**MODULE 6: MIGRATORY AND TRANSBOUNDARY SPECIES**

1. **What is in this module?**

This Module provides additional guidance to parties on some of the key considerations for undertaking NDFs for migratory species. It is recognized in this Module that there are specific considerations that apply to migratory species, and which must be addressed in the preparation of an NDF. To assist Scientific Authorities this Module provides examples that may be used to clarify considerations for migratory species. Some of the examples provided may not refer to species currently in trade but may, nevertheless, serve as comparators.

The present guidance concerns the preparation of NDFs specifically for migratory and transboundary species.

**1. Migratory species** means the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries (as defined in the Text of the Convention on the Conservation of Migratory Species of Wild Animals, CMS)

**2. Transboundary species** are species of which groups or individuals of a population of the species cross one or more national jurisdictional boundaries, but where this movement may not be clearly predictable or cyclical.

The preparation of an NDF and principles guiding such preparation are provided in Module 1 and 2 and are not discussed here. There are specific considerations relating to the preparation of an NDF for migratory and transboundary species and these are considered below.

1. **Multinational considerations**

Migratory and transboundary species may occur in two or more national jurisdictions. This makes the process of developing an NDF particularly complex, as Scientific Authorities should consider the potential impact of national take on the whole population of the species. They may also wish to consider the impacts that that may have on the ecosystem services that that species provides across its distribution range. In addition, considerations should be given to different types of use (e.g., food, medicine, curios, trophies, aphrodisiacs, spiritual artifacts, traditional use etc.) of the species across different national jurisdictions.

As indicated in the NDF Resolution and the generic guidance the Scientific Authority should take into account information on the species’ biology and life-history characteristics; distribution range (historical and current); population structure, status and trends; conservation status; threats; historical and current levels of legal and illegal trade; historical and current levels of mortality from combined causes; current and proposed management measures and consideration of levels of compliance; and population monitoring capacity. To the extent possible, Scientific Authorities should consider these aspects not only at their national level, but also in relation to the other countries with whom they share a species. It is therefore recommended that prior to permitting the taking of a migratory and transboundary species, Scientific Authorities of range states of such species liaise and collaborate with one another to be able to obtain the best available information on the aspects enumerated above. It should be noted that CITES recommends that collaboration between Scientific authorities of different Parties and, specifically, neighbouring Parties (Res Conf. 10.3 paragraph 2 d) and e).

In the case of migratory and transboundary species, each range state would be required to develop their own NDF. It is recommended that Scientific Authorities, of the states within the range of the species or population of the species under consideration liaise and, collaborate and, ideally, share in the preparation of NDFs or create consultative bodies for this purpose with other Scientific Authorities as far as possible. In the case of migratory species, consideration must be given to these concerns within countries where the species:

1. Breeds
2. Traverses in migration (migratory corridors).
3. “Winters” (referring to non-breeding areas).

CMS brings together the range States through which migratory species pass, but not all Parties to CITES are Parties to CMS. CITES Scientific Authorities may reach out directly to CMS National Focal Points, the contacts of whom are provided on the [CMS webpage](https://www.cms.int/en/national-focal-points). It should, also, be noted that not all Parties to CITES are signatories to the CMS. Alternatively, Scientific Authorities may wish to request the support of the CITES and CMS Secretariats in facilitating collaboration with CMS National Focal Points, where they believe that such engagement could result in obtaining useful information for NDF making.

In situations where there is significant trade, or where trade may be considered of potential risk to the species, the formation of formal or informal structures to address NDF findings for migratory and transboundary species involving range States or regional groupings of nations is strongly recommended. It is appreciated that the establishment of such structures involves significant effort and the development of protocols which may require engagement at governmental and regional level. Less formal collaboration could be established between national management authorities and allow information sharing for scientific authorities. This is further considered in this document with respect to transboundary species. This form of collaboration should be encouraged within the “spirit” of CITES as a Multinational Environmental Agreement. The establishment of more formal structure with respect to the saker falcon is reflected on in Box A. The Scientific Authority may have to take into consideration the scientific requirements of other agreements applicable to a species included in the CITES Appendices (Box B).

