of other species may be an issue for birds of prey using nests built by others. For instance, declining populations of Raven *Corvus corax* may have a negative influence on Gyrfalcon populations (Koskimies 2011), and some of the small falcons such as Eurasian Hobby are dependent upon viable populations of Hooded Crow *Corvus cornix* (Steen 2008b, Steen et al. 2008, 2009).

Species affected:
Category 1 species: -
Category 2 species: *European Honey Buzzard, Eurasian Hobby*
Further species: *Common Buzzard, Northern Goshawk, Osprey, Eurasian Eagle Owl, Ural Owl, Great Grey Owl, Boreal Owl*

4.3 Forestry

The forestry industry threatens several birds of prey thriving in mature and old forest, not only due to the physical loss of nesting trees and tree holes but also due to the decline and fragmentation of rich mature-forest and old forest stands, as this is important hunting habitat for several species (Opheim & Høitomt 2019, Saga & Selås 2012, Selås et al. 2008, Sonerud et al. 1986, Strøm & Sonerud 2001, Tornberg et al. 2006, Widén 1997). Importantly, forestry may also cause declining populations of prey such as forest grouse (Capercaillie *Tetrao urogallus*, Black Grouse *Lyrurus tetrix*, Hazel Grouse *Tetrastes bonasia*), and thereby low prey availability during the non-breeding season (Grønlien 2004, Tornberg et al. 2006, Widén 1997). Studies in Oppland indicate that Northern Goshawk, an old forest specialist, often deserts its territories if the amount of old forest in the surroundings drops below 25 – 30 %, especially if old forest stands are small and fragmented. This seems especially to be the case in forest of low productive class (Opheim & Høitomt 2019). Saga & Selås (2012) also pointed out the importance of focus on the remaining mature forest stand and its structure to protect the Northern Goshawk. However, forestry may also benefit some species preferring to hunt in the open (clear-cuts) or in medium-aged stands, such as Eurasian Sparrowhawk, Rough-legged Buzzard and Common Kestrel (Fåsseland 2012, Selås & Rafoss 2008, Sonerud 1986, Steen 2008a).

Logging activity takes place all year round in Norway, with figures from 2013 – 2017 indicating a peak in the harvest of timber in June, i.e. in the middle of the breeding season. The largest proportion of wood is harvested during spring and early summer (Norwegian Agriculture Agency 2020). One reason is probably that payments are better during this time of year, to stimulate a constant supply of

timber to the sawmill industry (Eggen 2018). However, new regulations were implemented in the PEFC Norwegian Forest Standard in 2019, stating that logging should be avoided in forests of particular importance for birds in May – July. How this will influence birds of prey is at present unknown. In addition to loss of nests and habitat, disturbance from timber harvesting during the breeding season may also reduce breeding success of sensitive species (see Ruddock & Whitfield 2007). Despite the forestry business own guidelines on how to protect nesting trees for birds of prey (Søgnen 2011), these sites need better formal protection. This also concerns trees with a potential as nest sites for birds of prey.

Governmental subsidies of forestry activities also increase the threat posed by the forestry business on important bird of prey habitats. Subsidies include support for the establishment of forest roads, logging in inaccessible areas and draining measures in forest habitats.

Species affected:
Category 1 species: -
Category 2 species: *European Honey Buzzard, Common Kestrel, Eurasian Hobby, Long-eared Owl*
Further species: *White-tailed Eagle, Northern Goshawk, Eurasian Sparrowhawk, Common Buzzard, Rough-legged Buzzard, Golden Eagle, Osprey, Merlin, Eurasian Eagle Owl, Northern Hawk Owl, Eurasian Pygmy Owl, Tawny Owl, Ural Owl, Great Grey Owl, Boreal Owl*

European Honey Buzzard, White-tailed Eagle, Osprey, Northern Goshawk (photo), Common Buzzard and Golden Eagle all prefer robust nesting trees in mature forest which may be vulnerable to logging. Logging is probably the primary cause of loss of nest sites for birds of prey in Norway. Although the Norwegian forestry business have official guidelines on how to protect nest sites of birds of prey, there are no formal regulations controlling this activity. Photo: Børre Østensen

4.4 Human disturbance

Disturbance from human activities is a significant threat to certain species of birds of prey, potentially affecting breeding success due to evasive behaviour (Ruddock & Whitfield 2007). Several birds of prey are very sensitive to human disturbance, which is considered the most important cause of nest abandonment by Norwegian experts (Annex 2). Golden Eagles and Snowy Owls may leave the nest at distances up to 1 km if disturbed while many others are actively disturbed at several hundred meters (Jacobsen et al. 2014, Ruddock & Whitfield 2007). Bergo (1984) found that very few nests of the Golden Eagle in Western Norway were situated closer than 500 m to permanent human settlements, cabins and roads, and from this suggested nest location to be affected by human activities. Rock climbing may be particularly problematic for species breeding on cliffs and may potentially reduce breeding success and lead to avoidance from exposed nest sites (Brambilla et al. 2004). The presence of birdwatchers, photographers and researchers may also have detrimental effects on birds of prey (Gutzwiller 1995, Rosenfield et al. 2007). Disturbance from bird photographers and drones may be an increasing threat to birds of prey in Norway (e.g. Jelstad 2014, 2017). Leisure activities such as paragliding and hang gliding also cause disturbance to some nest sites (Toralf Tysse pers. comm.).

Trekking and tourism have come in conflict with Gyrfalcon nest sites (e.g. Opheim 2008), and Johansen & Østlyngen (2011) found evidence of human disturbance at abandoned Gyrfalcon nest sites in Finnmark. Extensive development of cabins in alpine and wooded regions may itself cause disturbance to several birds of prey and may in addition involve the establishment of roads, ski resorts, trekking paths, watersports, etc. nearby (e.g. Opheim 2008). Fremming (1980) found the frequency of breeding failure in Golden Eagles to be higher in years with early Easter holidays in Norway and postulated this to be due to more ski tourism in the breeding areas at the time of egg laying. Skiing and trekking are probably widespread threats to birds of prey across Norway causing nest abandonment and breeding failure for several species (BirdLife Norway unpubl. data). Other disturbance may come from forestry, reindeer management, motor traffic including snowmobiles and All-Terrain Vehicles (ATVs), and from tourism (Jacobsen et al. 2014).

Species affected:
Category 1 species: -
Category 2 species: *Hen Harrier, Snowy Owl, Short-eared Owl*
Further species: *Northern Goshawk, Golden Eagle, Osprey, Gyrfalcon, Eurasian Eagle Owl*

4.5 Infrastructure

Construction of infrastructure is a highly relevant threat to a number of birds of prey species in Norway. Most migratory species face the risk of conflicts with infrastructural developments and, in particular, wind power plants and power lines. Such developments and establishments are also highly relevant for local breeding populations of different species. The risk of collision with trains and cars is also probably a significant threat to some species.

4.5.1 Electrocution

Electrocution is death caused by electric shock when birds cause an electrical short circuit and outages. The problem of electrocution increases as the distance between a phase conductor and an earthed device and/or the distance between two phase conductors gets shorter. Consequently, medium-voltage power lines are the most dangerous type for birds of prey. Large birds (e.g. with

long legs, wings or tail) like eagles and large owls are more vulnerable to electrocution than smaller ones (Benson 1981, Bevanger 2011, Lehman et al. 2007). Electrocution has been reported as one of the major threats to Eurasian Eagle Owls in Norway (Larsen et al. 1986, Norwegian Environment Agency 2009), and also poses a threat to a number of other species which use pylons and similar structures as lookout posts. As confirmed by ringing recoveries, this is also a major cause of death for (first year) White-tailed Eagles (see Heggøy & Øien 2014).

Species affected:
Category 1 species: *Red Kite*
Category 2 species: *European Honey Buzzard, Common Kestrel, Snowy Owl, Long-Eared Owl, Short-eared Owl*
Further species: *White-tailed Eagle, Common Buzzard, Rough-legged Buzzard, Golden Eagle, Osprey, Eurasian Eagle Owl, Great Grey Owl*

4.5.2 Wind power plant

Spending much time in the air, birds of prey are considered particularly vulnerable to collisions with structures such as wind turbines (e.g. Bevanger 2011). The development of wind power plants also involves habitat loss and industrialisation of natural landscapes through infrastructure development and foundation of turbines, as well as noise effects which may affect owl hunting behaviour in particular (see Mason et al. 2016). Wind power plants have been shown to cause significant mortality in some species, as well as avoidance behaviour (Hunt 2002, Johnston et al. 2014, Singh 2014, Thaxter et al. 2017, Walker et al. 2005).

Many wind power plants are built and planned along the Norwegian coastline and in several inland mountain areas, as well as offshore along the coast (The Norwegian Water Resources and Energy Administration 2020). The effects of these wind power plants upon native wildlife, including birds of prey, are poorly studied in Norway. Despite much research on the effects elsewhere, this is a general problem highlighted during environmental impact assessments and arguments against such projects in Norway. Knowledge about the effects of wind power plants upon birds is, however, much better for the BirdWind Project at Smøla in central Norway. A total of 100 White-tailed Eagles have been reported killed by wind turbines in the period 2005 – 2019 (Eggen 2019), and the wind power plant contributed to an additional 30 % mortality for the eagles. The number of breeding eagles within the wind power plant area was reduced during the study period, and the breeding success declined in territories within 500 m from the turbines (Dahl et al. 2011a, 2011b). Important prey organisms may also suffer from the development of wind power plants, due to habitat loss or collision risk. For instance, Willow Ptarmigan *Lagopus lagopus* has been shown to be particularly vulnerable to collisions (Dahl et al. 2011a, Bevanger et al. 2010).

Species affected:
Category 1 species: *Red Kite*
Category 2 species: *European Honey Buzzard, Black Kite, Common Kestrel, Snowy Owl*
Further species: *White-tailed Eagle, Eurasian Sparrowhawk, Common Buzzard, Rough-legged Buzzard, Golden Eagle, Osprey, Peregrine Falcon, Eurasian Eagle Owl*

4.5.3 Power lines and fences

Birds with high wing loading (heavy body) and low aspect (small wings) are considered particularly vulnerable to collision with power lines. These are characterized by rapid flight and low manoeuvrability and typically includes Anseriformes, Galliformes, Charadriformes, etc. (Bevanger 1998). Thus, birds of prey are generally at lower risk of power line collisions, although prey-mediated mortality related to power line collisions may be an issue.

Fences for grazing livestock, including reindeer fences, pose another collision risk to birds, including some birds of prey (Koskimies 2011). Generally, species hunting near the ground at high speed or in the dark are at risk, such as the Gyrfalcon and the Eurasian Eagle Owl, may be especially vulnerable to collisions (Koskimies 2011).

Species affected:
Category 1 species: -
Category 2 species: *Snowy Owl, Long-Eared Owl, Short-eared Owl*
Further species: *Eurasian Sparrowhawk, Merlin, Gyrfalcon, Eurasian Eagle Owl*

4.5.4 Cars and trains

The collision risk with cars or other vehicles is well illustrated by the cause of death for 206 Tawny Owls collected by the Agder Museum in Southern Norway, 77 of which were killed in traffic (Roar Solheim pers. comm.). This was also the most common cause of death (36 %) for recovered Norwegian-ringed Tawny Owls and is a common cause of death for other species of owls as well (Bakken et al. 2006). Collision with cars was also an important cause of death for Snowy Owls on wintering grounds in the Canadian prairies (Kerlinger & Lein 1988). For most species of diurnal birds of prey, the risk of being killed in traffic seems to be smaller than for owls, although this may be a potential threat also to some species of raptors (Eurasian Sparrowhawk, Common Kestrel, Peregrine Falcon; Bakken et al. 2003). Collision with trains is sometimes reported as the cause of death for Golden Eagles and White-tailed Eagles, which are attracted to carcasses from collisions with mammals or other bird species along roads or railways (Singh 2014, Statistics Norway 2013, Tjernberg 2006). Collision with trains is also an issue for a number of other species, such as Short-eared Owl and Hen Harrier in the Dovre mountain area, where the railway line passes through one of the most important breeding areas for these species in Norway (Ree 2005).

