International Species Action Plan
for the European Roller *Coracias garrulus garrulus*

Prepared by:

On behalf of the European Commission

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Milestones in the Production of the Plan
Draft 1.0 sent to all Contributors and published online: June, 2008
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Draft 2.0 published online: August 2008
First consultation with Member states: 10 October 2008
Draft 3.0 submitted to EC: 30 November 2008
Second consultation with Member States: 05 December 2008

International Species Working Group
At the SAP workshop 22-24 July 2008, held in Besenyőtelek, Hungary, participants decided to establish an informal Species Conservation Working Group.

Reviews
This Species Action Plan should be reviewed and updated every ten years (first review in 2018). An emergency review will be undertaken if there is a sudden major change liable to affect one of the populations or subspecies.

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Geographical scope of the action plan

This action plan is applicable to the range states of the European Roller *Coracias garrulus* in the European Union (Table 1).
However, given the significance of other range states outside the EU but within the geographical borders of Europe, and the conservation problems that affect the European Roller in and beyond that region, the geographical scope of the Action Plan has been extended to include the entire European breeding range of the species.

Map 1. The geographical distribution of the European Roller (BirdLife International 2008)

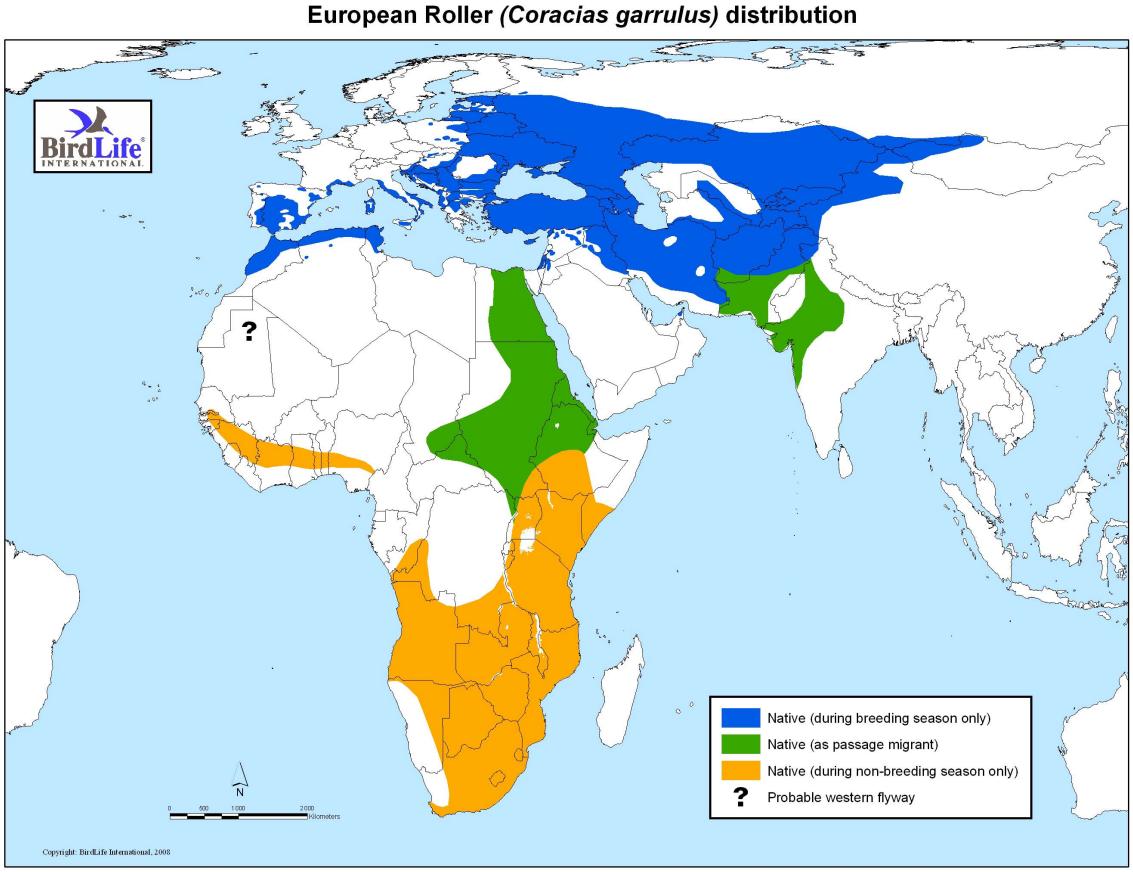

Table 1. European range states of the European Roller (BirdLife International 2008), member states of the EU in bold.

Range states	**Breeding**	**Migration**	**Wintering**
Albania	yes	No	no
Armenia	yes	No	no
Austria	**yes**	**Yes**	**no**
Azerbaijan	yes	No	no
Belarus	yes	No	no
Bosnia and Herzegovina	yes	No	no
Bulgaria	**yes**	**Yes**	**no**
Croatia	yes	No	no
Cyprus	**yes**	**Yes**	**no**
Czech Republic	**extinct**	**No**	**no**
Estonia	**extinct**	**No**	**no**
France	**yes**	**Yes**	**no**
Georgia	yes	No	no
Greece	**yes**	**Yes**	**no**
Hungary	**yes**	**Yes**	**no**
Italy	**yes**	**No**	**no**
Latvia	**yes**	**Yes**	**no**
Lithuania	**yes**	**No**	**no**
Macedonia, the former Yugoslav Republic of	yes	No	no
Montenegro	yes	No	no
Moldova	yes	Yes	no
Poland	**yes**	**Yes**	**no**
Portugal	**yes**	**Yes**	**no**
Romania	**yes**	**Yes**	**no**
Russia (European)	yes	No	no
Serbia	yes	Yes	no
Slovakia	**yes**	**Yes**	**no**
Slovenia	**extinct**	**No**	**no**
Spain	**yes**	**Yes**	**no**
Turkey	yes	Yes	no
Ukraine	yes	Yes	no

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0 - EXECUTIVE SUMMARY

The European Roller *Coracias garrulus* has an unfavourable conservation status and it is classified as Vulnerable in Europe and in the EU (BirdLife International 2004a, b). It is classified as SPEC 2. It has undergone moderately rapid declines across its global range and it is consequently considered globally Near Threatened (IUCN 2008).

The European Roller is listed in the following international legislation:

- *EU Birds Directive Annex I*
- *Bern Convention Appendix II*
- *Bonn Convention Appendix II*

It has a large global population; including an estimated number of 55,000-117,000 breeding pairs in Europe (50-74% of the global breeding range) and 13,000-25,000 breeding pairs in the EU 27.
Following a moderate decline during 1970-1990, the species has continued to decline by up to 25% across Europe during 1990-2000 (including in key populations in Turkey and European Russia). Overall European declines exceeded 30% in three generations (15 years). Populations in northern Europe have undergone severe declines and even local extinctions, for example in Russia it has disappeared from the northern part of its range and it recently went extinct in the Czech Republic, Slovenia and in Estonia.

The European Roller is restricted to the Palearctic, breeding from north-west Africa and the Iberian Peninsula eastwards through the Mediterranean to the western Himalayas. Over half of the global breeding range lies within Europe, where the strongholds are in Spain, Russia, Ukraine, Romania, Bulgaria and Turkey, which together hold about 90% of the European breeding population.
The Roller winters in the Afro-tropical region, mainly in eastern and south-east Africa.

The main causes of recent widespread decline are considered the loss of suitable habitat due to changing agricultural practices and loss of nest sites, use of pesticides and sustained persecution along the migration routes.
Critical threats affecting the Roller population in Europe are the conversion of permanent grassland to other land use, land abandonment and reduced management of meadows and pastures, destruction of microhabitats for large insects (tracks, hedges, beetle banks, uncultivated land) and loss of large trees in small wood formations, riverine woods, in hedges or solitary ones.

Goal
To restore the European population of the Roller to a favourable conservation status.

The target for restoring the favourable conservation status of the Roller in the EU is to:

- maintain a population considerably larger than 10,000 breeding pairs;
- Restore the area of the distribution to 1990 levels (cf. EBCC Atlas of European Breeding Birds, Hagemejer & Blair, 1997);
- In the short term, halt the decline of the species. In the long term - maintain overall stable population trend for at least 3 generations (15 years).

Objectives of the plan

Objective 1 Clarify the population status and viability of Roller populations in Europe by 2012.

Objective 2 Stop the decline of the European population by 2020 and promote conditions that will help populations to recover to favourable conservation status and will allow for range expansion in Europe.

Results

Result 1.1 Better planned and implemented Roller conservation measures.

Result 1.2 Increased knowledge on the status, distribution and survival of Roller populations.

Result 1.3 Higher level of awareness of key stakeholders achieved.

Result 2.1 Sufficient area of foraging habitat in terms of size and quality available throughout the distribution range.

Result 2.2 Sufficient number of nest-sites available throughout the breeding range.

Result 2.3 Mortality reduced to a level where it is not a limiting factor of population expansion

Most important actions

- Develop national species action plans.
- Identify and protect under national and/or international (e.g. Natura 2000) legislation the priority areas.
- Develop site management plans for Roller priority areas or include Roller conservation measures in existing ones
- Develop monitoring schemes and implement annual monitoring on Roller populations and breeding success.
- Fill critical knowledge gaps, develop and implement research plans focusing on Roller mortality, survival rates, factors influencing productivity and factors limiting expansion.
- Design and promote best practice agro-environmental and forest-environmental measures targeting Roller (e.g. to ensure that old cavity trees are not cut by forestry operations).
- Raise the awareness about the value and conservation status of the Roller among key stakeholders (nature conservation organisations, landowners, farmers, experts on chemical plant protection, foresters, municipalities, electric utilities, urban and infrastructure development planners, general public).
- Prevent the conversion of permanent grasslands to other land use.
- Promote / improve environmental impact assessment of irrigation schemes.
- Protect and restore non-productive features such as tracks, ditches, fallow and beetle banks and non-sprayed patches to increase prey availability.
- Identify and ban insecticides and herbicides with adverse effects on Roller populations in priority areas. Reduce pesticide use; promote low-chemical-input farming.