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| **BOX A:** The Saker Falcon, *Falco cherrug*, is a large falcon species that has been favoured for use in falconry for thousands of years. Notwithstanding its cultural and economic importance in many countries, population monitoring data have suggested that failure to control and reduce the cumulative effect of threats may cause most of the species’ subpopulations to significantly decrease or become extinct.Urgent coordinated action to maintain and restore the conservation status of the species has, therefore, been deemed necessary to avoid losing the species, including for future generations.Recognising the risk of extinction of the species throughout all or a significant part of its range, a Saker Falcon Task Force (STF) was established under the auspices of the Convention on the Conservation of Migratory Species of Wild Animals’ (CMS) Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (Raptors MOU).  The STF aimed to bring together Range States, Partners and other interested parties to develop a coordinated Global Action Plan, including a management and monitoring system, to conserve the Saker Falcon throughout its range. This goal included the ambition to develop and apply an Adaptive Management Framework to ensure that any taking of the species from the wild would be legal, controlled and sustainable. |
| **BOX B: International Obligations**1. **CITES** is a Multilateral Environmental Agreement (MEA) designed to regulate the international trade in endangered species included in its Appendices and ensure that this trade is sustainable, legal and traceable. CITES does not regulate the local or national trade in wild species.
2. **CMS** regulates the taking of listed migratory species, indirectly affecting national and international use and trade. It is important that the CITES Scientific Authority is aware of the listing of migratory species with respect to CMS, as well as other MEAs which may limit use and may apply different obligations on exporting states that are Party to both Conventions.
3. **Regional structures or agreements** may exist which govern the use of shared populations of species. Such regulation exists within the European Union. Similar Multinational Treaties include the Migratory Bird Treaty Act of 1918 which represents four separate treaties between the United States of America with Russia, Japan, Canada, and Mexico and regulates the trade in listed migratory bird species.

Regional trade and cooperation agreements may also be relevant and provide a forum for discussion of trade in shared species or populations of species. “Taking” is defined by CMS as “taking, hunting, fishing, capturing, harassing, deliberate killing, or attempting to engage in any such conduct” (CMS Convention Text, Art.1, I, i). |

1. **Harmonization of assessments**

Ideally, there should be harmonization of NDFs for a species developed across range States, particularly for transboundary and migratory species. Such harmonization will assist in establishing confidence that trade in the species will be non-detrimental throughout its range. Whilst it is appreciated that this may not always be possible, it may be achieved through formal and informal communication between the CITES Management and Scientific Authorities in these range States. It is important that individual states prepare their own NDFs and, also where possible, take cognisance of those prepared in other range States.

1. **Volume of existing legal and illegal trade**

Information on the volume of **legal trade** (international) authorized by the respective range States can be accessed through information reported by CITES Parties to the CITES Secretariat via [Annual Reports on trade](https://cites.org/eng/imp/reporting_requirements/annual_report) (CITES Trade Database; https://trade.cites.org/). It is important to assess the number of permits granted against the number of actual trade transactions (where this information is available) since the actual trade may be substantially less. The existence of unreported internal (domestic) trade within range States may also require assessment and this would not be available through CITES reports.

With regards to illegal trade, Parties should have their own records of illegal trade based on the Annual Illegal Trade reports (AITR) submitted as required in terms of Resolution Conf. 11.17 (Rev. CoP19) and the guidelines for submission of AITR on the CITES website: <https://cites.org/sites/default/files/eng/reports/illegaltrade/E-AITR-Guidelines-SC75.pdf>. The *Guidelines for the preparation and submission of the CITES annual illegal trade report* states that the annual illegal trade report should include information on all seizures involving CITES-listed species, irrespective of whether the seizure was made at an international border, or at domestic level. It should be noted that the CITES Secretariat is collaborating with UNODC to develop an online database that will be accessible to Parties (<https://dmpone.unodc.org/>. The annual illegal trade report could therefore be an important source of information.

In considering illegal trade in the assessment, the following points are important to consider:

1. Both official and anecdotal reports on illegal take and trade volumes within the respective range States jurisdictions may give some indication of the existence of illegal activity but may not give a reasonable indication of the magnitude the numbers extracted, for example use in traditional medicine.
2. The existence of markets for illegal specimens and the availability and value of these specimens may allow some estimation of illegal trade.
3. Similarly, consideration should be given to other populations of the species which may not be migratory, or which may not be part of the trans-boundary population.
4. If illegal trade occurs in some jurisdictions, consideration should be given as to whether trade allowed through the NDF may have a negative or positive influence on such illegal trade.

Consideration should also be given to the possibility of “laundering” of illegal specimens that may occur with the establishment of a legal market.

1. **Adaptive management and precautionary approach**

Adaptive management is discussed in detail in Section 9 of Module 1. There are areas that may need specific consideration in addressing the impacts of trade on migratory and transboundary species. These would include:

1. Res. Conf. 16.7 Paragraph 1. a) v) Recommends that “*the making of an effective non-detriment finding relies upon a correct identification of the species concerned and verification that it is specimens of this species that are to be exported*”. The Convention refers to the difficulty in correctly visually identifying the specimen, which may be a part or a product made from, the species. This is more difficult with migratory species where the source of the specimen/animal or the population of the species may be difficult to determine.
2. For migratory species, gauging how population dynamics will be affected by any levels of take is more complex than gauging these effects for non-migratory species, particularly for poorly researched species. Before an NDF is developed for such species, Scientific Authorities should make every possible effort to obtain as much information as possible regarding the aspects outlined in the subsection above on “Multinational Considerations in NDF preparation” (also see the section: Guidance on evaluating scientific approaches to studying migratory species).
3. The conservation status of a species may vary across national jurisdictions, in the case of transboundary and migratory species (National “Red Lists” or other national conservation-level assessments). The status of a species in national-level legislations does not necessarily equate to actual level of protection, but formal listings of species may vary substantially across country boundaries and, particularly, at the latitudinal range extremes. Asymmetries in listing could indicate that species are under less threat in one country compared to another or could reflect different levels of concern in the two countries although population status is similar. Regardless of this, asymmetries in listing could challenge cross‐border connectivity and climate change resilience in the face of possible species range shifts. This is an indication of the need for greater transboundary coordination in species management.
4. The scale of the proposed trade will affect the complexity of the scientific data required and the need for collaboration between national jurisdictions. Where a relatively large number of specimens are to be harvested, if the status of the species is uncertain or where the harvest is likely to be repeated, more in-depth NDFs are required, and in the case of transboundary and migratory species, consultation with other affected national jurisdictions becomes even more important.
5. **Guidance on evaluating scientific approaches to studying migratory species**

NDFs seek to use the best scientific information available on a species. Scientific Authorities should review available literature and information relevant to inform the NDF and determine the need for further studies. When assessing studies examining the sustainability of harvesting migratory and transboundary species, or when designing such studies directly, key considerations should include:

* 1. **Understanding the conservation status and trends of the populations of the species that will be impact by take**

To develop a suitable NDF for a migratory and transboundary species, the Scientific Authority must have an understanding of the conservation status and trends of the populations of the species that are likely to be impacted by any levels of take. Understanding this is a key step to understanding the potential impacts of any such take. It also provides a baseline for monitoring efforts. For this, cross-border information sharing and collaborative research may be needed. A review of the literature relating to the species must be performed and this may provide at least some of the required data and allow gaps in the knowledge to be determined. It is important to ensure that the NDF produced is based on science.

* 1. **Identifying appropriate sampling methods**

Sample sizes must be adequate to ensure statistical validity. With many migratory species, populations do not migrate all at once, while some individuals or populations may overwinter or breed at different locations. It is important, therefore, to ensure that the number of populations (and individuals within populations) sampled is sufficient to draw accurate inferences about the impact of harvesting on the species.

Larger sample sizes will make it easier to detect small changes in the harvested population (e.g., a decline of 5%), while smaller sample sizes will only allow detection of relatively larger changes (e.g., a decline of 50%). Larger sample sizes thus confer greater precaution into the examination of harvesting effects. In the same way, samples should be gathered from more than one population of the migratory species, at different locations within the country, to ensure that any detected changes in the population size or structure are not artifacts of natural population- or geographic-level variation among populations. The basis for these studies may be determined through review of literature relating to studies on other populations of the species or comparable species.

**6.3. Sampling points along a migration path**

Migratory species often undertake long journeys over long distances. Thus, the sites at which the population of migratory animals is censused plays an important role in influencing the results forthcoming from any study (see Box C). Ideally, sampling should be conducted at as many points as possible along a migration route to detect changes. If sampling at multiple points along the migration route is not possible, then at a minimum it is important to ensure consistency in sampling (see section 6.4 below).

**BOX C:** The population size and demographic attributes of a species of migratory bird will differ depending on whether the birds are sampled at their breeding ground (where the population may be higher due to the presence of immature individuals), along the flyway/migration route (noting that not all individuals may migrate or may not migrate at the same time), or at their final destination (at which point a significant proportion of the population may have died during the migration).

**6.4. Monitoring the impacts of harvest on the conservation status of the species**

Monitoring can be achieved through regular surveying of population status and trends. Accurate and consistent surveying will make it possible to apply adaptive management to the harvesting of species.

Surveying must be performed at predetermined times, intervals, and locations over time to ensure that any relevant trends are captured. The best timing for performing these surveys depends on the species in question. Information on such timing may be available in the literature, and when not, attempts should be made to take informed decisions based on scientific information available for comparable species.

Standardisation in surveying will help to ensure consistency in approach, which improves the confidence of wildlife managers that any observed changes are due to harvesting rather than other effects. For example, assessing populations of migratory species during their breeding period must be done at the same times each year. If assessments of the population are early in one year, then some species may not have arrived at the breeding ground. If the assessment is undertaken late in another year, then large numbers of breeding animals may have succumbed to predation, and some individuals may have begun their migration. The results of the two assessments would be wildly different and may be erroneously attributed to the impacts of harvesting.