Species affected:
Category 1 species: -
Category 2 species: *Hen Harrier, Common Kestrel, Peregrine Falcon, Snowy Owl, Long-eared Owl, Short-eared Owl*
Further species: *White-tailed Eagle, Eurasian Sparrowhawk, Golden Eagle, Eurasian Eagle Owl, Tawny Owl, Boreal Owl*

4.5.5 Bird strikes at airports

Reducing bird strikes at airports is critical for human safety. The problem is highly relevant in Norway, as most of the larger airports are located at or near important staging areas for birds. Among species and individuals involved in bird strikes there are generally few birds of prey. However, bird strike events involving birds of prey are presently only registered into the categories “raptors” and “owls”. Nevertheless, a few incidents with Tawny Owl, Long-eared Owl and particularly Short-eared Owl have been confirmed (Trond Øigarden pers. comm). Species like the Common Buzzard may also be affected at a few airports, primarily in Southern Norway.

Several measures may be taken to prevent bird strikes. Those most widely used in Norway include scaring of individuals or flocks by firing thunderclaps, gas guns and, at the largest airports, 24 hour patrolling using vehicles appointed to the task. Habitat management involves the management of green areas at airports, including plants with low nutritional value that attracts less birds, as well as the removal of trees and shrubs in the vicinity of the airport (Trond Øigarden pers. comm.). Airports are also provided with a general permission to shoot single individuals from the Norwegian Environment Agency in critical situations for safety. This permission includes all species listed as “Least Concern” on the national Red List, as well as five red listed species (not birds of prey). However, birds of prey are probably rarely shot at Norwegian airports. The use of raptors to scare away other birds are commonly used internationally. Falconry is prohibited in Norway, although a pilot project involving the setting up of a Peregrine Falcon nesting box for this purpose has been initiated at Sola Airport, southwestern Norway (Trond Øigarden pers. comm.).

Species affected:
Category 1 species: -
Category 2 species: *Long-eared Owl, Short-eared Owl*
Further species: *Common Buzzard, Tawny Owl*

Among bird of prey species involved in bird strikes the Short-eared Owl (a Category 2 species in the Action Plan of the CMS Raptors MoU) appears particularly vulnerable. Photo: Oddvar Heggøy

4.5.6 Other infrastructure

The Eurasian Sparrowhawk is particularly vulnerable to collision with buildings with windows or glass fronts. This was the cause of death for 42 % of recovered Norwegian-ringed Eurasian Sparrowhawks analysed up until 2003 (Bakken et al. 2003). Other species, including small owls, may also be affected but probably accounts for a minor part of incidents.

Species affected:
Category 1 species: -
Category 2 species: -
Further species: *Eurasian Sparrowhawk, Eurasian Pygmy Owl, Boreal Owl*

4.6 Hunting and persecution

4.6.1 Direct persecution

Many birds of prey have a history of persecution over several centuries in Norway, because of superstition, or because they are thought to represent a threat to livestock, fisheries, game populations and so on. Such opinions still exist, and there are several examples of use of poisons and illegal hunting (Shimmings 2018). Most of the (illegal) use of poisoned bait is probably aimed at killing large mammalian predators. Potentially, such activity could also affect carrion-feeding birds of prey.

Illegal hunting was in the early 1990s still one of the most common forms of environmental crime in Norway (Holme et al. 1994). More recent data suggests the majority of birds of prey species breeding in Norway have been exposed to environmental crime (Shimmings 2018). The Northern Goshawk is perhaps particularly vulnerable to persecution, due to its dietary preferences for small game species, which are favoured hunting objects (Selås 1997b, Tornberg et al. 2006). Previous accounts estimate that 2 000 goshawks were killed annually in Norway in the 1960s (Nygård et al. 1998). More recently, it was found that female turnover rate and breeding success of breeding Northern Goshawk in Southern Norway differed significantly between two areas with similar territory quality assumed to experience different levels of illegal human persecution, supporting this notion (Selås et al. 2017). Golden Eagle, Gyrfalcon and Eurasian Eagle Owl are also vulnerable to persecution (Bakken et al. 2003, Larsen et al. 1986, Statistics Norway 2013, Nygård et al. 2016, Steen & Sørli 2008). Golden Eagle in particular is viewed as a threat to livestock and domesticated reindeer by some interest groups and may thus fall victim to environmental crime (Knoff & Nøkleby 2009).

Illegal hunting for taxidermy or collecting purposes is a threat in many parts of the world including some European countries, and could be a threat to birds of prey breeding in Norway, including species like the Snowy Owl (Jacobsen et al. 2014, Solheim et al. 2004). Alle species of bird are potentially at risk from egg collecting. This illegal activity is outlawed in most countries including Norway, but still persists to this day, although not to the same extent as a century ago (e.g. Jacobsen et al. 2014, Nygård et al. 1998). Eggs taken from nests in Norway, including those from owls and raptors, have been found in egg collections abroad (BirdLife International 2017, Hägerroth 2015). Eggs may be taken for private egg collections, although in the case of many birds of prey the eggs may be artificially incubated to provide birds for falconry. In years of irruptions of Northern Hawk Owl, many have been shot for taxidermy purposes (BirdLife Norway unpubl. data).

Species affected:
Category 1 species: *all*
Category 2 species: *all*
Further species: *all*

4.6.2 Hunting and poisoning

All birds of prey are protected in Norway. However, migrating species may be hunted legally (or illegally) elsewhere (Jacobsen et al. 2014). In the Russian Arctic, species like Snowy Owl and Gyrfalcon are known to be trapped by snares and traps set for ptarmigans *Lagopus spp.* and foxes *Vulpes spp.*, previously in significant numbers (Potapov & Sale 2012). Legal hunting of prey species, Galliformes in particular, may be a threat to specialists such as Gyrfalcon (chapter 4.9). The use of lead ammunition may lead to poisoning of individuals feeding on small game such as Galliformes and Mountain Hare *Lepus timidus*, as well as those feeding on entrails and carcasses from hunting (chapter 4.7).

Species affected:
Category 1 species: -
Category 2 species: *European Honey Buzzard, Hen Harrier, Snowy Owl*
Further species: *White-tailed Eagle, Golden Eagle, Gyrfalcon, Eurasian Eagle Owl*

4.7 Lack of food

Starvation is a commonly reported cause of death for several birds of prey, especially during winter (Potapov & Sale 2012, Sunde 2002, Tornberg et al. 2006). Such incidents may be caused by low prey abundance or availability. Experts considered low prey availability one of the three most likely causes of nest abandonment in Norway (Annex 2). Ptarmigans are important prey for species like Golden Eagle, Gyrfalcon and Snowy Owl (Jacobsen et al. 2014, Koskimies & Sulkava 2011, Gjershaug 1994). Both Rock Ptarmigan *Lagopus muta* and Willow Ptarmigan are declining species in Norway, threatened by excessive hunting as well as climate change and an expansion in range and population increase of Red Fox *Vulpes vulpes* (Kålås et al. 2015, Koskimies 2011, Pedersen & Karlsen 2007, Steen 1989). In some inland areas, Gyrfalcon feed almost solely on ptarmigans (Koskimies & Sulkava 2011) and is therefore particularly vulnerable to declining populations. For such species, a certain minimum density of prey is critical for survival and nesting (Koskimies 1999, 2011).

In a Norwegian study, it was concluded that competition from Red Fox may influence breeding density of Northern Goshawk negatively by limiting populations forest grouse (Selås 1998). Importantly, forest grouse populations may also be negatively affected by forestry (Tornberg et al. 2006, Widén 1997).

Populations of Galliformes and Mountain Hare fluctuate in line with fluctuating populations of rodents, which in itself are very important food to many birds of prey species. Declining rodent populations, or decreased regularity in the occurrence of peak years as seen in relation to climate change (Ims et al. 2008, Selås 2011), may thus negatively affect a great number of species. However, a comprehensive study on trends in lemming abundance across the Arctic found no evidence of decreasing lemming populations in general, although there was a negative trend for low-arctic populations sympatric with voles (Ehrich et al. 2019). Notably, indications of population decline in rodent specialist such as the Rough-legged Buzzard has also been detected in some low-arctic mountain areas in Norway (Bergo et al. 2013, Furuseth & Furuseth 2015). In addition, Snowy Owl has disappeared as a breeding bird in Southern Norway (Jacobsen et al. 2014).

Declining populations of birds, as well as insects, in agricultural land may be another issue for some species depending upon these as prey, such as European Honey Buzzard and Eurasian Hobby (Cramp & Simmons 1980, Glutz von Blotzheim et al. 1971, Hagen 1952, Holstein 1944, Munch 1955, Steen 2008b, Steen et al. 2009).

Species affected:
Category 1 species: *all*
Category 2 species: *all*
Further species: *all*

4.8 Overgrazing

High densities of grazing livestock such as sheep and domesticated reindeer may lead to an imbalance between livestock and their natural resources. Overgrazing may have a number of undesirable effects, including whole ecosystem effects as well as effects on populations of other organisms feeding on graminaceous plants, such as rodents (Steen et al. 2005). This may have further effects on birds of prey populations. In an important breeding area for the Eurasian Eagle Owl in Norway, a significant difference in water vole density was found between islands with grazing sheep and islands without sheep. How this affects the Eurasian Eagle Owl population in this area is presently unknown (Frafjord 2014, Wabakken et al. 2014). Sheep may also shelter from inclement weather on ledges and overhangs that are used by Eurasian Eagle Owls (Norwegian Environment Agency 2009). Grazing pressure from sheep and domesticated reindeer have increased at several places in Norwegian mountainous regions during the last 50 years, especially in Central and Northern Norway (Finnmark) (Austrheim 2015).

Species affected:
Category 1 species: -
Category 2 species: *Hen Harrier, Common Kestrel, Snowy Owl, Short-eared Owl*
Further species: Common Buzzard, Rough-legged Buzzard, Golden Eagle, Eurasian Eagle Owl

High levels of pollutants have been found in the eggs of Merlins breeding in Norway. Photo: Børre Østensen

4.9 Environmental pollutants

Exposure to environmental pollutants may cause alterations in reproduction, immune function, growth, development and behaviour, as reported in several species (e.g. Ratcliffe 1970, Newton 1986, Barron et al. 1995, Verreault et al. 2004, Fisher et al. 2006). Raptors and owls are particularly vulnerable because of their position at the top of natural food chains. Many persistent environmental pollutants have a high affinity for fat tissue once inside the body of an animal. As fat tissue functions as insulation and as storage of energy, such lipophilic substances accumulate throughout an animal's lifetime, and will eventually be transferred to organisms at higher trophic levels of the food chain.

Emissions of several pollutants in Norway have declined significantly, including PCBs and DDT. Acid rain is a lesser problem than it was some decades ago, although this still is a problem in the south-west. However, emerging pollutants such as brominated flame retardants and fluorinated compounds are constantly found in the environment (Norwegian Environment Agency 2019c). Pollutant levels are generally low in inland and mountain populations of birds of prey in Norway, but higher in coastal populations and those species consuming birds (Gjershaug et al. 2008). Monitoring of environmental pollutants in birds of prey eggs through the TOV Program shows that levels of legacy pollutants generally are declining. The highest levels of organic pollutants are found in Merlin, Peregrine Falcon and White-tailed Eagle, and DDT and PCBs are the dominant pollutants (Nygård & Polder 2012).

4.9.1 Heavy metals

Species feeding on popular small game such as Galliformes and Mountain Hare, as well as those feeding on entrails and carcasses left from hunting, are particularly vulnerable to lead poisoning due to the ingestion of residues from lead shot used for hunting purposes (Østlyngen & Nøkleby 2014). Isomursu et al. (2018) found that lead poisoning was the primary cause of death for White-tailed Eagles in Finland, representing 31 % of total mortality. In Sweden, 14 % of registered mortality was related to lead poisoning in the same species (Helander et al. 2009). In a study by the Norwegian Veterinary Institute analysing livers from 268 raptors, including 116 Golden Eagles, 115 White-tailed Eagles and 37 Gyrfalcons, lead was found in 94,8 % of all individuals (Madslien et al. 2015). Lead poisoning was the likely cause of death for ten (3.7 %) individuals (> 15 mg/kg), including eight Golden Eagles. An additional 27 raptors (10 %) had a relatively high load of lead in their livers (3-15 mg/kg), including seventeen Golden Eagles, eight White-tailed Eagles and two Gyrfalcons. A general ban to the use of lead shots for small game hunting in Norway entered into force in 2005 but was reversed in 2015 due to political pressure.

Other heavy metals include mercury, which has been found in high levels in some birds of prey in Norway, including Northern Goshawk, Merlin, Peregrine Falcon and White-tailed Eagle (Dolan et al. 2017, Norheim & Frøslie 1978, Nygård & Polder 2012). In addition, cadmium levels above sub-lethal toxic threshold were found in Northern Goshawks in a study from Tromsø, Northern Norway (Dolan et al. 2017).