- Promote international cooperation for the study of movements and threats along flyways.

1 - BIOLOGICAL ASSESSMENT

Description
The European Roller is a Jackdaw-sized bird, called "Blue Crow" in several European languages (Fry & Fry 1999). Unmistakable in Europe: the whole head, neck and underparts are uniformly bright light blue while mantle, scapulars and tertials are rufous-brown. The wing covers are violet and light blue and the primary feathers black.

Taxonomy and biogeographic populations

Phylum:	*Chordata*
Class:	*Aves*
Order:	*Coraciiformes*
Family:	*Coraciidae*
Genus:	*Coracias*
Species:	*Coracias garrulus* Linnaeus, 1758

The Roller *Coracias garrulus* is a polytypic species with two subspecies: the nominate *C. g. garrulus* breeds from Morocco, south-west and south-central Europe and Asia Minor east through north-west Iran to south-west Siberia (Russia); *C. g. semenowi*, breeds in Iraq and Iran (except northwest where the nominate race occurs) east to Kashmir and north to Turkmenistan, south Kazakhstan and northwest China (west Sinkiang) (Fry & Fry 1999).

The present Action Plan applies to the populations of the nominate subspecies *Coracias garrulus garrulus* within the European Union.

Distribution throughout the annual cycle

All populations of the European Roller are long-distance migrants. The European Roller migrates diurnally, singly or in small parties, birds follow each other in a steady stream.
Spring migration takes place between March and June, mainly in April/May, while autumn migration is between August and November, mainly in September/October.
The species over-winters in two distinct regions of Africa, from Senegal east to Cameroon and from Ethiopia west to Congo and south to South Africa. It winters primarily in dry wooded savannah and bushy plains (BirdLife International 2008).

Habitat requirements
The European Roller breeds throughout temperate, steppe and Mediterranean zones characterized by reliable warm summer weather. Accordingly, it occurs in the continental interior avoiding oceanic influence. This species breeds in Europe mainly where annual temperature sum exceeds *ca*. 1400 degree days above 5°C, coldest month mean temperature is above *ca.*–10°C, and seasonal moisture deficiency is not extreme (Huntley *et al.* 2007).

It is a predominantly lowland species. Breeding habitat types preferred by the Roller are open forests, old parks, riverine forests, orchards, poplar and willow stands and riverbanks. On farmland, Rollers mostly occur in open Mediterranean habitats, arable and improved

grassland, steppe habitats, perennial crop, pastoral woodland, agricultural habitats (Cramp 1985; Tucker & Evans 1997).

They mainly nest in abandoned woodpecker (especially Green Woodpecker *Picus viridis*) cavities in oaks (*Quercus sp*.), pines (especially *Pinus sylvestris*) and in White Poplars (*Populus alba*), less frequently in Willows *Salix sp*. and in natural cavities of Planes (*Platanus orientalis*), mainly 4-10 m up (Fry & Fry 1999, Butler 2001, Poole 2007.). Where suitable trees are lacking they nest in exposed banks, walls, or fissured rock-faces (Cramp 1985) and often in loess and sand cliffs, especially where other hollow nesting birds are also present. Provision of suitable nest-boxes can increase the population size significantly in areas where natural cavities are scarce (Avilés *et al*. 1999). Rollers in France exhibit a strong preference for cavities with a south-westerly or north-westerly aspect (Butler 2001).

Rollers have formerly been described as aggressively territorial, solitary breeders (Samwald & Štumberger 1997), but they occur in distinct meta-populations and they are distributed in clusters within these meta-populations.

They mostly forage in agricultural habitats, especially meadows (May & August) and cereals (June & July). Rollers hunt from suitable commanding lookout posts on trees, overhead wires, etc. above bare or sparsely vegetated ground or short vegetation providing little cover for prey. They stoop on prey as the birds move only clumsily for brief distances on the ground (Cramp 1985).

The species is extremely polyphagous, eating a wide variety of invertebrates and occasionally vertebrates or even fruits (Thiollay 1985, Klausnitzer 1963, Cramp 1985). They prey upon hard insects, mainly Coleoptera and Orthoptera followed by *Araneae* and Hymenoptera (Tidmarsh 2003, Avilés & Parejo 2002). Animals other than insects comprise about 3% of prey: scorpions, millipedes, centipedes, spiders, worms, molluscs, frogs, lizards, snakes, small mammals and birds (Fry & Fry 1999).

Survival and productivity

The species has a monogamous mating system (Dementiev & Gladkov 1951). Nest-site and hunting area fidelity for up to 3 years was observed (Robel & Bude 1982, Hüe & Rivoire 1947).
The generation length of the Roller is approximately 5 and half years (BirdLife International, *unpublished data*). The age of first breeding in captive birds is one year but regular occurrence of non-breeders suggest that most birds in the wild do not breed before their second year (Glutz & Bauer 1980).

Scarce available data on nest re-occupation suggest relatively high survival rate of adults (Václav, R., Valera, F., Martínez, T., *unpublished data*; Racinskis, *unpublished data*).

Breeding cycle starts usually in April/May and ends in August with the peak period in mid June/mid July. The egg-laying period is between May and July, mainly mid June to mid July. Incubation lasts about 18 (17-20) days, and the fledging period is 26-27 days (Fry & Fry 1999). The 4 (2-7) eggs are incubated mainly by the female, who starts before the clutch has been completed (Cramp 1985, Avilés *et al*. 1999, Fry & Fry 1999, Václav, *pers. comm*.). The mean clutch size varies between 3.59 (Poland, Sosnowski & Chmielewski 1996) and 5.07 (Spain,

Avilés *et al*. 1999)

The reproductive success (fledging/successful nest) in declining Polish (Sosnowski & Chmielewski 1996) and German (Creutz 1979) populations is between 1.5 – 1.8, while in increasing populations in south-west Spain and in France is 3.74 (Avilés *et al*. 1999) and 4.0 - 5.4 respectively (Poole 2007).

In south-west Spain Rollers nesting in nest-boxes erected in open pasture field had the highest breeding success, suggesting that this is the most suitable habitat for Rollers in the region. Agricultural practices around nests negatively affected the breeding success resulting in reduced egg productivity and increased chick mortality, with higher losses in irrigated fields (Avilés & Parejo 2004). In the Northern range countries Pine Marten (*Martes martes*) is an important clutch predator.

Population size and trend

The Roller has a large global population, including an estimated number of 55,000 - 117,000 breeding pairs in Europe (50-74% of the global breeding range) and 13,000-25,000 breeding pairs in the EU 27.
The species has gone extinct in a number of countries in the past century, including Germany, Denmark, Sweden (Snow & Perrins, 1998) and Finland (Avilés *et al*. 1999), possibly due to habitat loss as a result of agricultural intensification (Snow & Perrins 1998).
The species in Europe underwent a moderate decline between 1970– 1990. With few exceptions, it continued to decline across most of its European range during 1990–2000 - including key populations in Turkey and Russia (BirdLife International 2004a). The overall declines exceeded 30% in three generations (15 years). Populations in northern Europe have undergone severe declines (Estonia: from 50-100 pairs in 1998 to no breeding pairs in 2004; Lithuania: from 1,000-2,000 pairs in 1970s to 20 pairs in 2004), and in Russia it has now disappeared from the northern part of its range. However, there is no evidence of any declines in Central Asia (BirdLife International 2008).
According to the modelled climate changes the climatic conditions suitable for the species will contract in the south of Europe (Spain, Italy and Greece) while they will expand further north and east (Huntley *et al*. 2007).

Map 2. Population trends for the 1990 - 2000 period (BirdLife International 2004a)