Breeding provides the opportunity to place markers or tags on young animals as a means of monitoring populations or tracking movements. A range of devices are used on migratory species with different applications (see Box D).

Satellite trackers can be used on a wide range of species to determine distribution, migration routes and assessing mortality. The cost of the technology limits the numbers of individuals tagged but invaluable data can be collected on relatively small numbers of individuals. Variations in technology include tags which use cellular phone networks rather than satellites and acoustic tags are used on turtles. Tags or trackers may increase the mortality risk for individuals so it must be used judiciously.

Larger numbers of individual animals can be marked in a variety of ways which are less expensive and pose less risk for the marked animal. These include bird-rings (or bands), microchips and physical marking such as clipping notches in specific patterns on turtle shells. It should be recognised that microchips have significant limitations as they are not immediately visible, and insertion involves an invasive procedure which entails some risk to the individual. Tracking of fish, such as sharks, by means of plastic dart tagging by recreational fishers as well as use of satellite tags can help in establishing the size and distribution of populations species. Such inexpensive marking does enable adaptive management of species harvests if recapture recording can be managed.

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| **BOX D**: A “Mark and Bank” scheme has been proposed for management of Saker falcon, *Falco cherug,* harvests. This scheme proposes widespread marking of Saker chicks in Central Asia with specialised numbered tamper-proof rings which incorporate a microchip. A feather is taken from the chick, linked to the ring, and banked for future DNA comparison if necessary. The recording of such rings by trappers (encouraged to engage through on-line recording system offering entry to a lottery) as well as though participation by falconers and falcon hospitals in Gulf States, would enable measurement of the saker population size, scale of trade and ultimately adaptive management of trade. |

**6.5. Frequency of assessment**

The frequency with which harvested populations of migratory species should be assessed for the preparation of an NDF will depend on a number of factors, as well as the objectives of management. As a rule, however, the greater the potential risk to the species and its populations, the more frequently assessments should be made. For example, if the conservation status of the species is poor, if the level of harvest is high, if the life-history or recruitment rate of animals is slow, or if many range states are harvesting from the migratory population, then assessments should be performed more frequently (annually or biennially). However, if the conservation status of the harvested species is secure, levels of harvest are low, the species has a fast rate of recruitment, or only one range state is utilising the migratory species, then assessment can be undertaken less frequently.

1. **Consideration of different harvesting areas with respect to migratory and transboundary species**

Both migratory and transboundary species will, by virtue of their movement, occupy different areas at different times. These movements may be seasonal and predictable, in the case of migratory species or more random in the case of transboundary species. Different considerations may apply depending on the specifics of the area where the intended harvest is to occur. It is important for the Scientific Authority to take the considerations relating to these different areas into account. These areas would include:

1. Breeding or nesting areas

2. Non-breeding / wintering areas

3. Migratory Corridors

4. Core-areas which are occupied by the bulk of the species population and peripheral areas where the species may be found intermittently, as a vagrant, or only when the numbers of the core-population are high.

5. Areas outside of any national jurisdiction (e.g., international waters).

1. Changing Demographics of Migrating Populations

Further to this it is important to recognise that the *demographics of a population* may change during the migration and may influence both the selection of the time or site of harvesting. This possible change in population demographics should also be considered in assessing the effects of harvesting.

**7.1. Breeding or nesting areas**

The Breeding Area can be considered as the geographic region where a migratory species, or population of the species, breeds and this may extend across multiple countries. Similarly, “nursing areas”, such as estuaries and mangroves may be important for aquatic species.

Some species may breed at both northern and southern destinations of the migration whilst other species breed only at one destination. Breeding or nesting areas represent areas of special concern with respect to migratory species. Although not necessarily the case, the population abundance may be more easily monitored and managed within these areas, but care must also be taken to ensure that harvesting does not interfere with breeding processes such that population recruitment is jeopardized. Box E provides examples of harvesting birds that specifically relate to breeding and nesting. There are also opportunities to enhance breeding success such as through nest site provision or enhancing food sources, as well as through protection of breeding and nursing grounds. There may be specific reasons to harvest in breeding areas, for example where young animals or eggs are the targets of harvest, or where the harvested product is the result of breeding activity.

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| **BOX E**: Examples of harvest that specifically relates to breeding and nesting of birds:1. The harvesting of eiderdown. Although eiderdown pillows or quilts are now a rarity, eiderdown harvesting continues and is sustainable, as it can be done after the ducklings leave the nest with no harm to the birds.
2. Harvesting of nests for “Birds Nest Soup” is more controversial. Edible bird's nests are bird nests created by edible-nest swiftlets, Indian swiftlets, and other swiftlets using solidified saliva, which are harvested for human consumption. Typically, the swiftlets nest in caves but nesting houses have been built to aid commercial production. Nests are harvested at the start of the breeding season, with up to three nests per male harvested before breeding is allowed to continue.
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Consideration must also be given to the recruitment of the species. Some species have small numbers of young, such as eagles, bustards, and leopard, and recruitment, following harvesting, may be slow. Other species may have relatively large numbers of young and this may moderate the effect of harvesting. Medium sized raptors, such as falcons and goshawks, breed annually producing two to five young. It is well established that there is a high mortality (approximately 70%) with death through starvation, predation, or accident, and this can be considered when modelling the effects of harvesting first-year birds of these species (See case study: Peregrine falcon).