Species affected:
Category 1 species: *all*
Category 2 species: *all*
Further species: *all*

4.9.2 Organic compounds

Organohalogen contaminants (OHCs) include polychlorinated biphenyls (PCBs), organochlorine pesticides (OCPs), brominated flame retardants (BFRs) and perfluorinated compounds (PFCs). Effects include impacts on liver, kidney, bone, endocrinology and metabolism (Sonne et al. 2010). High OHC concentrations found in White-tailed Eagles and Northern Goshawks in Northern Norway may increase risk of infections and lower reproduction rates (Sonne et al. 2010). Together with DDT, PCBs are generally the dominant persistent organic pollutants (POPs) in birds of prey in Norway, with especially high concentrations of PCBs in White-tailed Eagles and Eurasian Eagle Owls (Briels et al. 2019, Nygård & Polder 2012). Levels of BFRs are also highest in White-tailed Eagle and Eurasian Eagle Owl, as well as the Osprey and Peregrine Falcon (Herzke et al. 2005, Nygård & Polder 2012). PFCs have been found in high levels in Eurasian Eagle Owl, as well as White-tailed Eagle, Northern Goshawk, Merlin and Peregrine Falcon (Nygård & Polder 2012). Per- and polyfluoroalkyl substances (PFAS) concentrations in Tawny Owl were found to be low, with adverse effects unlikely (Ahrens et al. 2011).

DDE, the metabolite of the pesticide DDT, is well known for its eggshell thinning effects (Ratcliffe 1970, Lundholm 1997), and was probably the primary cause of dramatically declining populations of many birds of prey species during the 1960s and 1970s (Newton 1979), including the Peregrine Falcon (Cade et al. 1968, Lindberg et al. 1988, Ratcliffe 1980). DDE was also a likely cause of low productivity in a Golden Eagle population in Western Norway (Nygård & Gjershaug 2001). Additionally, particularly high levels have been found in Merlin eggs in Norway (Nygård 1999, Nygård & Polder 2012).

Species affected:
Category 1 species: *all*
Category 2 species: *all*
Further species: *all*

4.9.3 Anticoagulant rodenticides

Second generation anticoagulant rodenticides (SGARs) are commonly used for pest control in Norway, leaving exposure to non-target species a potential risk. For example, Langford et al. (2013) detected SGARs in approximately 70 % of Golden Eagles and 50 % of Eurasian Eagle Owls examined. High concentrations were found in about 30 % of the examined specimens (Langford et al. 2013). Similarly, the Norwegian Veterinary Institute found SGARs in 72 % of Eurasian Eagle Owls examined. The authors found levels to increase from 1994 to 2002, thereafter stabilizing (Bernhoft et al. 2018).

Species affected:
Category 1 species: -
Category 2 species: *Hen Harrier, Common Kestrel, Long-eared Owl, Short-eared Owl*
Further species: *White-tailed Eagle, Western Marsh Harrier, Northern Goshawk, Common Buzzard, Rough-legged Buzzard, Golden Eagle, Peregrine Falcon, Eurasian Eagle Owl, Northern Hawk Owl, Eurasian Pygmy Owl, Tawny Owl, Ural Owl, Great Grey Owl, Boreal Owl*

4.10 Climate change and extreme weather

Species thriving in a warmer climate may increase in some regions, and those confined to the Arctic or alpine regions may suffer from the effects of climate change due to changing habitats. It has been estimated that only 30 % of former Snowy Owl breeding areas may be suitable for the species in the future, excluding present Norwegian breeding grounds (Potapov & Sale 2012). Rough-legged Buzzard and Gyrfalcon are also expected to lose a great part of their current range due to climate change (Huntley et al. 2007).

A northward expansion of temperate forest and an altitudinal expansion of birch forest into mountain regions (Austrheim et al. 2015, Evans & Brown 2017, Johansen & Østlyngen 2011), may benefit some species and be problematic for others. The expansion of mountain birch forest seen during the last decades may however partly be attributed to the revegetation of areas cleared during a period of intensive mountain livestock farming during the 19th and early 20th century (Austrheim et al. 2015).

The focus on climate change has also been at the cost of conventional nature conservation. One issue may be the planting of trees as a measure to reduce the impact of climate change initiated by the Norwegian Government (Søgaard et al. 2019). Such even-aged plantations are unsuitable breeding and hunting habitat for several birds of prey species and may in particular threaten species thriving in the open, like the Eurasian Eagle Owl (Obuch & Bangjord 2016). However, plantations may provide breeding habitat for species such as Northern Goshawk, Eurasian Sparrowhawk and Long-eared Owl, particularly in former tree-less areas. Another issue is the development of “green energy” such as wind power plants, at the sacrifice of nature and fauna.

Climate change is expected to create a «warmer, wetter, and wilder” weather pattern in Norway (Alfsen et al. 2013). This will involve habitat changes for a number of species. In addition, several species are known to be vulnerable to bad weather including heavy precipitation, snow and low temperatures, especially during the breeding season (Haworth et al. 2009, Jacobsen et al. 2014, Kostrzewa 1989, Steen 2008b, Steen 2012). Very warm weather incidents during the breeding season may also be problematic (Beecham & Kochert 1975, Steenhof et al. 1997).

A warmer climate may lead to more frequent episodes of freezing and thawing throughout winter. This may create more ice layers in the snow, and wind transformation could harden the snow cover. Such structural changes in the snow cover may affect hunting efficiency as well as prey populations (Mysterud 2016). Less snow cover in winter and spring due to warmer weather will be problematic for some species, and probably benefit others (Mysterud 2016, Nybo & Sonerud 1990, Selås 1997c, 2001, Sonerud 1986, Sunde 2002). Moreover, high summer temperatures may limit reproduction of important prey such as Galliformes and rodents through effects on bilberry plants (Selås et al. 2011). However, warm spring and early summer temperatures may also improve chick survival (Wegge & Rolstad 2017). Birds breeding early also have larger clutches than those breeding later in the season, and the advancing spring may thus increase breeding success (Lehikoinen et al. 2013).

Species affected:
Category 1 species: *all*
Category 2 species: *Snowy Owl (+ all other species)*
Further species: *Rough-legged Buzzard, Gyrfalcon (+ all other species)*

4.11 Lack of knowledge

Lack of knowledge is an important threat to birds of prey in Norway. This includes lack of knowledge of important sites and habitats, as well as the lack of biological qualifications and expertise among managers and other authorities (primarily on municipal level). Limited data access for the relevant authorities is also a problem, although a new access system developed by the Norwegian Environment Agency should improve this.

4.12 Natural threats

In addition to human threats, birds of prey face a number of natural threats. However, some of these may also be altered by human influences. Despite being predatory, several birds of prey face the risk of becoming predated themselves. Some are hunted by other birds of prey (e.g. Mikkola 1976), and some may fall victim or lose their eggs or chicks to birds or mammals such as Red Fox and Pine Marten *Martes martes*. In special cases, Arctic Fox *Vulpes lagopus*, Wolverine *Gulo gulo*, Wolf *Canis lupus* and domestic dogs may also predate on eggs and chicks (Hagen 1960, Jacobsen et al. 2014, Sonerud 1985). The population and distribution of Red Fox in Norway has been increasing, possibly due to a lack of larger predators and to surplus food, especially in reindeer herding areas, where carcasses are more readily accessible (Selås & Vik 2006).

Insect parasitism (blackflies) may reduce breeding success and survival of Snowy Owls, with reported incidents from Norway and Finland (Solheim et al. 2013). Shortage of optimal nest sites may be an issue for several species, including Gyrfalcon (Koskimies 2011, Østlyngen et al. 2011). For species experiencing severe population bottlenecks, reduced genetic variation may be an issue. Studies on the Peregrine Falcon population from southeast Norway indicate such a scenario (Lifjeld et al. 2002), which may have reduced the flexibility of the population to adapt to similar events in the future.

Additionally, diseases such as avian influenza may cause mortality in birds of prey. However, there are no indications that birds of prey in Norway are threatened by outbreaks of avian influenza. For instance, Lee et al. (2019) found no evidence that White-tailed Eagles and Northern Goshawks were threatened by outbreaks of avian influenza in other parts of Europe (Lee et al. 2019).

4.13 Conclusions

Identified major species-specific threats to birds of prey in Norway are summarised in Table 7. Those considered of highest importance are habitat loss through land reclamation and forestry, human disturbance, electrocution, collision and the competition for limited resources.

Table 7. Major threats to Norwegian raptors and owls and their magnitude of impact: H - High: a factor causing or likely to cause rapid decline leading to depletion; M - Medium: a factor causing or likely to cause relatively slow, but significant, declines; Lw - Low: a factor causing or likely to cause fluctuations; L - Local: a factor causing or likely to cause declines in small parts of the population; U - Unknown: a factor that is likely to affect the species but the extent is unknown; N - None: no effects likely; DD - Data deficient: potential affects cannot be evaluated due to lack of knowledge.

Species	MoU Category	Agriculture	Hunting and persecution	Wetland drainage and land reclamation	Human disturbance	Pesticides and pollution	Forestry	Overgrazing	Human impact outside National boundary	Electrocution on electric poles	Climate change	Building and infrastructure development	Collision	Loss of nest sites	Competition for limited resources	Fisheries and aquaculture	Illegal trade	Lack of food (various causes)	Natural events (predation, weather, etc.)
Pallid Harrier	1	N	DD	Lw	Lw	U	N	U	U	U	U	N	U	N	N	N	DD	Lw	Lw
Red Kite	1	U	L	N	Lw	M	N	N	U	U	U	N	U	N	N	N	DD	Lw	Lw
Honey Buzzard	2	M	U	N	Lw	U	H	N	U	U	U	U	U	H	U	N	DD	Lw	Lw
Hen Harrier	2	Lw	U	M	M	U	N	U	U	U	U	Lw	U	N	U	N	DD	Lw	Lw
Common Kestrel	2	Lw	N	U	N	U	L	U	U	N	U	N	Lw	Lw	U	N	DD	Lw	Lw
Eurasian Hobby	2	M	N	Lw	L	U	Lw	U	U	N	U	N	N	Lw	U	N	DD	Lw	Lw
Snowy Owl	2	N	L	N	M	U	N	U	Lw	Lw	H	Lw	Lw	Lw	Lw	U	M	Lw	Lw
Long-eared Owl	2	M	N	N	Lw	U	L	N	U	N	U	N	Lw	Lw	U	N	DD	Lw	Lw
Short-eared Owl	2	Lw	N	L	Lw	U	L	U	U	U	U	U	Lw	N	U	N	DD	Lw	Lw
White-tailed Eagle	3	Lw	L	Lw	M	M	U	N	U	M	U	Lw	M	Lw	N	Lw	DD	Lw	Lw
Western Marsh Harrier	3	L	Lw	M	Lw	U	N	N	U	N	U	Lw	U	Lw	N	N	DD	Lw	Lw
Northern Goshawk	3	Lw	M	Lw	Lw	M	H	U	U	U	U	Lw	U	H	U	N	DD	Lw	Lw
Eurasian Sparrowhawk	3	Lw	N	Lw	N	U	U	N	U	N	U	N	M	Lw	N	N	DD	Lw	Lw
Common Buzzard	3	M	N	Lw	N	U	Lw	N	U	U	U	U	U	M	U	N	DD	Lw	Lw
Rough-legged Buzzard	3	Lw	N	N	Lw	U	N	U	U	U	M	U	U	U	U	N	DD	Lw	Lw
Golden Eagle	3	Lw	M	Lw	M	M	M	U	U	Lw	U	M	Lw	Lw	U	N	L	Lw	Lw
Osprey	3	Lw	U	Lw	M	M	Lw	N	U	U	U	Lw	U	Lw	U	U	DD	Lw	Lw
Merlin	3	Lw	N	Lw	Lw	M	U	N	U	N	U	N	Lw	Lw	U	N	DD	Lw	Lw
Gyrfalcon	3	N	Lw	N	M	U	N	U	U	U	M	Lw	Lw	M	M	N	Lw	Lw	Lw
Peregrine Falcon	3	L	L	Lw	Lw	M	N	N	U	U	U	U	L	N	U	U	U	Lw	Lw
Northern Hawk Owl	3	N	N	Lw	Lw	U	U	U	U	U	U	N	U	Lw	U	N	DD	Lw	Lw
Ural Owl	3	N	N	Lw	L	U	M	N	U	N	U	N	U	M	U	N	DD	Lw	Lw
Great Grey Owl	3	N	N	Lw	Lw	U	M	N	U	DD	U	N	U	M	U	N	DD	Lw	Lw
Boreal Owl	3	N	N	Lw	N	U	M	N	U	N	U	N	Lw	M	U	N	DD	Lw	Lw
Eurasian Eagle Owl	-	L	Lw	M	M	M	L	Lw	N	H	U	M	U	M	M	U	DD	Lw	Lw
Eurasian Pygmy Owl	-	N	N	N	N	U	U	N	N	N	U	N	Lw	Lw	U	N	DD	Lw	Lw
Tawny Owl	-	M	N	Lw	N	U	U	N	N	N	U	N	M	Lw	U	N	DD	Lw	Lw

5 CONSERVATION APPROACH

Table 8 provides an overview of interest groups involved in raptor and owl conservation in Norway. Involvement includes both opponents and advocates of raptor and owl conservation, as well as scientists and various authorities.