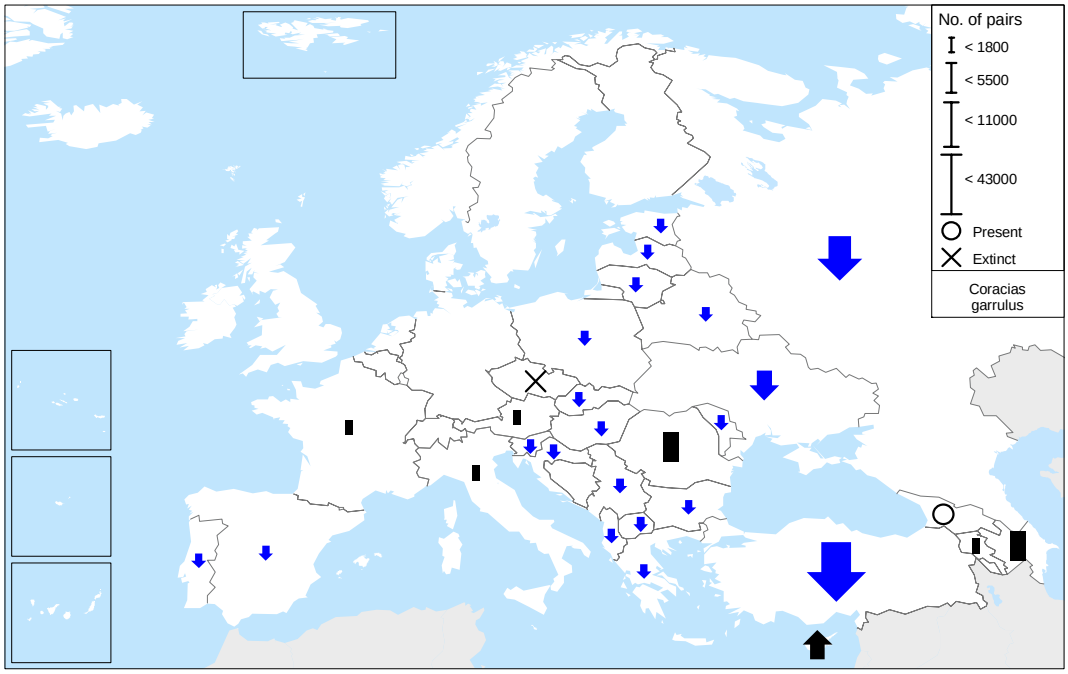


Table 2. Population size and trend by country

Country	Breeding pairs.	Quality	Year(s) of the latest estimate	Breeding Population trend in the last 15 years (= 3 generations)	Quality
Albania	10 - 50	M	2002	decline	P
Armenia	300 - 650	M	2000-2002	stable	M
Austria	**10 - 18**	**G**	**2001-2008**	**stable**	**G**
Azerbaijan	1,000 – 5,000	P	1996-2000	stable	P
Belarus	20 - 50	M	2008	large decline	M
Bulgaria	**2,500 – 5,500**	**M**	**1990-2005**	**small increase**	**M**
Croatia	0 - 5	M	2002	large decline	P
Cyprus	2,000 – 4,000	P	1994-2000	small increase	P
Czech Republic	**0**	**G**	**2000**	**extinct**	
Estonia	**1 – 5**	**G**	**2003-2007**	**moderate decline**	**M**
France	**800 – 1,000**	**M**	**2007**	**moderate increase**	**M**
Georgia	present				
Greece	**200 - 300**	**P**	**1995-2000**	**small decline**	**P**
Hungary	**1,000**	**G**	**2007**	**stable**	**G**
Italy	**300 - 400**	**P**	**2003**	**stable**	**P**
Latvia	**20 - 30**	**G**	**2005**	**large decline**	**M**
Lithuania	**35 - 50**	**G**	**2007**	**large decline**	**G**

Country	Breeding pairs.	Quality	Year(s) of the latest estimate	Breeding Population trend in the last 15 years (= 3 generations)	Quality
Macedonia, the Former Yugoslav Republic of	300 – 1,000	P		moderate decline	P
Moldova	50 - 80	M		large decline	P
Poland	**60 - 80**	**G**	**2007**	**moderate decline**	**M**
Portugal	**80 - 150**	**M**	**2001-2005**	**moderate decline**	**P**
Romania	**4,600 – 6,500**	**P**	**2002**	**small decline?**	**P**
Russia (European)	6,000 – 20,000	P	1990-2000	moderate decline	M
Serbia	70 - 120	M	2007-2008	small increase	M
Slovakia	1 - 20	P	2008	large decline	P
Slovenia	**0**		**2008**	**possibly extinct**	**M**
Spain	**2,000 – 6,000**	**M**	**2006**	**moderate decline**	**P**
Turkey	30,000 – 60,000	P	2001	moderate decline	P
Ukraine	4,000 – 5,000	M	1990-2000	large decline	G
Total EU (27)	**13,000 – 25,000**			**decline**	
Total Europe	**55,000 – 117,000**			**decline**	

Notes: G – Good; M – Medium; P – Poor.

2 – THREATS

General overview of threats

The loss of suitable habitat due to changing agricultural practices, loss of nest sites, and use of pesticides are considered to be the main causes of recent widespread decline (BirdLife International 2004a). Very few and sporadic pieces of information are available on the survival of Rollers on their migration routes as well as in their wintering areas. Available information about mortality factors such as electrocution does not allow precise modelling of their overall effects on Roller populations. Nevertheless, the difference in breeding success between declining and stable/increasing populations indicates that habitat changes in the breeding habitat are having a negative impact on the population.

List of critical threats

This list was defined at an experts' workshop using the following definitions:
Critical: a factor causing or likely to cause very rapid declines and/or extinction;
High: a factor causing or likely to cause rapid decline leading to depletion;
Medium: a factor causing or likely to cause relatively slow but significant declines.

The difference in breeding success between declining and stable/increasing populations as described above let the participants assume, also in the lack of available information regarding mortality outside the breeding season, that the survival rate of adults is not a limiting factor (Václav, R., Valera, F., Martínez, T., unpublished data).

- **Land abandonment/ reduced management (e.g. meadows and pastures)**
  Roller requires grazed grasslands as tall and dense grass cover reduces its hunting success.

- **Intensification of grassland management**
  The intensification of management (fertilization, ploughing, seeding/promotion of few grass species, pest control) reduces the biomass and diversity of potential prey for the species.

- **Conversion of permanent grassland to other land use**
  The transformation of pastures in other cultures or land uses (e.g. olive groves or in herbaceous monocultures) reduce habitat and food availability for the Roller.

- **Increasing habitat homogeneity (e.g. loss of field margins and increased field size)**
  The intensification of agriculture is resulting in the creation of large fields and the reduction of the extent of field margins hedgerows, tracks, ditches and fallow land that represent important habitat for the species' prey and offer nesting opportunity for the Roller.

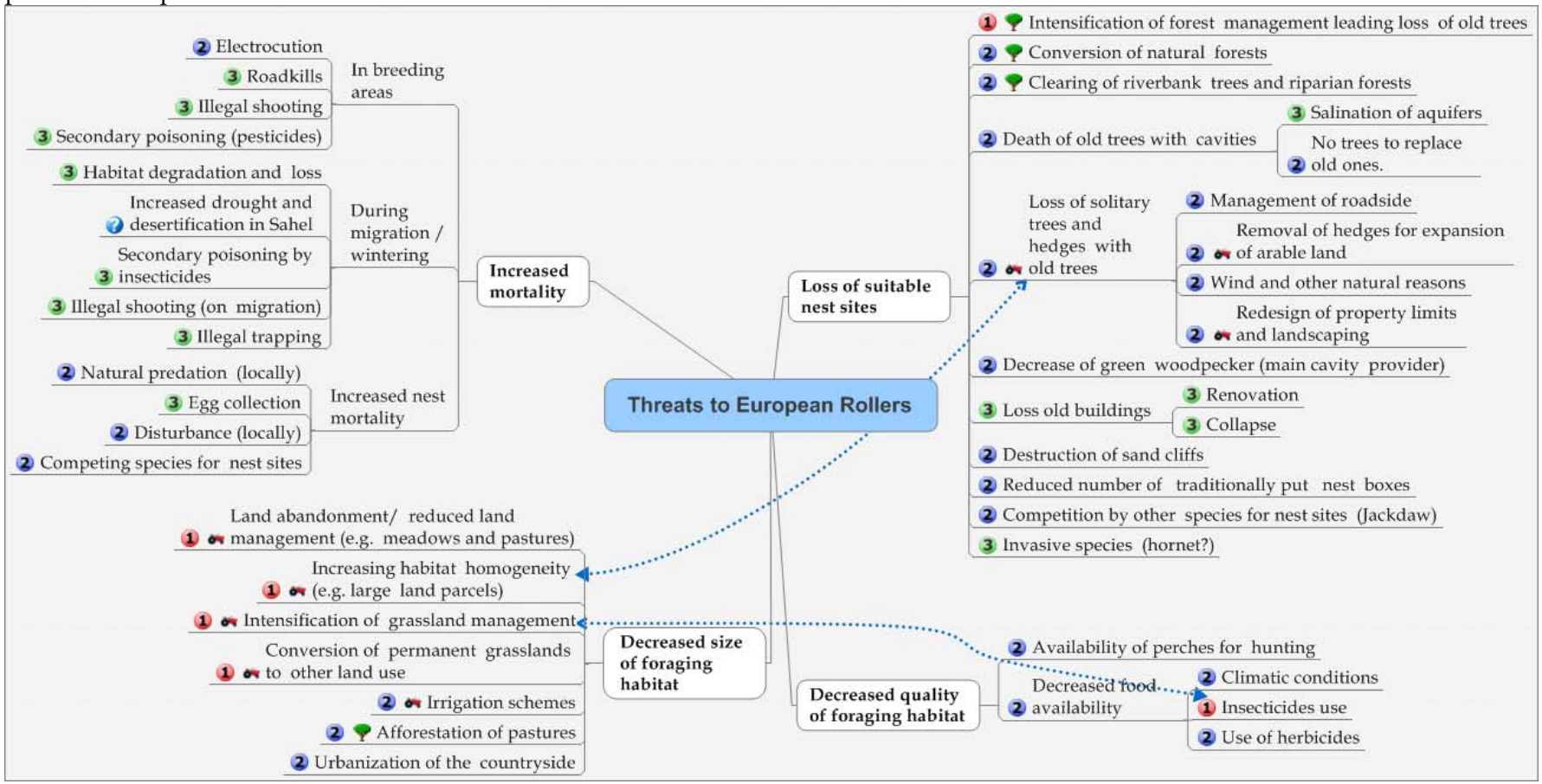
- **Intensification of forest management leading to loss of old trees**
  The Roller requires large trees, often partially dead. The intensification of forest practices is promoting the removal of dead/decaying trees (considered a potential source of pathogens and pests) and the replacement with fast growing trees that are not suitable for the species.