Harvesting of eggs of various species of crocodilians has benefited the conservation of these species. Hatchling crocodilians are known to have a high mortality rate. Harvesting of eggs, followed by rearing of hatchlings in a secure environment will significantly reduce mortality, whilst a proportion of hatchlings can later be released at an age and size where survival is much more likely. Similar considerations may also apply to the taking of young raptors for falconry and subsequent release after use.

**7.2. Non-breeding / Wintering areas**

Wintering areas may be considered as the migration destination at which breeding does not occur.

These areas may provide a suitable location to allow harvesting as no disruption of breeding activity will occur. In the case of birds that breed in the northern hemisphere, the populations may be condensed within the wintering area. For example, Amur falcons, *Falco amurensis,* congregate in Southern Africa while Sooty falcons*, Falco concolor,* migrates mainly to northern Madagascar, and this may facilitate population estimation.

Other species, such as salmon, may disperse widely during the non-breeding season. Harvesting of such species may be difficult to monitor and control. Overharvesting during non-breeding seasons may have devastating effects on the role of the species within the ecosystems where breeding occurs (see *Role in Ecosystems)***.**

Similar concerns may exist for species, such as the European populations of the saker falcon, *Falco cherug,* which are generally subjected to good conservation measures in their breeding range, but which disperse to North Africa in winter where effective controls on harvesting are lacking.

**7.3. Migratory Corridors**

A flyway is a flight path used by large numbers of birds while migrating between their breeding grounds and their non-breeding (overwintering) quarters. There are well recognized flyways that connect between North and South America as well as between Eurasia and Africa and Asia and Australasia. Established migratory routes of terrestrial or marine species are also important to consider.

The migration routes are subject to their own special considerations that should be taken into account during the preparation of an NDF. The species may condense at certain points on the migration route and this may provide important opportunities to monitor populations. The bi-annual passage of migratory animals may be seen as an important opportunity for harvesting and this may be ingrained within the cultures of the communities through which they pass. Migration routes may cross multiple countries with varying ability to control and manage harvesting. Box F describes and example of harvest along a migration route.

The migration routes may also pose significant dangers to migratory animals, particularly through environmental hazards and degradation. Electrical infrastructure, including dangerous transmission and distribution lines as well as wind-turbines, create risks of electrocution and collision. These risks are not confined to birds and may affect migration of land animals. The erection of disease-control fences may cause disruption of migratory routes for species, such as wildebeest and zebra, cutting them off from important grazing and water resources.

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| **BOX F**: The common quail, *Coturnix coturnix,* undergoes an annual migration from western Asia, across the Black Sea, through Turkey, across the Mediterranean Sea to North Africa. The flocks of quail are followed by migratory Sparrowhawks, *Accipiter nisus,* and this is seen as a significant cultural opportunity to local communities in both Turkey and North Africa who traditionally trap sparrowhawks, train them rapidly, hunt the quail for food and then release the sparrowhawks when the quail flocks move on. |

**7.4. Core and Peripheral areas**

The “Core” area for a species may be considered as the central region with greatest abundance for that species or population. It may also refer to secure conserved areas where the species is protected, and use is not permitted. “Peripheral” areas refer to areas outside of the core where the species is present during times of greater abundance or where the species occurs only as a vagrant (see box G).

The term “core area” may have different implications for different types of species. In the case of large species such as elephant, large carnivores and large ungulates, core areas refer to well conserved areas within which strong stable populations of the species are present. Harvesting in surrounding or distant areas may contribute to genetic isolation of the population within the conserved area, and this may affect viability of the population. This could be avoided through management planning. In the case of relatively small, conserved areas, hunting or other harvesting on the periphery may significantly affect numbers within the conserved area. Harvesting on the periphery of conserved areas may have conservation benefits if the surrounding community benefits from the harvest.

In the case of other species, particularly those not confined by conservation area boundaries, the core area may be understood as the area where the species or population of the species is known to predominate. The boundaries of this may be fluid depending on population pressures, prevailing weather conditions, or food availability. If the population within the core area is abundant, the NDF must consider whether the scale of harvest within this area is sustainable. The species may be rare at the periphery of the core area, but individuals in such areas may be vagrants or pushed there through population pressures within the core area, so small harvests in such areas may be of negligible concern.