Table 8. Authorities and interest groups with involvement in raptor and owl conservation in relation to the most relevant threats.

		Threats									
	Authority/group	Habitat loss	Loss of nest sites	Forestry	Human disturbance	Hunting and persecution	Infrastructure	Environmental pollutants	Overgrazing	Lack of food	Climate change
Authorities	National authorities	X	X	X	X	X	X	X	X	X	X
	Regional authorities	X	X	X	X	X	X	X	X	X	X
	Local authorities	X	X	X	X	X	(x)	X	X	X	X
	Forest authorities	X	X	X	X		X			X	X
	Energy authorities	X	X		X		X			X	X
	Traffic administrators	X	X		X		X				X
Interest groups	Hunters				X	X		X		X	
	Illegal hunting and other crime					X		X			
	Energy suppliers	X	X		(x)		X			X	X
	Wind power operators	X	X		X		X			X	X
	Industries and commerce	X	X	X	X		X	X			X
	Farmers	X	X		X	X	X	X	X	X	X
	Land-owners	X	X	X	X	X	X	X	X		
	Forest enterprisers	X	X	X	X		X			X	X
	Pigeon fanciers					(x)					
	Tourist industry	X	X		X	X	X	X			X
	Outdoor recreation/activities	(x)	X		X		X				
	Nature photographers		X		X						
	General public	X	X		X		X	X			X
	Nature conservation organisations	X	X	X	X	X	X	X	X		X
	Researchers	X	X	X	X		X	X	X	X	X

5.1 Aim and objectives

The aim of the present Norwegian strategic guidelines for birds of prey conservation is to conserve and strengthen all populations of regularly breeding raptor and owl species in Norway. This should be achieved through different objectives addressing the conservation of birds of prey, through factors such as reducing mortality rates, improving breeding success, habitat management and the implementation of further conservation measures.

5.1.1 Objectives

The general objective of the strategic guidelines is to conserve and protect birds of prey in Norway, and threatened species in particular (incl. CMS Category 1 and 2 species, CMS flagship species and species on the national Red List). This should be accomplished by the following impact objectives:

- Reduce mortality caused by human activities and structures, especially for species that face notable losses
- Increase breeding success by sustainable management of prey species and important habitats
- Prevent the introduction of new threats that cause significant mortality

Relevant activities to accomplish these objectives are provided below and summarised in Table 9.

5.2 Habitat conservation and sustainable management

Nature in Norway is relatively “intact” in the mountain regions and in the northern parts of the country. The lowland areas in the south are more threatened by human activity. In total 17.4 % of the Norwegian mainland is protected by law (Norwegian Environment Agency 2019a). The largest increase in protected area took place during the 1980s and 2000s. Most of the protected land is mountainous areas protected as national parks or protected landscapes. The amount of protected forest and coastal areas is small. The remaining land area that is not protected is managed primarily through the regulations of the Planning and Building Act as well as different sector regulations, such as the Forestry Act (Norwegian Environment Agency 2019a).

Several protected areas in Norway are popular tourist destinations, and in many areas this activity is encouraged by local and regional management. In most of the national parks and protected landscapes hunting for game species is allowed. The concurrent conservation of protective values may be a challenge. For birds of prey this includes keeping disturbance at a low level and keeping prey populations (e.g. Galliformes) sufficiently high.

Activities:

1.1 Survey, maintain and restore natural habitats (incl. wetlands and old forest) in the range of threatened species, including former habitats
1.2 Protect > 10 % of productive forest in Norway by 2025 prioritizing old forest habitats
1.3 Include the maintenance of important bird of prey habitats in management plans for protected areas
1.4 Define upper limits on the number of grazing livestock in protected areas and other important habitats
1.5 Reduce logging activity during the breeding season
1.6 Prevent clear felling of old growth forests

1.7 Require a minimum (25 %) of old forest stands to be spared during logging in woodland territories of birds of prey
1.8 Intensify the removal of introduced (alien) tree species
1.9 Stop Government subsidies of infrastructure and other activities threatening bird of prey habitats (incl. forest roads, wind power plants, logging in inaccessible areas, drainage and cultivation of wetland areas including peat bogs, etc.)
1.10 Promote establishment of tranquillity zones in important breeding areas to reduce disturbance, and take these into account in the planning of trekking paths, roads, tracks, etc.
1.11 Taking the needs of conservation of birds of prey more into account in sectors and policies including agriculture, forestry, fisheries, industries, physical development, tourism, energy, chemicals and pesticides
1.12 Include the protection of (threatened) birds of prey habitat in governmental land use management, and increase the opportunities of the County Governor to interfere in local development plans
1.13 Keep harvest of prey species at a sustainable level, e.g. by restrictions on the hunting season and on the hunting in protected areas
1.14 Increase food supply by protecting productive Galliformes habitats from hunting

Most of the 17.4 % of protected land in Norway is mountainous areas protected as national parks or protected landscapes. The amount of protected forest and coastal areas is small. To ensure suitable habitat for species like the Northern Goshawk, protection of productive forest may be beneficial. The prevention of clear felling of old growth forest and requirements for a minimum of old forest stands to be spared during logging in woodland territories may also prove effective. Photo: Børre Østensen

5.3 Protect/manage important sites and flyways

Several important birds of prey breeding sites are protected and, in some cases, the presence of birds of prey is an important reason for their protection, particularly in the case of nature reserves. Several breeding sites of special importance need better protection, including some identified as IBAs (Heggøy et al. 2014). Efforts have been made by BirdLife Norway in recent years to protect some of the latter. Birds of prey migration is poorly investigated in Norway, and no sites have been protected or managed specifically with respect to high concentrations of migrating individuals.

A general lack of published knowledge emphasizes the need to carry out comprehensive surveys to identify and protect important sites and flyways of migrating raptors in Norway.

Activities:

2.1 Survey, recognize and conserve key breeding and wintering sites
2.2 Designate sites of national/international importance as protected areas with management plans
2.3 Undertake EIAs for projects potentially impacting sites holding significant populations of Category 1 and 2 and flagship species, including organized recreation and recreational activities
2.4 Improve the requirements for EIAs associated with the establishment of infrastructure (e.g. wind power plants, power lines, roads, etc.), and for follow-up studies
2.5 Conduct risk analysis at important sites to identify and address actual or potential causes of mortality
2.6 Identify and designate important flyways/bottlenecks for bird of prey migration
2.7 Consider the implementation of temporary wildlife zones or protective areas during the breeding season to protect important sites
2.8 Consider proclaiming certain nest sites publically, to reduce pressure on others
2.9 Increase breeding opportunities by construction of artificial nest sites and clearing of overgrown nest sites
2.10 Strengthen environmental surveillance to prevent disturbance at important sites and consider video surveillance at sites of particular importance

5.4 Improvement of legal protection

The main legal instruments covering the protection of birds of prey and the conservation of main habitats and sites in Norway are summarized in chapter 6. A highly debated political resolution in 2019 legalised precautionary hunting of the Golden Eagle to prevent damage to livestock and domesticated reindeer. So far, there have been no legal adjustments to follow up this decision.

Current and recent efforts to improve legal protection for birds of prey include pressure from NGOs for implementing the FSC Standard certification system in Norwegian forestry for better protection of nest sites and breeding birds of prey. Today, most forest owners follow the PEFC Norwegian Forest Standard. NGOs are also working to ban the use of introduced alien species in forestry, prohibit ditch clearing in forest and strengthen requirements for selective felling of forest, the preservation of forest margins and considerations for preserving and restoring bogs and marshes. There have also been calls for the preparation of a national framework for wind power plant development in Norway. A draft was prepared in 2018 – 2019 but vetoed by Government due to political pressure.

Although law in Norway protects all birds of prey, the current legislation is not adequate in order to ensure viable populations of all species and to secure important breeding sites and flyways. Improvements should involve:

Activities:

3.1 Review relevant legislation and take steps to make sure that it requires all new power lines to be designed to avoid electrocution
3.2 Strengthen legal requirements to protect bird of prey nests and roost sites from damage and deliberate disturbance (incl. photographing)
3.3 Legally manifest the protection of bird of prey nest sites with relevant buffer zones in forestry, and extend the “five-year rule” to a “ten-year-rule” on the preservation of nests
3.4 Ban the use of introduced (alien) species in forestry
3.5 Specify special requirements for environmental assessments in planned logging areas, incl. legal obligation to search for bird of prey nest sites before logging
3.6 Review relevant legislation and take steps where possible to ban the use of chemicals causing significant avian mortalities
3.7 Strengthen application of legal protection by ensuring appropriate penalties
3.8 Identify gaps in existing Multi-lateral Environmental Agreements (MEAs) where bird of prey protection and conservation can be improved and draw these to the attention of the relevant Secretariat and other Parties
3.9 Ban the use of lead ammunition for hunting purposes
3.10 Review the self-defence clause (Section 17) of the Nature Diversity Act and prevent the killing of Category 1 and 2 and flagship species, or of individuals in circumstances where this is not “deemed necessary”
3.11 Review the regulation relating to killing of wildlife that cause damage, etc., and make steps to prevent the killing of birds of prey.
3.12 Restrict motor traffic on uncultivated land and in watercourses in order to reduce disturbance to important sites
3.13 Review relevant legislation to prevent the killing of sick or injured birds of prey without the consideration of professionals
3.14 Review relevant legislation and take steps to make sure that it is in accordance with international agreements

5.5 Reduce infrastructure mortality

Measures taken to date to reduce mortality from infrastructure on birds of prey in Norway are mainly aimed towards reducing electrocution risk in the vicinity of Eurasian Eagle Owl nest sites as part of the national Eagle Owl Action Plan (Husdal 2019). As part of this work, power lines and poles have been surveyed across the country to identify critical points with respect to electrocution risk. However, there is still work that need to be done to finish this survey with respect to all species of birds of prey.

Mitigation measures have been a priority close to important Eurasian Eagle Owl nest sites, involving the mounting of bird avoiders and elevated perches on top of the pylons, as well as replacement of open transformers with small and closed transformers and isolation of open power lines at poles and pylons (Norwegian Environment Agency 2009).

Although such measures may also benefit other birds of prey, they are at present probably too local and too few to make a significant difference to mortality in species other than Eurasian Eagle Owl. Marking of power lines to prevent collisions are primarily carried out at a few selected wetland localities. Most new medium-voltage power lines in Norway are constructed to avoid bird of prey electrocution or are underground cables. However, thousands of kilometres with older power lines remain.

With respect to wind power plants, consideration to birds of prey are generally few or even neglected. Several wind power plants are located in important birds of prey breeding habitat (Smøla, Frøya, Høg-Jæren) and in the middle of important flyways for raptor migration (Høg-Jæren, Lista).

Activities:

- 4.1 Survey power lines and poles to identify critical points with respect to electrocution/collision risk
- 4.2 Ensure that existing power lines posing the greatest risk to birds of prey are modified to avoid electrocution/collision
- 4.3 Ensure that all new power lines are constructed to avoid electrocution of birds of prey
- 4.4 Reduce collision risk along existing power lines (marking, ground cabling, etc.)
- 4.5 Prevent wind power plants at important migration, staging and breeding sites
- 4.6 Request the shutdown or removal of lethal wind turbines during critical periods (e.g. during migration)
- 4.7 Prepare and implement mitigation measures to reduce collision risk on roads, railways and at airports
- 4.8 Conduct Strategic Environmental Assessments of planned significant infrastructure developments within major flyways to identify key risk areas
- 4.9 Identify critical points for collisions with birds of prey on the Dovre railway line and carry out protective measures (e.g. reduced speed)

5.6 Prevent poisoning

National as well as EU regulations are crucially important tools to prevent harmful effects of pollutants. As one of the Signatories of the Stockholm Convention, as well as other international agreements such as the Basel Convention (on the Control of Transboundary Movements of Hazardous Wastes and their Disposal) and the Minamata Convention (on Mercury), most pollutants with a documented harmful effect on birds of prey are banned in Norway. Chemicals considered to pose a serious threat to health and the environment are listed in a national catalogue of priority (Norwegian Environment Agency 2020). The national regulations concerning environmental pollutants is in common with EU regulations.