The species has only recently been recognised as in need of specific conservation actions; Decision makers at all levels as well as site managers are not aware of the importance of the species to meet their conservation targets.

The Roller's detailed habitat requirement and - more crucially - the limiting factors and their relative importance are still poorly known. Researchers need to fill the large knowledge gap that this action plan has identified.

Problem tree

The problem tree includes threats considered critical (1) and important (2) based on available key knowledge. The full list of threats is shown in Annex 1. The small tree identifies threats related to forest management and policies; the tractor indicates threats by agriculture practices and policies.



3 - POLICIES AND LEGISLATION RELEVANT FOR MANAGEMENT

Bern Convention - Convention on the Conservation of European Wildlife and Natural Habitats

Category: **Appendix II**

Aim: To maintain populations of wild flora and fauna with particular emphasis on endangered and vulnerable species, including migratory species.
Appendix II: lists protected fauna species.

EU Birds Directive – Council Directive on the conservation of wild birds (79/409/EEC)

Category: **Annex I**

Aim: to protect wild birds and their habitats, e.g. through the designation of Special Protection Areas (SPAs).

Annex I: The directive requires that species listed in Annex I 'shall be subject of special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution ' and that 'Member States shall classify in particular the most suitable territories in number and size as special protection areas for the conservation of these species, taking into account their protection requirements in the geographical sea and land area where this Directive applies '.

Bonn Convention - Convention on the Conservation of Migratory Species of Wild Animals

Category: **Appendix II**

Aim: To conserve terrestrial, marine and avian migratory species throughout their range.

Appendix II refers to migratory species that have an unfavourable conservation status or would benefit significantly from international co-operation organised by tailored agreements. The Convention encourages the Range States to conclude global or regional Agreements for the conservation and management of individual species or, more often of a group, of species listed in Appendix II.

Global status[1]	European status[2]	SPEC category[3]	EU Status	EU Bird Directive Annex[4]	Bern Convention Appendix[5]	Bonn Convention Appendix[6]
NT	VU (A2b)	2	VU	I	II	II

[1] *IUCN 2008. 2008 IUCN Red List of Threatened Species.*
Categories: EX = Extinct; EW = Extinct in the Wild; CR = Critically endangered, EN = Endangered; VU = Vulnerable; LR = Lower Risk, CD = conservation dependent, NT = near threatened, LC = least concern; DD = data deficient, NE = Not Evaluated.

[2] *BirdLife International (2004a) Birds in Europe: population estimates, trends and conservation status. Second edition. Wageningen, The Netherlands: BirdLife International. (BirdLife Conservation Series No. 12). Categories as above*

[3] *BirdLife International (2004b) Birds in the European Union: a status assessment. Wageningen, The Netherlands: BirdLife International.*

[4] *The species shall be subjected to special conservation measures concerning their habitat in order to ensure their survival and reproduction in their area of distribution.*

[5] *Give special attention to the protection of areas that are of importance (Article 4) and ensure the*

special protection of the species (Article 6). For more details see the Convention text.

[6] *Animals for which agreements need to be made for the conservation and management of these species. For more details see the Convention text.*

National policies, legislation

The Roller is a protected species throughout most of its distribution range (Annex 3 provides an overview of the protection status in Europe). The species is listed in Annex I of the Birds Directive and is protected in all EU countries.

The inclusion of the species breeding territories in protected areas varies considerably between countries. Where the species has small populations and is concentrated, it has been well covered by SPAs (e.g. 100% in Austria, Estonia and Slovakia). Over 50% of the national populations are in SPAs in Hungary, Lithuania, Portugal and Latvia. Only a quarter of the Polish population is captured by the SPA network and the percentage is only 10% in Spain. IBAs cover over half of the Serbian population, but most of them are not legally protected.

Recent conservation activities

Species action plans have been developed in Hungary, Latvia, and Andalusia (Spain); similar documents are being drafted in Slovakia and Catalonia (Spain). Working groups (incl. informal structures and mostly composed by volunteers) are present in Austria, Belarus, France, Latvia, Lithuania, Serbia and Slovakia. (Annex 4)

Most range countries have monitoring programmes in place at different scales (national, regional, local) (Annex 5)
In Latvia conservation actions are being implemented since the compilations of the national action plan. Nest boxes, often in the frame of research programmes have been installed in France, Hungary, Serbia, Slovakia and Spain.

4 - FRAMEWORK FOR ACTION

Goal
To restore the European population of the Roller to a favourable conservation status.

The target for favourable conservation status of the Roller in the EU is to:

- maintain a population larger than 10,000 breeding pairs;
- restore the area of the distribution to 1990 levels (cf. EBCC Atlas of European Breeding Birds, Hagemejer & Blair, 1997);
- In the short term, halt the decline of the species. In the long term - maintain overall stable population trend for at least 3 generations (15 years).

Objectives of the plan

Objective 1	Clarify the population status and viability of Roller populations in Europe by 2012.
Objective 2	Stop the decline of the European population by 2020 and promote conditions that will help populations to recover to favourable conservation status and will allow for range expansion in Europe.

Results

Result 1.1	Better planned and implemented Roller conservation measures.
Result 1.2	Increased knowledge on the status, distribution and survival of Roller populations.
Result 1.3	Higher level of awareness of key stakeholders achieved.
Result 2.1	Sufficient foraging habitat is available throughout the distribution range in terms of size and quality.
Result 2.2	Sufficient number of nest-sites is available throughout the breeding distribution.
Result 2.3	Reduced mortality to a level where it is not a limiting factor of population expansion.

Actions

Table 3 Actions *corresponding to the results and ranked according to their importance, following from the problem tree.*

Results	Actions	Overall priority level	Time scale	Responsible organization
***Objective* 1.** Clarify the population status and viability of Roller populations in Europe by 2012.				
1.1 Better planned and implemented Roller conservation measures.	1.1.1 Develop national species action plans. *Critical:* all range countries.	C	Short	Ministries of Environment, National nature conservation authorities
	1.1.2 Legally protect under national and/or international (e.g. Natura 2000) legislation the priority areas. *Critical*: all range countries	C	Medium	Ministries of Environment, National nature conservation authorities
	1.1.3 Develop site management plans for Roller priority areas or include Roller conservation measures in existing ones *Critical*: all range countries	C	Medium	Site management authorities
	1.1.4 Increase the effectiveness of Environmental Impact Assessments for projects affecting Roller habitats. *Critical*: all range countries.	C	Short	National nature conservation authorities
1.2 Increased knowledge on the status, distribution, survival and effective conservation measures for Roller populations.	1.2.1. Develop monitoring schemes and implement annual monitoring on Roller populations and breeding success. *Critical:* all range countries.	C	Short	NGOs and scientific institutions and national conservation authorities in the member states

	1.2.2. Fill critical knowledge gaps, develop and implement research plans focusing on Roller mortality, survival rates, factors influencing productivity and factors limiting expansion. *Critical:* all range countries.	C	Short	NGOs and scientific institutions in the member states
	1.2.3. Define priority areas for Roller conservation *Critical:* all range countries	C	Immediate	NGOs and scientific institutions in the member states
	1.2.4. Design and promote best practice agro-environmental measures targeting Roller. *Critical*: all range countries.	C	Medium	NGOs and scientific institutions in the member states
	1.2.5. Design and promote best practice forestry measures targeting Roller. *Critical*: all range countries.	C	Medium	NGOs and scientific institutions in the member states
	1.2.6. Develop best practice guide for nest box placement, design and maintenance to reduce nest site competition with other species and natural predation. *Critical*: Slovakia *High*: Estonia, Latvia, Poland, Portugal, Spain.	C	Short	NGOs and scientific institutions in the member states
	1.2.7. Analyse Roller carcasses to investigate secondary poisoning. Identify poisoning chemicals and promote their restriction/banning in Roller priority areas. *High:* Romania, Spain.	L	Long	NGOs and scientific institutions in the member states

1.3 Higher level of awareness of key stakeholders achieved	1.3.1	Raise the awareness about the value and conservation status of the Roller among key stakeholders (nature conservation organisations, landowners, farmers, experts on chemical plant protection, foresters, municipalities, electric utilities, urban and infrastructure development planners, general public). Critical: all range countries. *Critical:* all range countries.	C	Short	NGOs and scientific institutions in the member states
	1.3.2	Ensure that state, regional and local nature conservation agencies are aware of Roller priority areas, *High:* France, Hungary, Poland, Portugal, Slovakia, Spain.	M	Long	Ministries of Environment

Objective 2. Stop the decline of the European population by 2020 and promote conditions which will help populations and range expansion in Europe					
Results	**Actions**		**Overall Priority level**	**Time scale**	**Responsible organization**
2.1 Sufficient foraging habitat is available throughout the distribution range in terms of size and quality.	2.1.1	Promote habitat heterogeneity through e.g. agro-environmental schemes. *Critical*: Portugal *High:* Belarus, Bulgaria, France, Portugal, Romania, Slovakia, Spain	H	Medium	Ministries of Environment, Agriculture, National nature conservation authorities
	2.1.2	Promote legal restrictions to prevent the conversion of permanent grasslands to other land use. *Critical:* Hungary, Poland, Portugal, Serbia, Slovakia, Spain. *High:* Estonia, France, Romania.	H	Long	Ministries of Environment, Agriculture, National nature conservation authorities