On the other hand, it is important to establish whether small numbers of a species in a given area represent vagrants on the periphery of a strong population or a separate population which is doing poorly due to conservation constraints.

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| **BOX G: Species populations in "core" versus "peripheral" areas:** **Leopard (*Panthera pardus*) populations in South Africa:** Some protected leopard populations are also likely to be exposed to strong edge effects. For example, in the Phinda-Mkhuze complex in northern KwaZulu-Natal, the density of leopards declined from 11.1/100 km2 in the centre of the protected area, to 7.2/100 km2 at its periphery due to harvesting in adjacent non-protected areas (1) clarify reference. Nevertheless, the core of larger protected areas such as the Kruger National and Kgalagadi Transfrontier Parks likely constitute inviolate refuges for leopards.**Red-necked Falcon (*Falco chiquera*) in South Africa**: This is a species of Least Concern, which occurs in Southern Africa including Namibia, Botswana, North-West Zimbabwe, and Mozambique (as well as further north). Within South Africa, it has a stronghold within the Kgalagadi National Park, and occurs sporadically in the north and west of the country and there are historic reports of breeding. Thus, it may be considered rare within South Africa and a harvest of individuals within South Africa, excluding the Kgalagadi Park, would hold no conservation significance for the species.**Saker falcon (*Falco cherug*), in Central Asia**: populations within Mongolia and China are strong with a non-breeding surplus, limited by nest site availability. The strength of these populations results from provision of artificial nest-sites, management of illegal trade and mitigation of electrocutions on dangerous electrical transmission lines. In contrast to this, populations within areas of Central Asia to the west of China and Mongolia, are doing poorly as these conservation constraints have not been managed.It is necessary to recognize these as separate populations which require different management strategies and harvest restrictions. |

**7.5. Areas outside of any national jurisdictions – international waters**

Guidance relating to the preparation of NDFs for specimens harvested in areas beyond national jurisdiction is provided in Module 5 on Aquatic species.

**7.6. Changing demographics of migrating populations**

It must also be recognised that the demographics of populations of migrating species vary during migration. Whilst moving from breeding to other areas, the overall number of individuals in a population and their age distribution will vary in response to mortality due to natural and anthropogenic (including harvest) causes (Box H).

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| **BOX H**: In the specific case of raptor species, natural mortality may be as high as 70% for first year raptors. First year birds, and, in some species such as the Saker falcon, particularly larger female birds, may be in higher demand for use in falconry, leading to preferential harvesting. Simultaneously, larger female raptors may also be more vulnerable to electrocution than males when perching on dangerously constructed electrical transmission infrastructure. Newton, I. (1986) The Sparrowhawk clarify reference. |

1. **Application of the precautionary principle for migratory species**

Adaptive management is discussed in Section 9 of Module 1 – this guidance is applicable to migratory species and consideration should be given to the fact that migratory and transboundary species may occur in two or more national jurisdictions which may increase the risk to the species – see section C. 1. See Box I for an example of application of the Precautionary Principle involving a transboundary species in practice.

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| **BOX I: Example of implementation of the Precautionary principle:** The 2015 South African NDF assessment for the Leopard, *Panthera pardus,* would exemplify the application of the precautionary principle. This species occurs in approximately 20% of the country and 68% of this is outside of protected areas The protected areas provide secure core areas for the species and hunting occurs outside of these areas, on private land. Individual animals cross between adjacent countries including Mozambique, Zimbabwe, Botswana, and Namibia. The NDF found that there was uncertainty relating to the total population of the species in South Africa, uncertainty relating to the illegal killing of leopards in South Africa as well as in adjacent States and poor management of existing harvests. Based on these uncertainties, steps were recommended to develop better monitoring and management of any permitted harvest, and these included: 1. The development of guidelines for the allocation of leopard trophy quotas.
2. A conditional leopard trophy quota allocation in compliance with the new guidelines.
3. The development of national norms and standards for the management and monitoring of leopard trophy hunting and putative damage causing animals.
4. Full implementation of the norms and standards by the end of 2019.

Thus, the NDF recognised and addressed the knowledge deficits and proposed the means to address these, while imposing better controls on the harvest. Subsequent NDFs will take into account the significant improvements in the regulatory and management regime pertaining to leopards in South Africa. |

1. **The role of migratory species within the ecosystem**

Many migratory species play a significant role in their ecosystems and in fact may play disproportionate roles within their ecosystems compared to other species. For this reason, special consideration must be given to CITES Paragraph 3 of Article IV on the role of the species in the ecosystem.