The use of lead shot for small game hunting purposes was banned during 2005 – 2015, but the Norwegian Parliament decided to permit the use of lead shots for small game hunting outside wetlands and shooting ranges from 2015. Lead from ammunition is the single largest source of lead emissions in Norway, posing a risk to several species, and those feeding on carcasses and other remains in particular.

Levels of environmental pollutants are monitored through a number of different governmental programs. Environmental pollutants in birds of prey eggs have been included as part of the TOV Program since 1992 (Nygård & Polder 2012). The screening program "New Pollutants" surveys the occurrence of new and potentially damaging pollutants in the environment and biota, including birds of prey (Langford et al. 2013). Another program "Pollutants in urban animals" monitors levels of pollutants in terrestrial animals in Oslo, including the Eurasian Sparrowhawk (Heimstad et al. 2019). In addition, pollutants in air, water and the terrestrial environment are monitored through other governmental programs (Norwegian Environment Agency 2017).

Activities:

5.1 Reduce pesticide use, incl. rodenticides and insecticides
5.2 Continue to tighten regulations and discharge requirements for industries and commerce
5.3 Uphold the ban on carbofuran and similar chemicals
5.4 Raise awareness of the negative impacts of certain pesticides on birds of prey and other wildlife, promote safer alternatives
5.5 Campaign to ban the use of lead ammunition for hunting purposes
5.6 Uphold the ban on the use of human drugs (incl. diclofenac, etc.) in veterinary medicine, to prevent these entering the food chain

The program "Pollutants in urban areas" monitors levels of pollutants in terrestrial animals in Oslo, including Eurasian Sparrowhawk. In addition, environmental pollutants in bird of prey eggs in Norway has been monitored since 1992. Photo: Børre Østensen

5.7 Prevent illegal persecution

Relatively few illegal persecution incidents have resulted in convictions in Norway in recent years, although persecution of birds of prey does occur regularly in certain areas and some species are considered to be more vulnerable (Selås et al. 2017, Shimmings 2018). Such incidents may occur where certain species are thought to represent a threat to livestock, fisheries, or game populations. Species such as Northern Goshawk, White-tailed Eagle and Golden Eagle may be significantly affected by persecution in some areas. However, for most species direct persecution only plays a minor role in Norway, although several may suffer from illegal hunting/persecution during migration. More research into the problem and stronger surveillance in some areas may however be preferable.

Activities:

6.1 Develop strategies and mechanisms to ensure consistent prosecution of environmental crime
6.2 Promote investigations of the extent of persecution and potential effects on birds of prey
6.3 Educate and inform game wardens, police and courts about environmental crime towards birds of prey
6.4 Strengthen environmental surveillance to prevent and uncover persecution incidents
6.5 Increase public awareness of environmental crime, and how to look for and report suspicious activity
6.6 Educate farmers about livestock mortality caused by birds of prey and how to prevent it
6.7 Educate hunters about mortality of quarry species caused by birds of prey and their role in the ecosystem
6.8 Ensure proper routines and agreements to prevent the spreading of sensitive information

5.8 Monitor bird of prey populations, carry out research and take appropriate remedial measures

Golden Eagle and Eurasian Eagle Owl are the only two species that are intensively monitored through national governmental monitoring programs. Those are also among the birds of prey species given the highest scientific and political interest in Norway. Additionally, national projects by NGOs monitor Norwegian Snowy Owl and White-tailed Eagle populations. Other species are generally monitored through local or regional projects (Chapter 3.3, Table 3). Concentrations of environmental pollutants in raptor eggs are monitored through the TOV Program (Framstad 2020). Important prey organisms, such as rodents and Galliformes, are also monitored through the TOV Program (Framstad 2020), as well as through the Norwegian state-owned land and forest enterprise (Statskog SF) and some other regional and local projects (e.g. Ehrich 2019, Frafjord 2009, Steen 2017, Wegge & Rolstad 2018).

Conservation research on birds of prey in Norway includes investigations of levels and effects of environmental pollutants, prey and habitat choice, home range size, dispersal, effects of forestry, causes of mortality, etc.

Activities:

7.1 Ensure continuation of existing monitoring programs (population/migration)
7.2 Establish monitoring of selected species (cf. Table 10)
7.3 Survey breeding sites of Category 1 and 2 and flagship species
7.4 Sample life history data incl. survival, dispersal and turnover rates

7.5 Continue monitoring of important prey organisms
7.6 Encourage studies on population density, size and trends for species where information about this is insufficient
7.7 Encourage studies on home range, nomadic movements and migration routes, to improve management and estimates of populations shared with other countries
7.8 Identify threats to species/populations in decline
7.9 Investigate effects of energy infrastructure on bird of prey mortality
7.10 Establish a national database on the causes of bird of prey mortality (incl. infrastructure mortality, poisoning), including determination of the species involved
7.11 Establish a national database on bird of prey killed under permission to prevent damage/economic loss
7.12 Continue monitoring programs on toxic chemicals and their impacts on birds of prey, implement appropriate measures
7.13 Review relevant literature concerning threats and conservation of birds of prey in Norway
7.14 Assess the scale of harvest of prey organisms and investigate implications for bird of prey populations
7.15 Assess and address impacts of habitat loss (incl. overgrowing) and habitat protection on bird of prey populations
7.16 Encourage studies on how birds of prey adapt to human activities
7.17 Carry out research into the effects of climate change on birds of prey and important prey organisms
7.18 Encourage studies on the effects of grazing livestock on flora and fauna
7.19 Encourage studies on the positive aspects of birds of prey conservation

5.9 Conserve selected species

The Eurasian Eagle Owl is currently the only bird of prey with a national Single Species Action Plan (Norwegian Environment Agency 2009). A scientific report on the biology and threats to Norwegian Snowy Owls was published in 2014 (Jacobsen et al. 2014), intended to form the basis of a future national Single Species Action Plan for this species.

Activities:

8.1 Prepare a national Single Species Action Plan for the conservation of Snowy Owl
8.2 Implement conservation programs (e.g. action plans) for rare and threatened species (Northern Goshawk, Gyrfalcon, Snowy Owl)
8.3 Regularly revise existing conservation programs/action plans to evaluate implementation and relevant measures
8.4 Establish a quality standard for Category 1 and 2 and flagship species of Norway

5.10 Raise awareness of problems faced by raptors and measures needed to conserve them

Awareness among the general public and experts is important to exercise political pressure, as well as to educate and inform managers and decision makers. Effective tools in this regard are media campaigns as well as school campaigns. Few such campaigns have been implemented in recent years, although NGOs are continuously working to raise awareness of problems faced by birds of prey and measures needed to conserve them. During the 1970s and 1980s several awareness campaigns focused on the problem of environmental crime directed towards birds of prey, including the collection of eggs and chicks, and collecting for taxidermy purposes. Golden Eagle has received significant attention in recent years, due to conflicts with interest groups such as farmers and other holders of grazing livestock. Several awareness campaigns have been carried out by NGOs related to this.

Activities:

9.1 Develop awareness programs within the general public as well as authorities/interest groups (forestry, agriculture, etc.) to inform about bird of prey biology, status and conservation
9.2 Develop educational resources to inform children, schools and families about birds of prey
9.3 Organise regional and national training workshops to improve skills in the monitoring of birds of prey
9.4 Inform about important bird of prey sites and their conservation through media, leaflets and information boards
9.5 Raise awareness of activities that devalue/destroy bird of prey habitats
9.6 Raise awareness of activities causing disturbance to birds of prey and how to avoid them
9.7 Inform about the negative impacts of lead ammunition (and fishing weights) and contamination of birds of prey and the environment

5.11 International cooperation

As a Signatory of the CMS Raptors MoU, as well as other relevant international Agreements, Norway recognizes the importance of international cooperation and regulations to protect birds of prey and their habitats. Participation at Signatory meetings, as well as other international conferences and seminars, has been and will continue to be important to improve this work.

Activities:

10.1 Engage with range states to list all threatened birds of prey to CMS Appendix I
10.2 Ensure the participation of Norway in the Raptor MoU Signatory meetings
10.3 Promote the development and extension of single- or multispecies international action plans for all globally threatened birds of prey
10.4 Encourage and facilitate trans-boundary measures to protect important areas and flyways
10.5 Establish flyway-scale monitoring networks comprising a representative range of sites where systematic and coordinated monitoring of breeding populations, reproductive success and migration numbers can be undertaken
10.6 Improve international cooperation through conferences, seminars and workshops
10.7 Ensure continuation of Norwegian initiatives such as the International Snowy Owl Working Group (ISOWG)

5.12 Supporting measures

§ 4 of the Animal Welfare Act states that "anybody who discovers an animal which is obviously sick, injured, or helpless, shall as far as possible help the animal", and further: "If it is obvious that the animal will not survive or recover, the person who discovered the animal may kill it at once". However, judging whether an animal is fatally wounded may be difficult or even impossible. One could therefore argue that decisions about rehabilitation or killing should always be taken by professionals. Yet, the legal instruments in Norway enables anyone who finds sick or injured wildlife to make such judgement. Currently, most birds of prey that are sick, injured or helpless, are probably killed immediately. How many individuals that are killed in this way is unknown (Grønlien 2018). There are at present no governmental approvals or regulations for the rehabilitation of injured or sick individuals, and no official rehabilitation institutions are established. All current rehabilitation facilities are run on an entirely voluntary basis.

11.1 Establish a network of rehabilitation institutions for birds of prey across Norway under governmental control

11.2 Leave assessment of sick and injured individuals to professionals for correct species determination, diagnosis and prognosis before decisions about rehabilitation or killing are taken

11.3 Establish regulations, guidelines and protocols to register rehabilitation facilities and ensure that these are adhered to

11.4 Rehabilitate all CMS Category 1 and 2 species, and flagship species of Norway

The Snowy Owl is among the most threatened birds of prey breeding in Norway, and the preparation of a national Single Species Action Plan for the conservation of the species should be of high priority. Ensuring the continuation of initiatives such as the International Snowy Owl Working Group is also of high importance. Photo: Ingar Jostein Øien

Table 9. Recommended activities of the Norwegian strategic conservation guidelines for raptors and owls. Principal Activity References according to Activity Codes in Table 2 of the Raptors MoU is indicated in brackets for each activity. BoP: Birds of Prey, Auth.: Authorities.

Act. ID	Objective Activity	Priority[1]	Time schedule[2]	Feasibility	Specific stakeholders
1	**Habitats conservation and sustainable management**				
1.1	Survey, maintain and restore natural habitats (incl. wetlands and old forest) in the range of threatened species, including former habitats (4.3.1)	High	Ongoing	Medium	Auth., public
1.2	Protect > 10 % of productive forest in Norway prioritizing old forest habitats (4.3.1)	High	Long term	Medium	Auth., landowners
1.3	Take into account the maintenance of important BoP habitats in management plans for protected areas	Medium	Ongoing	High	Auth., researchers
1.4	Define upper limits on the number of grazing livestock in protected areas and other important habitats	Medium	Medium	Medium	Auth., landowners, farmers
1.5	Reduce logging activity during the breeding season	Medium	Ongoing	High	Auth., forestry
1.6	Prevent clear felling of old forest	Medium	Short term	Medium	Auth., forestry
1.7	Require a minimum (25 %) of old forest stands to be spared during logging in woodland territories of BoP	Low	Medium	Medium	Auth., forestry
1.8	Intensify removal of introduced (alien) tree species	Low	Ongoing	High	Auth., forestry
1.9	Stop governmental subsidising of infrastructure and activity threatening BoP habitats	Medium	Short term	Medium	Auth., forestry
1.10	Promote establishment of tranquillity zones in important breeding areas to reduce disturbance, and take these into account in the planning of trekking paths, roads, tracks, etc.	High	Ongoing	High	Auth., public
1.11	Taking the needs of conservation of BoP more into account in sectors and policies including agriculture, forestry, fisheries, industries, tourism, energy, chemicals and pesticides (4.3.4)	High	Medium	High	Auth., farmers, forestry, fisheries, industries, tourism, energy suppliers, etc.
1.12	Include the protection of (threatened) BoP habitat in governmental land use management, and increase the opportunities of the County Governor to interfere in local development plans	High	Short term	Medium	Auth., landowners, public
1.13	Keep harvest of prey species at a sustainable level, e.g. by restrictions on the hunting season and on the hunting in protected areas	Medium[†]	Ongoing	High	Auth., landowners, hunters
1.14	Increase food supply by protecting productive Galliformes habitats from hunting	Medium	Long term	Medium	Auth., landowners, hunters
2	**Protect/manage important sites**				
2.1	Survey, recognize and conserve key breeding and wintering sites (4.2.1)	High	Ongoing	High	Auth., landowners, experts
2.2	Designate sites of national/international importance as protected areas with management plans (4.2.1)	High	Long term	Medium	Auth., landowners
2.3	Undertake EIAs for projects potentially impacting sites holding significant populations of Category 1 and 2 and flagship species, including organized recreation and recreational activities (4.2.2)	High	Ongoing	High	Auth.
2.4	Improve requirements for EIAs associated with the establishment of infrastructure, and for follow-up studies	Medium	Short term	High	Auth.
2.5	Conduct risk analysis at important sites to identify and address actual or potential causes of mortality (4.2.3)	Medium	Ongoing	High	Auth., researchers
2.6	Identify and designate important flyways/bottlenecks for BoP migration (4.2.1)	Medium	Medium	High	Auth., researchers, experts
2.7	Consider implementation of temporary wildlife zones or protective areas during the breeding season to protect important sites	Medium	Short term	Medium	Auth., experts
2.8	Consider announcing selected nest sites publically to reduce pressure on others	Low	Ongoing	High	Auth., experts
2.9	Increase breeding opportunities by construction of artificial nest sites and clearing of overgrown sites	Low	Ongoing	High	Auth., experts