	2.1.3 Promote grazing livestock practices and hay mowing on meadows and grasslands by increasing the economic viability of livestock farming in high priority Roller areas through agro-environmental schemes or other rural development measures. *Critical*: Hungary, Poland. *High:* Bulgaria, Estonia, France, Latvia, Lithuania, Romania, Serbia, Slovakia, Spain.	H	Long	Ministries of Environment, Agriculture, National nature conservation authorities
	2.1.4 Promote / improve environmental impact assessment of irrigation schemes. *Critical:* Portugal. *High:* Belarus, Romania, Slovakia, Spain.	H	Long	Ministries of Environment, Agriculture
	2.1.5 Promote set aside retention in fallow land (through voluntary measures if not legally required). *Critical:* France, Poland. *High:* Hungary.	M	Long	Ministries of Environment, Agriculture
	2.1.6 Protect and restore non-productive features such as tracks, ditches, fallow and beetle banks and non-sprayed patches to increase prey availability. *Critical:* France, Poland. *High:* Portugal, Romania, Slovakia, Spain.	H	Medium	Ministries of Environment, Agriculture, National nature conservation authorities
	2.1.7 Identify and ban insecticides and herbicides with adverse effects on Roller populations in priority areas. Reduce pesticide use, promote low-chemical-input farming. *Critical:* Austria, Bulgaria. *High:* Belarus, France, Hungary, Romania, Slovakia, Spain.	H	Medium	Ministries of Environment, Agriculture

	2.1.8 Support organic farming using Roller as flagship speies. *Critical:* Austria, Bulgaria *High*: Belarus, France, Hungary, Romania, Slovakia, Spain.	M	Long	Ministries of Environment, Agriculture and NGOs
	2.1.9 Ensure that cross-compliance requirements are strictly adhered to; especially avoid afforestation of pastures and other permanent grasslands. *High:* Hungary, Poland, Slovakia, Spain, also Serbia	M	Long	Ministries of Environment, Agriculture
	2.1.10 Ensure that Roller priority areas are taken into account during urban development planning. *High:* France, Hungary, Poland, Portugal, Slovakia, Spain.	M	Long	Ministries of Environment, National spatial planning authorities
	2.1.11 Provide natural and artificial perches for hunting in areas where they are missing. *High:* Bulgaria, France, Poland, Slovakia.	M	Long	Nature conservation authorities, site managers, farmers beneficiaries to agri-environment
2.2. Sufficient number of nest-sites is available throughout the breeding distribution	2.2.1 Ensure that old cavity trees are not cut by forestry operations. *Critical:* France, Hungary, Serbia, Slovakia. *High:* Belarus, Bulgaria, Latvia, Poland, Portugal, Romania, Spain	H	Long	Ministries of Environment, Forest agency, National nature conservation authorities
	2.2.2 Conserve riverbank trees and riparian forests as protected habitat types and features of the landscape. *Critical:* France, Poland, Slovakia. *High:* Bulgaria, Romania.	M	Long	Ministries of Environment, Forestry agency, National nature conservation authorities

	2.2.3 Map, protect and restore hedges and suitable wood lots, trees in farmland. *Critical:* Slovakia. *High:* Austria, Belarus, France, Poland, Spain.	M	Long	Ministry of Environment, National nature conservation authorities
	2.2.4 Promote planting of native soft woods and the elimination of introduced tree species in Roller priority areas through forestry planning and site management plans. *Critical:* Poland. *High:* Hungary, Serbia, Slovakia.	M	Long	Ministries of Environment, Forestry agency
	2.2.5 Promote legal protection of sand cliffs as breeding habitat for Rollers and other birds *Critical:* Spain, Bulgaria	M	Medium	Ministry of Environment
	2.2.6 Install nest boxes including in areas with healthy populations but with likely shortage of nest sites. *Critical:* Poland. *High:* Bulgaria, Slovakia, Spain.	M	Long	NGOs and nature conservation authorities, protected area managers
	2.2.7 Provide alternative nest sites (nest boxes) near old buildings with nests to avoid nest-site destruction. *Critical*: Portugal. *High:* Spain.	L	Medium	NGOs and nature conservation authorities, protected area managers
2.3. Reduced mortality to a level where it is not a limiting factor of population expansion	2.3.1 Promote international cooperation for the study of Roller movements and the threats along flyways. Critical: all range countries.	H	Long	Ministries of Environment, NGOs
	2.3.2 Promote bird friendly electric pylon design. Replace, modify or retrofit power lines to prevent Roller electrocution in priority areas. *High:* Hungary, Portugal.	M	Medium	Ministries of Environment, utilities

	2.3.3 Introduce temporary speed limit restrictions in core breeding areas. *High:* Spain.	L	Medium	National nature conservation authority, National traffic regulation authorities

Priority level:
C - Critical
H - High
M - Medium
L - Low

Time scales attached to each Action:
- Immediate: completed within the next year.
- Short: completed within the next 3 years.
- Medium: completed within the next 5 years.
- Long: completed within the next 10 years.

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ANNEX 1

Threats importance at population/group of countries level

Threat description	**Austria**	**Belarus**	**Bulgaria**	**Estonia**	**France**	**Hungary**	**Latvia**	**Lithuania**	**Poland**	**Portugal**	**Romania**	**Serbia**	**Slovakia**	**Spain**	**Turkey**
1. Increased mortality															
1.1. Increased adult mortality in breeding areas															
1.1.1. Electrocution	L		L	L	L	H	?	L	L	H	L	M	?	M	?
1.1.2. Road kills	M		L	L	L	M	L	L	L	?	L	?	?	H	L
1.1.3. Illegal shooting (breeding areas)	?		M	L	L	L	L	L	L	L	L		M	L	L
1.1.4. Secondary poisoning by insecticides	?		?		L	M	?	L		?	H		M	H	M
1.2. Decreased survival on migration and wintering															
1.2.1. Habitat degradation and loss in S Europe (see above), Middle East and Africa	?		H		?			?			?		?		M
1.2.2. Increased drought and desertification in Sahel	?				?			?			?		?		
1.2.3. Secondary poisoning by insecticides	?		M					?			?		?		M
1.2.4. Illegal shooting (on migration)	?		L					?			?		M		L
1.2.5. Illegal trapping	?		L					?			L		?		L
1.3. Increased nest mortality															
1.3.1. Natural predation (locally)	?		L		L	M	H	L	L	L			C	L	L
1.3.2. Egg and nestling collection	?		L		L	L	L	L	L	L	L		M	L	L
1.3.3. Disturbance (locally)	H		L		L	M	M	M	M	M	L		M	H	M
1.3.4. Competing species for nest sites	M		L		M	M	M	L	H	H			L	H	M
2. Decreased reproductive output															
2.1. Decreased size of foraging habitat															
2.1.1. Land abandonment/ reduced land management (e.g. meadows and pastures)	M	M	H	H	H	C	H	H	C	?	H	H	H	H	M

2.1.2. Afforestation of pastures	L	L	L	M	L	H		M	H	M	M	H	H	H	M
2.1.3. Increase in monoculture: intensive olive plantation and fodder	C	H	M	M	M	M	L	L	M	C	H	M	H	H	L
2.1.4. Cultivation of fallow land (no set aside)	C	M	M	M	C	H	M	L	C	L	?	M	M	L	L
2.1.5. Irrigation schemes	L	-	M	L	M	L	L	L	H	H	?	L	L	C	M
2.1.6. Increasing habitat homogeneity (e.g. large land parcels)	C	H	H	M	H	M	M	L	M	H	H	M	M	H	M
2.1.7. Intensification of grassland management	C	M	M	M	M	L	M	M	L	M	M	L	H	M	M
2.1.8. Disappearing of non productive pieces of land (tracks, ditches, fallow)	C	M	M	L	C	M	M	L	C	H	M	M	H	H	M
2.1.9. Urbanization of the countryside	H	L	L	?	H	H	M	L	H	H	M	M	H	H	L
2.1.10. Conversion of permanent grasslands to other land use	M	M	M	H	H	C	M	M	C	C	H	C	C	C	L
2.2. Loss of suitable nest sites															
2.2.1. Replacing native soft woods (poplar, willow) with hard woods (oak) or introduced trees (*Robinia pseudoacacia*)		L	M	L	L	H	L	L	L	L	M	H	M	L	L
2.2.2. Conversion of natural forests		H	M	M	L	M	L	M	L	L	M	M	C	L	L
2.2.3. Logging of used/suitable trees		H	H	M	C	C	M	M	H	H	H	C	C	H	M
2.2.4. Clearing of riverbank trees and riparian forests	L	M	H	L	C	L	L	L	C	L	H	L	C	L	M
2.2.5. Loss old buildings	L		L			L	L	L	L		L	L	L	H	M
2.2.5.1.Renovation	L				M				L	C	L	L		H	L
2.2.5.2.Collapse	L				L				L	C	L	L		H	M
2.2.6. Intensification of forest management leading loss of old trees	M	H	H		L	H	H	M	L	L	H	C	C	L	M
2.2.7. Destruction of sand cliffs	L	L	M		L	L	L	L	L	L	L	M	L	C	M
2.2.8. Death of old trees with cavities	M	L	H	L	L		M	L	C	L	L	M		L	M
2.2.8.1. Salination of aquifers			M	L	L	L			L	L			C		
2.2.8.2. No trees to replace old ones.			L	L	L	H			C	L		M	H		

2.2.9. Decrease of green woodpecker (main cavity provider)	?	L	L	L	L	L	L	M	C	L	M	?	H	H	?
2.2.10. Loss of solitary trees and hedges with old trees	H	H	M				M	M	H	L		M		H	L
2.2.10.1. Management of roadside	L	H	M	L	M	M			H	L	M	M	L		
2.2.10.2. Removal of hedges for expansion of arable land	H	L	M	L	H	L			M	L	M		C		
2.2.10.3. Wind and other natural reasons	M	L	L	L	L	H			H	L	M	M	C		
2.2.10.4. Redesign of property limits and landscaping	C	L	L		H	M			M	L	M	M	H	H	
2.2.11. Reduced number of traditionally put nest boxes	L		L	L	L	L	M	M	L	L	L	L	L	H	L
2.2.12. Competition by other species for nest sites (Jackdaw)	M	M	M		L	L	L	L	L	L		M	L	H	?
2.2.13. Invasive species (hornet?)	L	L	L		L		L		L			L	L	H	?
2.3. Decreased quality of foraging habitat															
2.3.1. Availability of perches for hunting	M	M	H		H	M	M		C	L	L	M	C	L	L
2.3.2. Decreased food availability	C	?	H				H	M	C	L			H	M	
2.3.2.1. Climatic conditions	M	L	M	M	L	M		M	H	L		M	H	L	
2.3.2.2. Insecticides use	C	H	C		H	H			M	L	H	M	H	H	M
2.3.3. Use of herbicides	H	H	C		H	M	?	?	M	L	M	L	H	H	M

Notes: C – Critical; H – High; M – Medium; L – Low; *Empty cell - n/a* - not applicable; ? - Not enough information

NB! Information in this table was assessed at the experts' workshop and is not a complete list of threats from all range states.