Migratory species cyclically leave and re-enter ecosystems. This movement is usually associated with weather change and is seasonal. These cyclical movements may, thus, coincide with abundance of food or the migratory species, itself, may represent an essential source of food that enables predator species to breed and thrive. Similarly, the inflow of returning individuals may represent an influx of nutrients which are then redistributed and so contribute to the health of the ecosystem. In this consideration, the Scientific Authority may need to consult more broadly to determine the effects of reduction in the size of a population of a migratory species within an ecosystem. As already stated, it is also important to appreciate that a species may be harvested to a level which is sustainable (implying no risk of extinction) but at which it can no longer perform its role within the ecosystem (ecological extinction).

Scientific Authorities making NDFs for migratory species should consider carefully the role the species plays throughout its migratory route, its impacts on other species, and link this to ecosystem function.

Consideration of the role/function of migratory species within ecosystems can be categorized (From Akcakaya et al 2019 - include reference) as follows:

**9.1. Direct Interaction (including trophic functions and cascades)**

These functions would include pollination, seed dispersal, herbivory and predation. Examples of species providing such ecosystem functions would include:

* 1. Migratory hummingbirds as pollinators,
	2. Seed dispersal by a wide range of species such as flying foxes, hornbills and herbivores such as elephant.
	3. Herbivory such as by parrotfish which prevent coral-to-microalgal phase shift in reefs which may be inhibited by reduction in population density through fishing mortality.
	4. Predation by sea otters on urchins so maintaining kelp forests and wolf predation on elk so maintaining willow ecosystems.
	5. Seasonal influx of migratory species is necessary for the survival of predatory species. Many species benefit from the cyclical influx of migratory species and depend on these as a resource when breeding, preparing for hibernation or migration. Eleonora’s and Sooty Falcons are rare island dwelling species that rely on an influx of migratory passerines to feed their chicks. As a result of this, both species delay breeding to late summer to coordinate with the southerly migration. Reductions in passerines could adversely affect both these species. Island dwelling pit vipers also rely on migratory passerines and have evolved a specialised metabolism which allows for long periods of fasting between migration influxes.
	6. Seasonal influx of predatory migratory species may also be important in maintaining ecological balance. Migratory species often rely on the seasonal abundance of food in wintering or breeding areas and so provide a balance within ecosystems through control of species which may otherwise be detrimental to the ecosystem or are pests to crops. This may be seen though the influx of insectivores including migratory raptors to Southern Africa during the northern winter and which predate on the winged termites and quelea species (*Quelea sp.)*. The Saker falcon feeds on rodents within its steppe-land breeding range and can control these in agricultural areas. The provision of artificial nest -sites has been used to increase Saker numbers, benefiting conservation efforts, and to support biological control of pest species.
	7. **Indirect interactions (structural functions)**

These functions would include habitat creation, ecosystem engineering, nest-site provision.

* 1. Habitat creation and effect on habitat heterogeneity through behaviour reliant on population density such as wallowing by American Bison and tree-destruction as well as water-hole creation by African elephant.
	2. Ecosystem engineering such as conversion of woodland to mixed savannah -woodland by African elephant.
	3. Nest-site and habitat creation such as creation of cavities within Baobab trees by elephant providing nesting and roosting sites for Mottled Swift and Bohms Spinetail.
	4. Competition between species may have indirect effects if this balance is altered. The presence of leopards within an ecosystem influences the numbers of smaller predators such as caracal and jackal. When leopards are reduced or removed, the numbers of these species may increase with resultant impacts on the prey base of these species.
	5. **Diffuse interactions (ecosystem level functions)**

This would include nutrient cycling or redistribution.

1. Communally nesting or roosting birds, if in large numbers, can, through fertilization at roosting or nesting sites, create biodiversity “hotspots” or change local ecosystems. This can be seen through communal roosts of migratory species such as metallic starlings (*Aplonis metallica*) or Amur falcons (*Falco amurensis*).
2. Large collections of nesting seabirds introduce quantities of sea-derived nutrients to the ecosystem in the form of guano. Declining numbers of nesting birds, resulting from depleted fish stocks or introduced predators, can change the local ecosystem.
3. The carcasses of Pacific salmon when spawning contribute considerable sea-derived nutrients to forest ecosystems with effects measurable some distance from the rivers and seen to vary with large annual fluctuations in the numbers of spawning fish.
	1. I**ntra-specific interactions (within-species processes).**

This would include population movement (including migration) and reproductive aggregations.

* + 1. “Green-wave surfing” and other seasonal migration by ungulates. This behaviour can be affected by population continuity, age-structure facilitating transmission of knowledge and landscape connectivity.
		2. Reproductive aggregations. Sufficient population density may be necessary to overcome sperm limitations in spawning. Similarly, population size may be critical for lek-formation. Raptors may disperse when numbers are critically depleted resulting in breeding failure (Allee effect).