Act. ID	Objective Activity	Priority[1]	Time schedule[2]	Feasibility	Specific stakeholders
2.10	Strengthen environmental surveillance to prevent disturbance at important sites, consider video surveillance at sites of particular importance	High	Short term	High	Auth.
3	**Improve legal protection**				
3.1	Review relevant legislation and take steps to make sure that it requires all new power lines to be designed to avoid BoP electrocution (4.1.3)	Medium	Short term	High	Auth., energy suppliers
3.2	Strengthen legal requirements to protect BoP nests and roost sites from damage and deliberate disturbance (incl. photography) (4.1.1)	High	Short term	High	Auth., forestry, outdoor activists, nature photographers
3.3	Legally manifest the protection of bird of prey nest sites with relevant buffer zones in forestry, and extend the “five-year rule” to a “ten-year-rule” on the preservation of nests	Low	Short term	High	Auth., forestry
3.4	Ban the use of introduced (alien) species in forestry	Medium	Medium	Medium	Auth., forestry
3.5	Specify special requirements for environmental assessments in planned logging areas, incl. legal obligation to search for BoP nest sites before logging	Medium	Short term	High	Auth., forestry, landowners
3.6	Review relevant legislation and take steps where possible to ban the use of chemicals causing significant avian mortalities (4.1.2)	High	Ongoing	High	Auth., researchers
3.7	Strengthen application of legal protection by ensuring appropriate penalties (4.1.4)	Low	Short term	High	Auth.
3.8	Identify gaps in existing Multi-lateral Environmental Agreements (MEAs) where BoP protection and conservation can be improved and draw these to the attention of the relevant Secretariat and other Parties (4.1.5)	High	Ongoing	High	Auth., experts
3.9	Ban the use of lead ammunition for hunting purposes	Medium	Immediate	High	Auth., hunters
3.10	Review the self-defence clause (§ 17) of the Nature Diversity Act and prevent the killing of Category 1 and 2 and flagship species, or of individuals in circumstances where this is not “deemed necessary”	Low	Immediate	High	Auth., public, farmers
3.11	Review the regulation relating to killing of wildlife that cause damage, etc., and make steps to prevent the killing of birds of prey.	Low	Immediate	High	Auth., landowners, farmers, public
3.12	Restrict motorised traffic on uncultivated land and in watercourses in order to reduce disturbance to important sites	Medium	Short term	High	Auth., landowners, farmers, tourist industry, public
3.13	Review relevant legislation to prevent the killing of sick or injured birds of prey without the considerations of professionals	Low	Short term	High	Auth., public
3.14	Review relevant legislation and take steps to make sure that it is in accordance with international agreements	High	Immediate	High	Auth., NGOs
4	**Reduce infrastructure mortality**				
4.1	Survey power lines and poles to identify critical points with respect to electrocution/collision risk	Medium	Medium	High	Auth., energy suppliers, railways
4.2	Ensure that existing power lines posing the greatest risk to BoP are modified to avoid electrocution/collision (4.3.2)	Medium	Medium	Medium	Auth., energy suppliers, railway administrators
4.3	Ensure that all new power lines are constructed to avoid electrocution of birds of prey	High	Ongoing	High	Auth., Energy suppliers
4.4	Reduce collision risk along existing power lines (marking, ground cabling, etc.)	Low	Medium	Medium	Auth., energy suppliers
4.5	Prevent wind power plants at important migration, staging and breeding sites	High	Ongoing	Medium	Auth., experts
4.6	Request for shutdown or removal of lethal wind turbines during critical periods (e.g. during migration)	Low	Ongoing	High	Auth., wind power plant operators

Act. ID	Objective Activity	Priority[1]	Time schedule[2]	Feasibility	Specific stakeholders
4.7	Prepare and implement mitigation measures to reduce collision risk at roads, railways and airports	Medium	Ongoing	Medium	Auth., road and railway admin., AVINOR
4.8	Conduct Strategic Environmental Assessments of planned significant infrastructure developments within major flyways to identify key risk areas (4.2.4)	Medium	Ongoing	High	Auth., researchers, NGOs
4.9	Identify critical points for collisions with birds of prey on the Dovre railway line and carry out protective measures (e.g. reduced speed)	Medium	Short term	High	Auth., researchers, railway administrators
5	**Prevent poisoning**				
5.1	Reduce pesticide use, incl. rodenticides and insecticides	High	Ongoing	High	Auth., farmers, forest enterprisers, public
5.2	Continue to tighten regulations and discharge requirements for industries and commerce	Medium	Ongoing	High	Auth., industries
5.3	Uphold the ban on carbofuran and similar chemicals	High	Ongoing	High	Auth., farmers
5.4	Raise awareness of the negative impacts of certain pesticides on BoP and other wildlife, promote safer alternatives	Medium	Ongoing	Medium	Auth., NGOs, forest enterprisers, farmers
5.5	Campaign to ban the use of lead ammunition for hunting purposes	Medium	Immediate	High	Auth., hunters
5.6	Uphold the ban on the use of human drugs (incl. diclofenac, etc.) in veterinary medicine, to prevent these entering the food chain	Medium	Ongoing	High	Auth., veterinarians, farmers
6	**Prevent illegal persecution**				
6.1	Develop strategies and mechanisms to ensure consistent prosecution of environmental crime	Medium	Medium	Medium	Auth., poachers
6.2	Promote investigations of the extent of persecution and potential effects on birds of prey	High	Ongoing	High	Auth.
6.3	Educate and inform game wardens, police and courts about environmental crime towards BoP (4.1.4, 4.4.2)	Medium	Medium	Medium	Auth., poachers
6.4	Strengthen environmental surveillance to prevent and uncover persecution incidents (4.1.4)	High	Short term	High	Auth.
6.5	Increase public awareness of environmental crime, and how to look for and report suspicious activity (4.1.4)	Medium	Ongoing	Medium	Auth., hunters, poachers, public
6.6	Educate farmers about livestock mortality caused by BoP and how to prevent it	Low	Ongoing	Medium	Auth., farmers
6.7	Educate hunters about mortality of quarry species caused by BoP and their role in the ecosystem	Medium	Ongoing	Medium	Auth., hunters
6.8	Ensure proper routines and agreements to prevent the spreading of sensitive information	High	Ongoing	High	Auth., poachers
7	**Monitoring and research**				
7.1	Ensure continuation of existing monitoring programs (population/migration) (4.5.1/4.5.2)	High	Ongoing	High	Auth., researchers, experts
7.2	Establish monitoring of selected species (cf. Table 10)	High	Medium	Medium	Auth., researchers, experts
7.3	Survey breeding sites of Category 1 and 2 and flagship species	High	Ongoing	Medium	Auth., researchers, experts
7.4	Sample life history data incl. survival, dispersal and turnover rates	High	Ongoing	Medium	Auth., researchers, experts
7.5	Continue monitoring of important prey organisms	High	Ongoing	High	Auth., researchers
7.6	Encourage studies on population density, size and trends for species where information about this is insufficient	Medium	Ongoing	High	Auth., researchers
7.7	Encourage studies on home range, nomadic movements and migration routes, to improve management and estimates of populations shared with other countries	High	Ongoing	High	Auth., researchers
7.8	Identify threats to species/populations in decline	High	Ongoing	Medium	Auth., researchers
7.9	Investigate effects of energy infrastructure on BoP mortality (4.5.5)	High	Medium	High	Auth., researchers, energy suppliers

Act. ID	Objective Activity	Priority[1]	Time schedule[2]	Feasibility	Specific stakeholders
7.10	Establish a national database on the causes of BoP mortality (incl. infrastructure mortality, poisoning), including determination of the species involved	Medium	Immediate	High	Auth., energy suppliers, traffic administrators, researchers
7.11	Establish a national database on BoP killed under permission to prevent damage/economic loss	Low	Immediate	High	Auth., public
7.12	Continue monitoring programs on toxic chemicals and their impacts on BoP, implement appropriate measures (4.5.4)	High	Ongoing	High	Auth., researchers
7.13	Review relevant literature concerning threats and conservation of birds of prey in Norway	Medium	Short term	High	Auth., researchers
7.14	Assess the scale of harvest of prey organisms and investigate implications for BoP populations (4.5.8)	Medium[†]	Medium	Medium	Auth., researchers
7.15	Assess and address impacts of habitat loss (incl. overgrowing) on BoP populations (4.5.3)	Medium	Medium	Medium	Auth., researchers
7.16	Encourage studies on how birds of prey adapt to human activities	High	Short term	High	Auth., researchers
7.17	Carry out research into the effects of climate change on BoP and important prey organisms (4.5.10)	Medium	Ongoing	High	Auth., researchers
7.18	Encourage studies on the effects of grazing livestock on flora and fauna	High	Ongoing	High	Auth., researchers
7.19	Encourage studies on the positive aspects of birds of prey conservation	Low	Ongoing	High	Auth., researchers
8	**Conserve selected species**				
8.1	Prepare a national Single Species Action Plan for the conservation of the Snowy Owl	High	Immediate	High	Auth., researchers, experts, NGOs
8.2	Implement conservation programs (e.g. action plans) for rare and threatened species (Northern Goshawk, Gyrfalcon, Snowy Owl)	High	Medium	High	Auth., researchers, experts, NGOs
8.3	Regularly revise existing conservation programs/action plans to evaluate implementation and relevant measures	High	Ongoing	High	Auth., experts
8.4	Establish a quality standard for Category 1 and 2 and flagship species of Norway	Medium	Short term	High	Auth., researchers, experts, NGOs
9	**Raise public awareness**				
9.1	Develop awareness programs within the general public as well as auth./interest groups (forestry, agriculture, etc.) to inform about BoP biology, status and conservation (4.4.1/4.4.2/4.4.6)	Medium	Medium	Medium	Auth., experts, NGOs, other interest groups
9.2	Develop educational resources to inform children, schools and families about BoP (4.4.3)	Medium	Medium	Medium	Auth., experts, NGOs, public
9.3	Organise regional and national training workshops to improve skills in the monitoring of BoP (4.4.5)	Low	Ongoing	High	Auth., experts, NGOs
9.4	Inform about important BoP sites and their conservation through media, leaflets and information boards (4.4.4/4.4.6)	Medium	Medium	High	Auth., experts, NGOs, public
9.5	Raise awareness of activities that devalue/destroy BoP habitats (4.4.1/4.4.2)	Medium	Ongoing	Medium	Auth., experts, NGOs, public
9.6	Raise awareness of activities causing disturbance to BoP and how to avoid them (4.4.1/4.4.2)	Medium	Medium	Medium	Auth., experts, NGOs, public
9.7	Inform about the negative impacts of lead ammunition and contamination of BoP and the environment (4.4.1/4.4.2)	Medium	Medium	High	Auth., experts, NGOs, public