ANNEX 2

Table 2a. Most important sites for the Roller in the European Union and their SPA status

Country	IBA Code	Site name	Area (km²)	SPA Code	Name of SPA	Area (km²)	Total protected IBA (km²)
Austria	AT043	Südoststeirisches Hügelland	108.64	AT2230000	Teile des südoststeirischen Hügellandes inklusive Höll und Grabenlandbäche	156.67	75.5
Bulgaria	BG009	Zlatiata	434.93	BG0002009	Zlatiata	434.95	434.8
	BG062	Ludogorie	913.86	BG0002062	Ludogorie	913.88	913.3
	BG074	Nikopolsko plato	222.60	BG0002074	Nikopolsko Plateau	222.62	222.5
	BG096	Obnova	54.22	BG0002096	Obnova	54.24	54.2
France	FR224	Gorges du Gardon	195.84	FR9110081	Gorges du Gardon	70.11	126.8
				FR9112031	Camp des Garigues	20.85	41.7
	FR225	Hautes garrigues du Montpellierais	907.06	FR9112004	Hautes garrigues du ontpellierais	455.35	430.3
				FR9112011	Gorges de la vis et cirque de Navacelles	202.75	0.0
				FR9112012	Gorges de Rieutord, Fage et Cagnasse	122.81	60.1
	FR229	Etangs de Vendres, Pissevache et Lespignan	48.66	FR9110080	Montagne de la Clape	90.14	0.1
				FR9110108	Basse plaine de l'Aude	48.39	45.9
	FR234	Petite Camargue fluvio-lacustre	193.84	FR9112001	Camargue gardoise fluvio-lacustre	57.12	56.7
				FR9112013	Petite camargue laguno-marine	156.46	4.9
				FR9112017	Etang de mauguio	74.06	0.0
				FR9310019	Camargue	1,137.57	1.0
	FR239	Camargue	762.58	FR9310019	Camargue	1,137.57	760.4
	FR240	Crau	441.57	FR9310064	Crau	392.27	377.2

Country	IBA Code	Site name	Area (km²)	SPA Code	Name of SPA	Area (km²)	Total protected IBA (km²)
				FR9312001	Marais entre Crau et Grand Rhône	72.10	1.0
				FR9312013	Les Alpilles	269.34	0.1
	FR245	Marais entre Crau et Grand Rhône: Meyranne, Chanoine, Plan de Bourg et Salins du Caban	56.58	FR9310064	Crau	392.27	0.8
				FR9312001	Marais entre Crau et Grand Rhône	72.10	52.0
	FR250	Plateau de l'Arbois, garrigues de Lancon et chaîne des Côtes	347.23	FR9310069	Garrigues de Lançon et Chaînes alentour	273.95	263.4
				FR9312009	Plateau de l'Arbois	42.99	42.7
	FR251	Plaine des Maures	75.91	FR9310110	Plaine des Maures	45.22	45.2
Hungary	HU021	JászkarajenÅ‘ környéki puszták	80.67	HUDI10004	Jászkarajenõi puszták	105.38	79.1
	HU026	Alsó-Tisza-völgy	294.84	HUKN10007	Alsó-Tisza-völgy	357.32	275.6
	HU036	Hevesi-sík	639.66	HUBN10004	Hevesi-sík	774.79	527.2
				HUHN10002	Hortobágy	1,207.98	0.4
	HU037	Borsodi-MezÅ‘ség	390.18	HUBN10002	Borsodi-sík	370.45	368.2
	(blank)	Kolon-tó	345.03	HUKN10002	Kiskunsági szikes tavak és az õrjegi turjánvidék	357.53	307.3
Italy	IT117	Litorale Romano	338.30	IT6030026	Lago di Traiano	0.62	0.6
				IT6030084	Castel Porziano (Tenuta presidenziale)	60.38	59.8
	IT125	Fiume Biferno	448.42	IT7228230	Lago di Guadalfiera - Foce del Fiume Biferno	287.44	278.6
	IT126	Monti della Daunia	746.10	IT7222108	Calanchi Succida - Tappino	2.28	0.4

Country	IBA Code	Site name	Area (km²)	SPA Code	Name of SPA	Area (km²)	Total protected IBA (km²)
				IT7222124	Vallone S. Maria	19.74	9.7
				IT7222248	Lago di Occhito	24.57	24.1
				IT7222253	Bosco Ficarola	7.17	2.3
				IT7222265	Torrente Tona	3.94	1.1
				IT7222267	Località Fantina - Fiume Fortore	3.65	3.2
	IT149	Marchesato e Fiume Neto	702.06	IT9320302	Marchesato e Fiume Neto	702.15	1,403.5
	IT203	Gargano Promontory and Capitanata Wetlands	312.73	IT9110037	Laghi di Lesina e Varano	152.09	303.8
				IT9110038	Paludi presso il Golfo di Manfredonia	144.43	278.9
				IT9110039	Promontorio del Gargano	700.57	1,399.2
			2,059.08	IT9110037	Laghi di Lesina e Varano	152.09	303.8
				IT9110038	Paludi presso il Golfo di Manfredonia	144.43	278.9
				IT9110039	Promontorio del Gargano	700.57	1,399.2
	(blank)	Lago di Bracciano e Monti della Tolfa	906.11	IT6030005	Comprensorio Tolfetano-Cerite-Manziate	698.36	692.0
				IT6030085	Comprensorio Bracciano-Martignano	195.45	193.4
Lithuania	LT032	Aukstaitijos nacionalinis parkas	368.27	LTIGNB003	Vakarine Aukstaitijos nacionalinio parko dalis	350.06	347.7
				LTSVEB002	Labanoro giria	532.03	0.0
	LT034	Dzukijos miskai	585.39	LTVAR0009	Cepkeliu pelke	127.56	0.0
				LTVARB002	Cepkeliu pelke	112.25	0.0
				LTVARB005	Dainavos giria	558.67	558.3
				LTVARB007	Grybaulios zuvininkystes tvenkiniai	7.43	0.0

Country	IBA Code	Site name	Area (km²)	SPA Code	Name of SPA	Area (km²)	Total protected IBA (km²)
Poland	PL038	Puszcza Napiwodzko-Ramucka	1,064.34	PLB280007	Puszcza Napiwodzko-Ramucka	1,167.30	1,052.7
	PL053	Dolina Omulwi	345.38	PLB140005	Doliny Omulwi i P³odownicy	344.14	336.9
				PLB140014	DOLINA DOLNEJ NARWI	259.23	0.1
				PLB280007	Puszcza Napiwodzko-Ramucka	1,167.30	0.0
	PL057	Dolina Dolnego Bugu	698.20	PLB140001	Dolina Dolnego Bugu	743.21	674.5
				PLB140002	Dolina Liwca	274.40	0.0
				PLB140007	Puszcza Bia³a	838.37	0.1
Portugal	PT008	Serra da Malcata	163.43	PTZPE0007	Serra da Malcata	163.56	162.6
	PT012	Serra de Penha Garcia e Campina de Toulões	156.79	ES0000434	Canchos de Ramiro y Ladronera	230.83	0.2
				ES4320001	Canchos de Ramiro	69.23	0.2
	PT029	Castro Verde	835.72	PTZPE0046	Castro Verde	790.59	1,580.8
				PTZPE0047	Vale do Guadiana	765.72	0.0
	PT051	Serra do Caldeirão	711.62	PTCON0037	Monchique	760.01	0.1
				PTCON0057	Caldeirão	472.83	472.2
Slovenia		Doli Slovenskih goric	49.57	SI5000004	Slovenske gorice - doli	49.45	43.9
Spain	ES142	Secanos de Lérida	937.53	ES0000321	Anglesola-Vilagrassa	8.56	8.6
				ES0000322	Granyena	66.46	44.3
				ES5130014	Aiguabarreig Segre-Noguera Pallaresa	101.13	0.0
				ES5130016	Valls del Sió-Llobregós	266.30	169.2
				ES5130021	Secans de la Noguera	89.58	80.8
				ES5130025	Bellmunt-Almenara	34.64	34.5
				ES5130032	Vessants de la Noguera Ribagorçana	65.22	11.9
				ES5130036	Plans de Sió	52.90	52.7
				ES5130037	Secans de Belianes-Preixana	19.24	19.2