The Scientific Authority should where, uncertainty exists, take a precautionary approach through harvest limitation and establishment of measurement protocols which allow an adaptive management system. *The CITES NDF Checklist can be adapted to accommodate these considerations for migratory species.* Box J provides a case study of NDF-related considerations for Peregrine Falcons (*Falco peregrinus minor*) in the Western Cape, South Africa.

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| **Box J: Motivation for a Harvest of Wild Peregrine Falcons, *Falco peregrinus minor,* in the Western Cape, South Africa.**It must be noted that the following case study was not developed as part of an NDF and the proposal is for harvesting of young birds from nests or in their first year for local use by falconers. There is no trade in wild Peregrine falcons, nor is there any illegal trafficking of the species within South Africa. The preparation of this Case Study does not imply any attempt to recommend trade in the species. It examines accepted international norms and applies the precautionary principle. We would note that the requirement of CITES, for an NDF, is not that the effect of the harvest should be undetectable, but that the harvest must be sustainable. The proposal below exceeds this requirement. Most of the raptors required by falconers are considered “of least concern” according to the IUCN Red List. The peregrine falcon is considered “of least concern” but remains included on the Threatened or Protected Species (TOPS) list within South Africa despite agreement to de-list this species in 2011. There is evidence of strong populations of this species in The Western Cape and evidence of increasing populations in urban settings2.The Western Cape falconry clubs have assessed the requirement for peregrine falcons for use as hunting falcons for the coming year (this was prepared in 2021). They have prepared a motivation for consideration be given for a quota of young (first year birds) with a number requested based on sound but cautious scientific principles:There are an estimated 200 to 400 breeding pairs of peregrines in the South Western Cape (Pepler et al) and the breeding success for this species has been estimated to vary from 1.1 to 1.37 chicks per year(Jenkins A).3 Based on this, a very cautious calculation using the lowest of these estimates for peregrine chicks bred in the South Western Cape per annum would give a number of at least 220 young birds. This number must be significantly higher if extended to the whole of the Western Cape.Population modelling studies have been performed elsewhere to establish the basis for calculating falconry harvests:1. A very limited harvest of peregrine falcons is permitted, under EU “Birds Directive” derogation, in the Republic of Ireland. Scientific modelling to show the effects of this harvest has been undertaken by Sielicki4. This demonstrates that a harvest of 5% of chicks would have no effect on the population and 10% would be sustainable.
2. A study was undertaken by the United States Fish and Wildlife Service to estimate the effect of allowing a harvest of peregrines for the purposes of falconry. The conclusion of this study was that a 5% harvest of young (first year) birds would be undetectable in any population study5.
3. The CMS/UNEP Saker Task Force determined that a 5% harvest of young saker falcons, in Central Asia and the near east, for falconry would be acceptable6.

Indeed, a 5% harvest of young falcons appears to be internationally acceptable as a level at which such a harvest would have no impact on population levels.Falconers in the Western Cape acknowledge the responsibility of CapeNature (The responsible Authority) to manage and conserve the natural resources of the province. They also acknowledge the need to apply the precautionary principle, but, also to make science-based and reasonable decisions. Using the figures provided and taking the lowest estimates, these being a population of 200 breeding pairs of peregrines in the South-Western Cape with an average clutch survival of only 1.1 fledged chicks per nest, we can estimate that there will be a minimum of 220 fledged peregrines in the South Western Cape annually and this number must be larger for the whole of the Western Cape Province. The falconers would request a permit for the harvest of 10 peregrines for 2021/2022 season. This number is below 5% of the production of wild peregrines within the province and will have no influence on the population of peregrines. We must also note that the majority of these birds will, ultimately, be released back to the wild. Pepler D, Lombard A, Oettle E, Populations of Peregrine Falcon in the South Western Cape. South Africa. (2008)2 Altwegg R, Jenkins A, Abadi F, Nest boxes and immigration drive the growth of an urban Peregrine Falcon Falco peregrinus population. Ibis (2013)3 Jenkins A, Ostrich - Journal of African Ornithology 71(3-4):385-392 (2000)4 Sielicki J, Population modelling of Peregrines in Ireland – Conference Proceedings International Conference on the Stewardship of Biodiversity and Sustainable Use. (2016)5 Final Revised Assessment, Management Plan and Implementation Guidance: Take of Nestling Peregrine Falcons in the Contiguous United States and Alaska for Use in Falconry – US Fish and Wildlife Service, Division on Bird Management (2006)6 Kovács, A., Williams, N.P. and C.A. Galbraith (2014) Saker Falcon Falco cherrug Global Action Plan (SakerGAP), including a management and monitoring system, to conserve the species. CMS Raptors MoU Coordinating Unit, Abu Dhabi. CMS Technical Series No. XX.  |