10	**International cooperation**				
10.1	Engage with range states to list all threatened BoP to CMS Appendix I	High	Ongoing	High	Auth., experts, NGOs
10.2	Ensure the participation of Norway in the Raptor MoU Signatory meetings	High	Ongoing	High	Auth.
10.3	Promote the development and extension of single- or multispecies international action plans for all globally threatened BoP (4.6.2)	High	Ongoing	High	Auth., NGOs
10.4	Encourage and facilitate trans-boundary measures to protect important areas and flyways	Medium	Ongoing	High	Auth., experts, NGOs
10.5	Establish flyway-scale monitoring networks comprising a representative range of sites where systematic and coordinated monitoring of breeding populations, reproductive success and migration numbers can be undertaken (4.5.1)	Medium	Medium	Medium	Auth., researchers, experts, NGOs
10.6	Improve international cooperation through conferences, seminars and workshops (4.6.3)	Medium	Ongoing	Medium	Auth., researchers, experts, NGOs
10.7	Ensure continuation of Norwegian initiatives such as the International Snowy Owl Working Group	High	Ongoing	High	Auth., researchers, experts, NGOs
11	**Supporting measures**				
11.1	Establish a network of rehabilitation institutions for birds of prey across Norway under governmental control	Low	Long term	Medium	Auth., NGOs
11.2	Leave assessment of sick and injured individuals to professionals for correct species determination, diagnosis and prognosis before decisions about rehabilitation or killing are taken	Low	Short term	High	Auth., experts, veterinarians, public
11.3	Establish regulations, guidelines and protocols to register rehabilitation facilities and ensure that these are adhered to	Low	Short term	High	Auth., NGOSs, experts, veterinarians, public
11.4	Rehabilitate all CMS Category 1 and 2 species, and flagship species of Norway	Low	Medium	Medium	Auth., NGOs

[1]: **First** - an activity needed to prevent global extinction of a species (not relevant in Norway). **High** (CMS Guidelines: Second) - an activity needed to prevent, or reverse population declines in any globally threatened or Near Threatened species, or the majority of other species with an Unfavourable Conservation Status. **Medium** (CMS Guidelines: Third) - an activity needed to restore populations of a globally threatened or Near Threatened species, or to prevent population declines in any species with an Unfavourable Conservation Status. **Low** (CMS Guidelines: Fourth) - an activity needed to restore populations in any species with an Unfavourable Conservation Status, or to prevent population declines in any species with a Favourable Conservation Status

[2]: **Immediate** - an activity expected to be completed within two years. **Short term** - an activity expected to be completed within three years. **Medium** - an activity expected to be completed within five years. **Long term** - an activity expected to be completed within seven years. **Ongoing** - an activity expected to be undertaken throughout the period that the MoU is effective for that Signatory.

[†]: Of "**High**" priority given listing of Snowy Owl as a Category 1 species in the Action Plan of the CMS Raptors MoU

6 LEGISLATION RELEVANT TO RAPTOR AND OWL CONSERVATION

6.1 Habitat loss

(1) Nature Diversity Act
(2) Convention on Migratory Species (CMS, Bonn Convention)
(3) Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention)
(4) Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)
(5) Forestry Act
(6) Planning and Building Act
(7) Energy Act

6.2 Loss of nest sites

(1) Nature Diversity Act
(2) Forestry Act
(3) Planning and Building Act
(4) Energy Act
(5) Convention on Migratory Species (CMS, Bonn Convention)

6.3 Forestry

(1) Forestry Act
(2) Nature Diversity Act

6.4 Human disturbance

(1) Nature Diversity Act
(2) Outdoor Recreation Act
(3) Forestry Act
(4) Act relating to governmental nature surveillance
(5) Act relating to motor traffic on uncultivated land and in watercourses
(6) Wildlife Act

6.5 Hunting and persecution

(1) Wildlife Act
(2) Nature Diversity Act

6.6 Infrastructure

(1) Planning and Building Act
(2) Energy Act
(3) Convention on Migratory Species (CMS, Bonn Convention)

6.7 Environmental pollutants

(1) Pollution Control Act
(2) The Stockholm Convention on Persistent Organic Pollutants

6.8 Overgrazing

(1) Nature Diversity Act

6.9 Lack of food

(1) Nature Diversity Act
(2) Wildlife Act

6.10 Climate change

(1) Convention on Climate Change

6.11 Lack of knowledge

(1) Freedom of Information Act
(2) Environmental Information Act
(3) Public Administration Act
(4) Nature Diversity Act

7 EXISTING AND POTENTIAL SOURCES OF FUNDING

Estimating the cost of implementing the prioritised activities is beyond the scope of these guidelines. Budgets and fundraising plans for each selected measure need to be developed. Generally, budgeting and fundraising should primarily be driven by stakeholders "responsible" for the relevant activities ("polluter pays" principle). This involves public as well as private sectors, including forestry, tourism, energy production and agriculture.

Monitoring and research usually involve governmental funding through national and local authorities, as do several of the other activities and measures recommended in this document. However, the broad spectrum of threats and suggested measures involves a great variety of interest groups and sectors (Table 8), which makes funding from several different financial mechanisms possible. Some activities may also be (and already are) carried out by volunteers (NGOs and BirdLife Norway in particular), such as field surveys, smaller scale monitoring, restoration and construction of nest sites and the raising of public awareness. Trust and foundations may also support measures financially on a regional or local scale.

8 IMPLEMENTATION OF ACTIVITIES

The Norwegian Government, as well as the counties and municipalities, are primarily responsible for the implementation of the management priorities recommended in these strategic guidelines. Interest groups and NGOs may also play an important supportive role. However, the establishment of a coordination unit, e.g. a reference group, is recommended to guide the implementation of activities, and to bring together the different groups involved in the research and conservation of birds of prey. A reference group should be coordinated by the Norwegian Environment Agency and be composed of representatives from BirdLife Norway, the Norwegian Institute for Nature Research (NINA) and others working with these issues.

The merlin is one example of a species with insufficient knowledge about population size and population trend in Norway. Photo: Børre Østensen

9 FURTHER RESEARCH

9.1 Monitoring

Knowledge of population size and trends is still lacking for certain birds of prey species in Norway, including almost all breeding Category 2 species (Table 10). Dispersal, migration and wintering of species such as Honey Buzzard and Eurasian Hobby require further investigation, both nationally and internationally.

As pointed out in Chapter 5, continuation of existing monitoring programs should be afforded high priority, as well as the establishment of monitoring of new species not presently covered by current monitoring programs. For some species, such as Osprey, Gyrfalcon and Peregrine Falcon, several regional projects already exist, and coordination/merging of those into national projects would probably be feasible. The Gyrfalcon is currently monitored through the TOV Program but may be a relevant candidate for Governmental monitoring coordinated by the Norwegian Environment Agency, as already established for Golden Eagle and Eurasian Eagle Owl. Additionally, there is a need for better data on population trends for all CMS Category 2 species as well as some CMS Category 3 species (Table A1, Annex 1).

Continuation of existing monitoring programs of important prey organisms such as lemming and other rodents, and Galliformes is also critical. Additionally, the establishment of monitoring programs for important insect prey such as dragonflies and bees should be considered. Monitoring of levels of toxic chemicals in birds of prey eggs and tissue (feathers) is also of high importance, and continuation of existing programs should also be a priority. Collection of feather samples during ringing or other nest visits is important in order to better understand kinship between and movements of individuals. DNA profiles from collected samples could also be used to uncover wildlife crime such as the true origins of birds kept in captivity and falconer birds.

A scheme to measure the loss of habitats in important breeding and hunting areas is presently lacking but would be beneficial for proper planning of land use. In order to obtain an overview of trends and extent of birds of prey mortality caused by anthropogenic sources, a national database should be established to register such events. This should include individuals killed by power lines (incl. electrocution), wind turbines, cars, trains and environmental pollutants, as well as those confirmed killed illegally or by legal permission to prevent damage/economic loss.

9.2 Conservation research

Few birds of prey currently benefit from targeted nationwide conservation measures, except from the general protection of all species and their habitats under the Natural Diversity Act. The Eurasian Eagle Owl is one of few exceptions, as the only species with a national Single Species Action Plan (Norwegian Environment Agency 2009). In some regions, owls and a few raptors benefit from a great number of nesting boxes and platforms erected by enthusiasts, including Great Grey Owl, Boreal Owl, Tawny Owl, Ural Owl and Common Kestrel. Artificial nests have also been constructed for several species, notably the Gyrfalcon. Several regional and local projects are working closely together with the forestry industry to reduce damage to forest dwelling species such as the Northern Goshawk.

For some migratory birds of prey in Norway we know very little about dispersal, migration and wintering areas. One of these is the Eurasian Hobby, which breeds in the southeast of Norway. Knowledge of the Norwegian population size and trends is also still insufficient for this species. Photo: Børre Østensen

However, to pinpoint birds of prey conservation, research is needed to identify threats and their significance and to develop and implement effective conservation measures. Areas of focus include investigations on the effects of human disturbance (incl. trekking, skiing, tourism, snowmobiles, etc.) on bird of prey productivity, nest site fidelity, etc., effects of energy infrastructure on birds of prey mortality and populations, assessment of the impacts of harvest of prey organisms (Galliformes in particular), as well as the impacts of toxic chemicals, habitat loss and climate change.

9.3 International cooperation

Strengthening international cooperation is invaluable for the research and conservation of species moving across national borders. An effective tool to accomplish this is the establishment of international species working groups or committees, administrated by lead coordinators and open for participation by all interested parts representing their country of interest. International species working groups may be established under the CMS Raptors MoU. Relevant priorities will be to:

1) Establish flyway-scale monitoring networks comprising a representative range of sites where systematic and coordinated monitoring of breeding populations, reproductive success and migration numbers can be undertaken (Activity 10.5)

2) Share research results and knowledge through conferences, seminars and workshops (Activity 10.6).

3) Prepare International Single Species Action Plans if relevant for the species in question.

Under this it is also of high importance to ensure the continuation of Norwegian initiatives such as the International Snowy Owl Working Group (ISOWG) (Activity 10.7).

Table 10. The most apparent knowledge gaps with respect to Norwegian raptor and owl populations.

Knowledge gap	Involved species	Importance
Population size and trend	Category 2 species: all, Eurasian Sparrowhawk, Merlin, Northern Hawk Owl, Eurasian Pygmy Owl, Tawny Owl, Boreal Owl	Medium
Population dynamics (survival, recruitment, genetic structure, population viability analyses)	Category 2 species: all, flagship species: all except Golden Eagle	High
Habitat use and selection	European Honey Buzzard, Western Marsh Harrier, Hen Harrier, Common Buzzard, Merlin, Eurasian Hobby, Gyrfalcon, Peregrine Falcon, Long-eared Owl, Short-eared Owl	High
Dispersal, migration and wintering	European Honey Buzzard, Western Marsh Harrier, Hen Harrier, Eurasian Hobby, Gyrfalcon, Eurasian Pygmy Owl	Medium
Nomadic movements	Gyrfalcon, Northern Hawk Owl, Ural Owl, Long-eared Owl, Short-eared Owl	Medium
Impact of threats	All CMS Category 1, 2 and flagship species	High
Research and conservation methods	European Honey Buzzard, Northern Goshawk, Gyrfalcon	Medium
Effectiveness of conservation	Eurasian Eagle Owl	Medium
Database for fatal causalities	All species	High
Sensitivity to wind power	All species	High
Extent of persecution	White-tailed Eagle, Hen Harrier, Northern Goshawk, Golden Eagle, Eurasian Eagle Owl, Snowy Owl	Local

10 CONCLUSIONS

The present guidelines present the status of birds of prey and their habitats in Norway, summarise the threats, and recommend relevant management and conservation measures to be implemented. The overall aim is to conserve and strengthen all populations of regularly breeding raptor and owl species in Norway. The proposed measures focus on general threats to birds of prey rather than specific threats to single species.

Although there are few globally red listed species regularly occurring in Norway, the country is highly important to several species, including seven with an Unfavourable Conservation Status at a regional level. In addition, Norway holds more than 25 % of the European breeding population of five raptor species, namely White-tailed Eagle, Rough-legged Buzzard, Merlin, Gyrfalcon and Short-eared Owl. However, a general lack of research and monitoring focusing on certain species prevent the implementation of targeted protective measures.

Despite large areas of relatively unspoiled nature, birds of prey in Norway face a number of threats, most of which are related to human pressure on their habitats. Among the major problems are forestry, habitat loss through the development of wind energy and other infrastructure, lack of food (human induced and natural), as well as human disturbance related to recreational and developmental activity. The Norwegian legal framework provides reasonably good protection for birds of prey. Enforcement of the relevant legislation could, however, almost certainly be improved.