Country	IBA Code	Site name	Area (km²)	SPA Code	Name of SPA	Area (km²)	Total protected IBA (km²)
	ES144	Cogul-Alfés	186.27	ES0000021	Secans de Mas de Melons-Alfés	64.22	110.4
				ES5130038	Secans del Segrià i Utxesa	37.90	26.2
	ES168	Monte El Valle y Sierras de Altaona y Escalona	236.26	ES0000269	Monte el valle y Sierras de Altahona y Escalona	148.23	130.3
	ES175	Saladares del Guadalentín	64.41	ES0000268	Saladares del Guadalentin	30.12	27.2
	ES284	Sierra de Pela-Embalse de Orellana-Zorita	1,434.65	ES0000068	Embalse de Orellana y Sierra de Pela	425.97	419.1
				ES0000333	Llanos de Zorita y Embalse de Sierra Brava	187.76	171.5
				ES0000367	La Serena y sierras periféricas	1,534.65	0.6
				ES0000400	Arrozales de Palazuelo y Guadalperales	131.24	53.7
				ES0000401	Colonias de Cernicalo Primilla de Acedera	0.00	0.0
				ES0000408	Vegas del Ruecas, Cubilar y Moheda alta	142.07	142.1
	ES295	Llanos entre Cáceres y Trujillo-Aldea del Cano	1,062.29	ES0000071	Llanos de Cáceres y Sierra de Fuentes	695.84	695.7
				ES0000356	Riberos del Almonte	82.72	18.6
				ES0000416	Embalse de Aldea del Cano	1.09	0.0
				ES0000422	Colonias de Cernicalo Primilla de la ciudad monumental de Caceres	0.16	0.2
Spain				ES0000425	Magasca	108.41	41.6
TOTAL			**20,926.82**			**28,167.74**	**19,689.7**

Table 2b. Most important sites for the Roller in non-EU countries and their protection status

Country	International and national name	Area (ha)	Location		Population		Year	Season	Accuracy	Protected areas name	Type of protected area	% area protected
			Lat	Long	Min	Max						
Serbia	Subotica-Horgoš Sands (Subotičko-horgoška peščara)	11,,000	?	?	13	16	2008	B	Good	Subotica Sands Landscape of Outstanding Values; Ludaš Lake Special Nature Reserve; Seleveljske Pustare Special Nature Reserve	?	
	Kapetanski Rit and surrounding continental Salinas (Kapetnski rit i okolne saltine)	10,000	?	?	15	20	2008	B	Good	Kamaraš Nature Park	?	100%
	North Banat (Severni Banat)	20,000 ha	?	?	14	20	2008	B	Good	Great Bustard Pastures	?	70%
	Deliblato Sands (Deliblatska peščara)	35,000 ha	?	?	1	2	2007-2008	B	Medium (E)	Deliblato Sands Special Nature Reserve	?	30%
Serbia	Negotinska Krajina	Ca. 30,000	?	?	7	13	2005-2007	B	Medium (E)	-	1	90%

	(Negotinska Krajina)	ha										
	Šumadija (Šumadija)	Cca 10,000 ha	?	?	4	10	2007	B	Medium (I)	-	?	10%
	Vršac Surroundings (Okolina Vršca)	15,000 ha	?	?	1	3	2005	B	Medium (E)	Vršački Bred Lndscape of Outstanding Values	?	0%
	Ağrı Dağı	109,726	44,30 E	39,68 N	Present	?	1995-2005	B	Poor	National Park	Category II: National Park	50%
Turkey	Akdağ-Denizli	126,946	28,81 E	37,76 N	4	?	1995-2005	B	Good (O)	No protection status	?	74,624 ha protected
	Allahuekber dağları	295,968	42,51 E	40,64 N	5	?	1995-2005	B	Good (O)	National Park	Category II: National Park	No protected area
	Amanos dağları	372,779	36,34 E	36,85 N	Present	?	1995-2005	B	Poor	Nature Protection Site, Wildlife Protection Area	Category Ib: Wilderness Area, and Category IV: Habitat / Species Management Area	
	Armutlu Yarımadası	80,038	29,05 E	40,54 N	Present	?	1995-2005	B	Poor	No protection status	?	30,128 ha protected
	Batı Menteşe Dağları	142,222	27,76 E	37,49 N	Present	?	1995-2005	B	Poor	Archaeological and Natural SİT	Category III: Natural Monument	No protected area
	Beydağları	191,178	30,18 E	36,75 N	Present	?	1995-2005	B	Poor	Natural SİT	Category III: Natural Monument	823 ha protected
	Boz dağlar	236,126	27,98 E	38,34 N	Present	?	1995-2005	B	Poor	Natural SİT	Category III: Natural	35,615 ha protected

											Monument	
	Bozova	164,743	38,69 E	37,50 N	Present	?	1995-2005	B	Poor	No protection status	?	5,819 ha protected
	Çaldıran ovası	38,556	44,07 E	39,13 N	Present	?	1995-2005	B	Poor	No protection status	?	No protected area
	Çanakkale boğazı	110,294	26,46 E	40,18 N	Present	?	1995-2005	B	Poor	National Park	Category II: National Park,	No protected area
	Çankırı Jipsli Tepeler	125,052	33,69 E	40,53 N	Present	?	1995-2005	B	Poor	No protection status	?	23686 ha protected
	Çoruh vadisi	63,765	41,60 E	40,81 N	10	?	1995-2005	B, M	Good (O)	Wildlife Protection Area	Category IV: Habitat / Species Management Area	No protected area
	Datça ve Bozburun Yarımadaları	247,684	28,10 E	36,82 N	Present	?	1995-2005	B	Poor	National Park, Specially Protected Area, Wildlife Protection Area, Natural and archaeological SİT	Category II: National Park, Category V: Protected Landscape/Seascape, Category IV: Habitat / Species Management Area and Category III: Natural Monument	12834 ha protected
	Dicle vadisi	135,548	41,43 E	37,68 N	Present	?	1995-2005	B, M	Poor	Archaeological SİT	Category III: Natural Monument	200.181 ha protected
	Dönemeç Deltası	9,224	43,19 E	38,35 N	2	?	1995-2005	B	Poor	No protection status	?	No protected

												area
	Ekşisu Sazlığı	2,372	39,62 E	39,71 N	3	5	1995-2005	B	Good (O)	Archaeological SİT	Category III: Natural Monument	No protected area
	Ermenek vadisi	139,820	32,91 E	36,65 N	Present	?	1995-2005	B	Poor	Wildlife Protection Area	Category IV: Habitat / Species Management Area	
	Foça yarımadası	25,411	26,82 E	38,70 N	Present	?	1995-2005	B	Poor	Specially Protected Area, Natural and Archaeological SİT	Category V: Protected Landscape/Seascape and Category III: Natural Monument	No protected area
	Gediz Deltası	26,165	26,91 E	38,52 N	Present	?	1995-2005	M	Poor	Ramsar Site, Natural and Archaeological SİT	Natural and Archaeological SİT, Category VI: Managed Resource Protected Area,	2,656 ha protected
	Geyik dağları	251,601	32,20 E	36,97 N	Present	?	1995-2005	B	Poor	Wildlife Protection Area	Category IV: Habitat / Species Management Area	?
	Göksu Deltası	21,752	33,99 E	36,33 N	Present	?	1995-2005	B, M	Poor	Specially Protected Area, Natural SİT, Ramsar Site	Category VI: Managed Resource Protected Area, Category IV: Habitat / Species Management	7,614 ha protected

											Area and Category III: Natural Monument	
	Göreme tepeleri	6,871	34,86E	38,65 N	Present	?	1995-2005	B	Poor	National Park	Category II: National Park	?
	Güllük Deltası	24,280	27,59 E	37,19 N	15	20	1995-2005	B, M	Poor	Specially Protected Area	Category V: Protected Landscape/Seascape	6,422 ha protected
	Güney Van Gölü Kıyıları ve Alacabük Dağı	44,850	42,77 E	38,40 N	4	?	1995-2005	B	Poor	Archaeological SİT	Category III: Natural Monument	?
	Hafik Zara Tepeleri	103,032	37,41 E	39,80 N	Present	?	1995-2005	B	Poor	No protection status	?	?
	Hodulbaba dağı	79,589	32,96 E	38,04 N	Present	?	1995-2005	B	Poor	Wildlife Protection Area	Category IV: Habitat / Species Management Area	No protected area
	Iğdır ovası	65,173	44,27 E	39,94 N	Present	?	1995-2005	B, M	Poor	No protection status	?	51,244 ha protected
	Karakaya barajı	9,351	38,67 E	38,43 N	Present	?	1995-2005	B	Poor	No protection status	?	362 ha protected
	Kaz Dağları	160,161	26,99 E	39,72 N	Present	?	1995-2005	B	Poor	National Park, Nature Protection Site	Category II: National Park and Category Ib: Wilderness Area,	No protected area
	Kazan tepeleri	43,943	32,77 E	40,10 N	Present	?	1995-2005	B	Poor	No protection status	?	21,178 ha protected
	Kastabala Vadisi	9,145	36,24 E	37,20 N	10	?	1995-2005	B	Poor	No protection status	?	No protected

												area
	Kızılırmak Deltası	31,327	35,94 E	41,72 N	40	50	1995-2005	B, M	Good (O	Ramsar Site, Wildlife Protection Site, Natural SİT	Category VI: Managed Resource Protected Area, Category IV: Habitat / Species Management Area and Category III: Natural Monument	1,466 ha protected
	Kirmir Vadisi	37,142	32,00 E	40,16 N	5		1995-2005	B, M	Poor	Archaeological and Natural SİT	Category III: Natural Monument	5173 ha protected
	Manyas Gölü	21,821	27,96 E	40,18 N	10	12	1995-2005	B	Good (O)	National Park, Ramsar Site, Natural SİT	Category VI: Managed Resource Protected Area, Category III: Natural Monument	?
	Mardin Dağları	287,162	41,11 E	37,31 N	Present	1995-2005	B	Poor	No protection status	?	No protected area	
	Marmara adaları	102,875	27,72E	40,51 N	Present		1995-2005	B	Poor	Natural SİT	Category III: Natural Monument	No protected area
	Hasan Dağı	199,181	34,39 E	38,14 N	Present		1995-2005	B	Poor	Specially Protected Area	Category V: Protected Landscape/Seascape	5510 ha protected