In order to improve the conservation status of birds of prey breeding in Norway, their protection and requirements must be taken more into consideration in management and planning processes. This implies knowledge of important sites and habitats, as well as general biology, among local as well as regional managers and authorities, which must be ensured through field surveys, data access to the relevant persons and collaborative initiatives between managers and other authorities, enterprises and experts.

Despite a low human population and large areas of unspoiled nature, birds of prey breeding in Norway face several threats. With the aim to conserve and strengthen all populations of regularly breeding raptor and owl species in Norway, this report recommends relevant management and conservation measures that ought to be implemented. Photo: Børre Østensen

11 REFERENCES

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Annex 1

Table A1. Summary of conservation status and population size and trends for CMS Category 1 and 2 species of birds of prey regularly occurring in Norway.

Common name	Scientific name	National legal status	National cons. status[1]	National status[2]	Breeding population size[3]	Migration numbers[4]	National trend[5]	Trend period	Is the species monitored?	National Action Plan?
Pallid Harrier	*Circus macrourus*	Protected	-	PM, V	0-5 P (G)	50-150 (G)	-	2010-20	-	No
Red Kite	*Milvus milvus*	Protected	-	PM, V	0-5 P (G)	20-50 (G)	-	2010-20	-	No
European Honey Buzzard	*Pernis apivorus*	Protected	U	RB	500-1000 P (M)	U	U	2010-20	Locally	No
Hen Harrier	*Circus cyaneus*	Protected	U	RB	25-140 P (M)	U	U	2010-20	Occasionally	No
Common Kestrel	*Falco tinnunculus*	Protected	F	RB	3000-10000 P (M)	U	U	2010-20	Locally	No
Eurasian Hobby	*Falco subbuteo*	Protected	U	RB	145-230 P (M)	U	U	2010-20	Occasionally	No
Snowy Owl	*Bubo scandiacus*	Protected	U	RB	< 100 P (G)	50-100 (M)	S	2010-20	Annually	No
Long-eared Owl	*Asio otus*	Protected	F	RB	1500-8000 P (P)	U	U	2010-20	No	No
Short-eared Owl	*Asio flammeus*	Protected	F	RB	1000-5000 P (M)	U	U	2010-20	No	No

[1]National conservation status: F: Favourable, U: Unfavourable, [2]National or Regional status: RB: Regular breeder, OB: Occasional breeder, PM: Passage migrant, V: Vagrant [3]P: pairs, data quality: Good (G) = Reliable quantitative data available (eg atlas, survey or monitoring data) for the whole period, Medium (M) = generally well known, but only poor or incomplete quantitative data available, Poor (P) = Poorly known with no quantitative data available, [4]Migration numbers: number of individuals, data quality: Good (G), Medium (M), Poor (P), Unknown (U), [5]National (breeding population) trend – S: Stable (<10% decline and <10% increase), U: Unknown (insufficient data).

Table A2. Important habitats for raptors and owls regularly occurring in Norway. Importance: C – Critical, H – High, M – Medium, Lw – Low, L – Local, N – None or negligible.

Common name	Scientific name	Important habitats												
		Boreal Forest	Subarctic Forest	Temperate Forest	Subarctic Shrubland	Tundra	Subarctic Grassland	Wetlands (inland)	Rocky Areas	Marine Coastal	Arable land	Pasture land	Plantations	Urban areas
Category 1 species														
Pallid Harrier	*Circus macrourus*	Lw	Lw	N	Lw	H	M	H	N	Lw	M	M	N	N
Red Kite	*Milvus milvus*	Lw	Lw	M	N	N	N	M	N	N	M	H	Lw	Lw
Category 2 species														
European Honey Buzzard	*Pernis apivorus*	M	M	C	N	N	N	Lw	N	N	H	H	Lw	Lw
Hen Harrier	*Circus cyaneus*	N	N	N	H	M	M	C	N	N	M	M	N	N
Common Kestrel	*Falco tinnunculus*	M	M	Lw	M	H	M	M	H	L	M	M	Lw	Lw
Eurasian Hobby	*Falco subbuteo*	Lw	Lw	H	N	N	N	C	Lw	N	M	M	M	L
Snowy Owl	*Bubo scandiacus*	N	N	N	Lw	C	M	M	H	M	Lw	Lw	N	N
Long-eared Owl	*Asio otus*	Lw	M	M	N	N	M	M	N	N	H	H	H	Lw
Short-eared Owl	*Asio flammeus*	M	M	N	H	H	H	C	N	Lw	M	H	N	N
Category 3 species														
White-tailed Eagle	*Haliaeetus albicilla*	N	Lw	M	Lw	M	M	M	H	C	Lw	M	Lw	Lw
Western Marsh Harrier	*Circus aeruginosus*	N	N	N	N	N	N	C	N	N	H	H	N	N
Northern Goshawk	*Accipiter gentilis*	H	H	H	Lw	N	Lw	H	N	Lw	M	Lw	L	L
Eurasian Sparrowhawk	*Accipiter nisus*	H	H	H	Lw	N	Lw	M	N	Lw	H	M	H	H
Common Buzzard	*Buteo buteo*	H	H	H	N	N	N	M	Lw	N	H	M	Lw	Lw
Rough-legged Buzzard	*Buteo lagopus*	H	M	Lw	H	C	M	M	H	Lw	M	M	N	N
Golden Eagle	*Aquila chrysaetos*	H	H	M	M	H	H	M	H	L	L	L	N	N
Osprey	*Pandion haliaetus*	H	H	H	N	N	N	C	N	N	Lw	N	Lw	N
Merlin	*Falco columbarius*	H	H	Lw	H	M	M	M	H	Lw	L	L	N	Lw
Gyrfalcon	*Falco rusticolus*	N	N	N	M	C	M	H	C	L	L	L	N	N

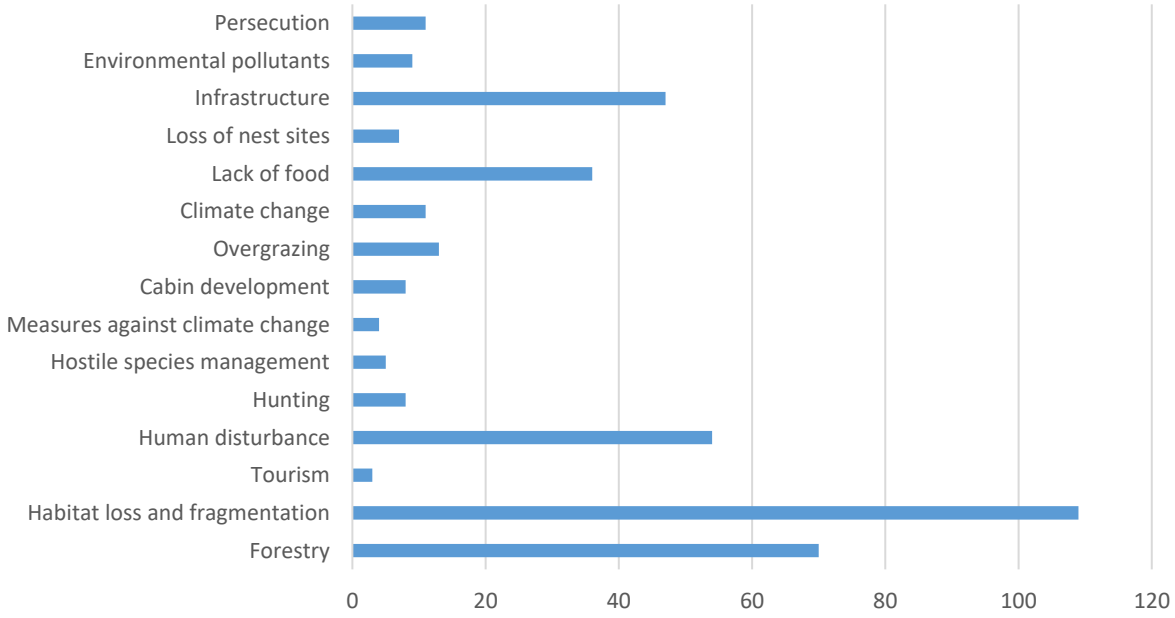
Peregrine Falcon	*Falco peregrinus*	Lw	Lw	Lw	Lw	Lw	M	H	C	H	H	M	N	M
Northern Hawk Owl	*Surnia ulula*	H	H	Lw	M	Lw	Lw	Lw	N	Lw	Lw	M	Lw	N
Ural Owl	*Strix uralensis*	H	M	H	N	N	N	H	N	N	Lw	Lw	N	Lw
Great Grey Owl	*Strix nebulosa*	H	H	M	N	N	N	M	N	N	M	M	N	N
Boreal Owl	*Aegolius funereus*	H	H	M	N	N	N	Lw	N	N	N	L	M	N
Other species														
Eurasian Eagle Owl	*Bubo bubo*	M	M	M	Lw	Lw	H	H	H	H	M	M	N	Lw
Eurasian Pygmy Owl	*Glaucidium passerinum*	H	H	H	N	N	N	Lw	N	N	Lw	Lw	Lw	N
Tawny Owl	*Strix aluco*	Lw	M	H	N	N	N	Lw	N	N	H	H	Lw	H

Annex 2

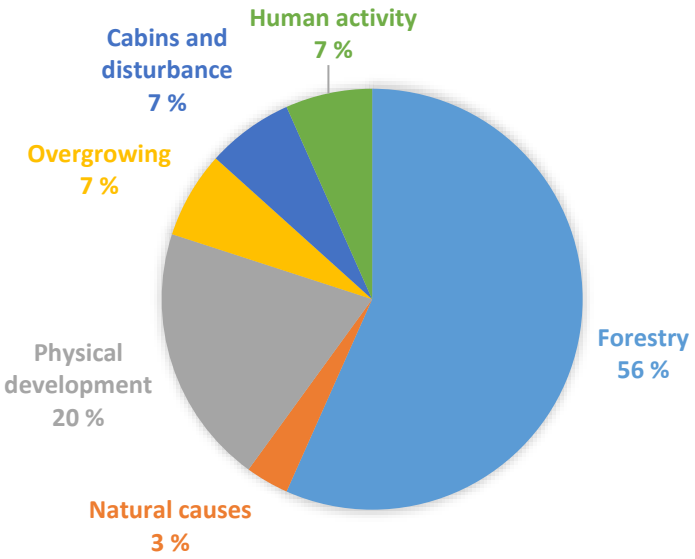
Questionnaire

As a part of the work with these strategic guidelines, experts on birds of prey were asked to fill out a questionnaire concerning important threats and conservation activities. In total 30 experts answered the questionnaire, and some of the results are presented here.

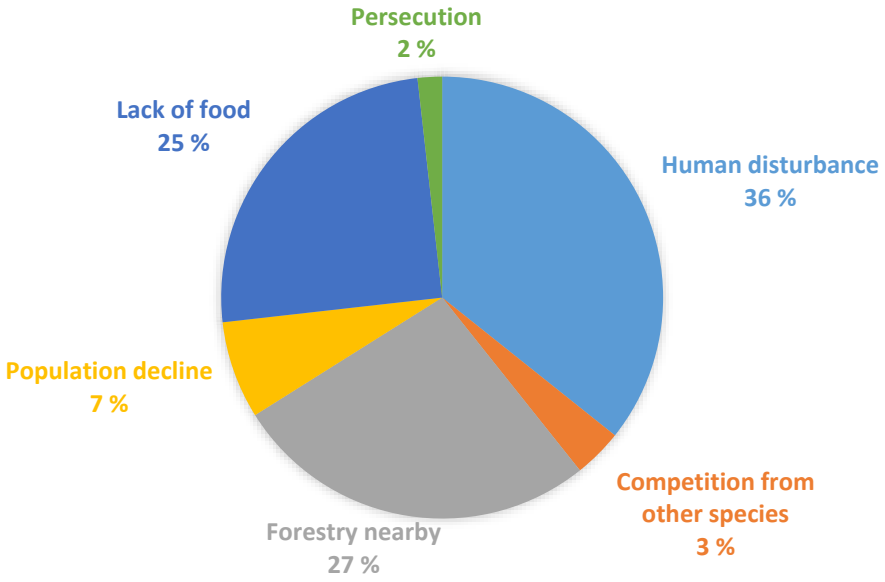
Question: Name and rank 3 – 5 threats to birds of prey in Norway considered of most importance.



Question: What is the most important reason for nest losses in your research area?



Question: What is considered the most important reason for nest abandonment (nesting area still intact) in your research area?



Question: Which of the following species do you think would benefit from a national conservation program (e.g. Single Species Action Plans)?