	Mersin tepeleri	46,185	34,45 E	36,89 N	Present		1995-2005	B	Poor	No protection status	?	No protected area
	Munzur Dağları	585,044	39,26 E	39,38 N	Present		1995-2005	B	Poor	National Park & Wildlife Protection Area	Category II: National Park & Category IV: Habitat / Species Management Area	35,028 ha protected
	Nallıhan Tepeleri	82,667	31,54 E	40,24 N	4			1995-2005	B	Good (O)	No protection status	?
	Nemrut Dağı	108,331	38,93 E	37,98 N	Present	1995-2005	B	Poor	National Park, Archaeological SİT	Category III: Natural Monument	11929 ha protected	
	Olur-oltu Bozkırları	104,907	42,03 E	40,56 N	Present		1995-2005	B	Poor	No protection status	?	5,044 ha protected
	Sarıyar Barajı	31,754	31,38E	40,02N	Present		1995-2005	B	Poor	Wildlife Protection Area	Category IV: Habitat / Species Management Area	4,420 ha protected
	Saros körfezi	41,735	26,52 E	40,61 N	Present		?	1995-2005	B	Poor	Natural SİT	Category III: Natural Monument
	Tanin Tanin Dağları	183,854	42,93 E	37,48 N	Present	?	1995-2005	B	Poor	No protection status	?	No protected area
	Tendürek Dağı	90,680	43,89 E	39,36 N	Present	?	1995-2005	B	Poor	No protection status	?	No protected area

	Tohma vadisi	79,704	37,44 E	38,60 N	Present	?	1995-2005	B	Poor	Natural SİT	Category III: Natural Monument	No protected area
	Uluabat Gölü	24,623	28,60 E	40,17 N	Present	?	1995-2005	B	Poor	Ramsar Site	Category VI: Managed Resource Protected Area,	No protected area
	Van ovası	102,960	43,38 E	38,71 N	Present	?	1995-2005	B	Poor	No protection status	?	19,900 ha protected
	Yılanlıkale tepesi	9642	35,68 E	36,93 N	Present	?	1995-2005	B	Poor	No protection status	?	No protected area
												No protected area

Notes: B – Breeding; M – Migration; O – Observed; E – Estimated; I – Inferred; ? – unknown or insufficient information

ANNEX 3

National legal status

Country	Legal protection
Austria	Protected
Belarus	Red data Book, 1 category (CR)
Bulgaria	Priority for conservation, threatened species (Biodiversity Act, Annex 2), protected over the whole territory (Biodiversity Act, Annex 3).
Estonia	Protected species, protection category I
France	Protected species
Hungary	Strictly protected at national level
Latvia	Specially protected species, micro reserve species
Lithuania	Red data Book, 1 (E), individuals are fully protected (Law on Protected Species)
Italy	Protected
Poland	Protected species, the tree with nest cavity protected including a 300m radius area around it
Portugal	Fully protected species (by national and EU law)
Romania	Protected species
Serbia	Natural Rarity (strictly protected species)
Slovakia	Protected species, species of European significance
Spain	National level: general animal protection, species status - vulnerable; Province level: general protection, species status – species of special interest.
Turkey	Protected against hunting

Recent or ongoing conservation measures

Country	Is there a national action plan for the species?	Is there a national Roller project / working group?
Austria	No	Yes
Belarus	No	One specialist and a group of volunteers
Bulgaria	No	No
Estonia	No	?
France	No	Yes there is a national Working Group on this species: www.onem-france.org/rollier
Hungary	Yes (Harasztyh *et al.*, 2003)	Yes
Latvia	A national Roller action plan was compiled in 2000 but has not been officially approved and formally implemented.	Roller conservation and survey work is done yearly since 1999 by a small group of LOB members mostly on voluntary basis and very locally – covering Garkalne forest Roller stronghold (since 1999) and the two satellite breeding sites at Silakrogs (2002) and Adazi (2006). In regards to the national action plan, by these activities LOB has been actually implementing the most urgent fieldwork and protection tasks.
Lithuania	No	Not official group, annual observations of the species on voluntary basis/ annual meeting organised by LOD-BirdLife Lithuania
Poland	Protected in Poland, Breeding tree with cavity protected within a radius of 300m.	?
Portugal	No	No
Romania	No	No
Serbia	No	Yes. See www.riparia.org.yu

Country	Is there a national action plan for the species?	Is there a national Roller project / working group?
Slovakia	Under preparation	Non-official of 4 stable members and occasional volunteers: working on research and in active and passive conservation: breeding habitat/hollow characterization, breeding biology and success; foraging range size and structure; foraging habitat selection; analysis of landscape structure changes since year 1949; diet and food supply; building of fauna database and searching for new sites; nest-boxes programme (installation, maintenance, control, anti-Marten protection), collaboration with local people and forming of environmental awareness
Spain	Andalusia's action plan – Conservation scheme for steppe birds of Andalusia. A draft in Catalonia	No
Turkey	No	No

Ongoing monitoring schemes for the species

Country	Is there a national survey / monitoring programme?	Is there a monitoring programme in protected areas?
Austria	No official monitoring program.	Yes, carried out by site management
Belarus	No official survey**/ monitoring** program.	No official monitoring program.
Bulgaria	Yes locally. Monitoring scheme of breeding success in artificial nest boxes in territory of Persina Nature Park.	Partly, monitoring scheme of breeding success in nest boxes in territory of Persina Nature Park (IBAs BG017, BG074 and BG083).
Estonia	Yes, but not regular.	?
France	Under establishment, tested sincein 2007.	?
Hungary	Yes, annual breeding survey.	Yes
Latvia	No. Episodic surveys in wider countryside outside Garkalne forest area have been done since 1999 and all observations reported by birdwatchers and general public are collected. However, this hardly constitutes a national survey or monitoring programme.	No. The main breeding area of Garkalne forest which is protected since 2004 has been surveyed yearly both before and after designation. The national protected area monitoring scheme started only in 2008.
Lithuania	Yes, monitoring conducting every 2 years, almost 80% coverage of the national population.	Yes, almost 100%
Poland	Only local. We ask friends in other areas of Poland and this monitoring started in 2008.	No. Only done partially in Podkarpacie Region by Akcja Kraska
Portugal	No	Episodic surveys in Castro Verde and Vila Fernando
Romania	Survey programme exists but not sufficiently developed.	No
Serbia	No	Yes
Slovakia	Official under State Nature Conservancy of the Slovak Republic. Non-official parallel intelligence contacts among professional and amateur ornithologists and/or any nature visitors or workers	Yes
Spain	No	A recovery project of the Roller is carried out in the Aiguamolls de l'Empordà Natural Park since 2006 through setting up nest boxes and studing the species' biology in this space. In the near future the project will extend to a larger area.
Turkey	The only ongoing monitoring scheme is Kuşbank, the	Individual counts are carried out.

	Worldbirds in Turkey. Other then the regular data entry to this system, there is no national monitoring programme, individual counts are carried out in project sites where the species is present but not in the framework of a national monitoring programme.	

ANNEX 4

Knowledge gaps regarding Roller conservation (as defined at the SAP Workshop)

KNOWLEDGE GAPS	Importance	Likely cost
Methods		
Population-size estimation methods	H	L
Monitoring methods for estimating trends	C	L
Survival, mortality and health status		
Health status, parasitism (induced by climate change?)	L	H
Poisoning effects on adults and breeding success	M	H
Survival rates	C	H
Habitat use and selection		
Habitat (breeding and foraging) selection and preference (optimal foraging sites)	C	H
Bio-indicator potential	M	H
Social behaviour and density dependent breeding habitat selection, congregation of breeding sites	H	H
Impact of threats		
Impact of climate change on populations	M	H
Monitoring of electrocution on power lines	L	H
Secondary poisoning	M	H
Impact of public policies (esp CAP) on Roller status	C	H
Migration and wintering grounds		
Migration pattern, time and routes	M	H
Wintering grounds of Western and Eastern sub-populations	H	H
Factors (e.g. pesticide use) affecting the survival during migration and wintering	H	H

Population ecology		
Genetic structure and fragmentation (gene flow between subpopulations)	H	H
Dispersal mechanism of species (e.g. how to attract species to empty areas?)	M	H
Population Viability Analyses	C	L
Identification and assessment of conservation measures		
Design and evaluation of agri-environmental measures	C	H
Effects of nest box distribution pattern and design	M	L
Status of Roller populations		
Population size	H	H
Trend	C	L
Distribution	M	H

Notes: C – Critical; H – High; M – Medium; L - Low

Overview of the coverage of the species in networks of sites with legal protection status.

Country	Percentage of national population included in IBAs	Percentage of population included in SPAs	Percentage of population included in areas protected under national law
Austria	100	100	100
Bulgaria	20	12	<1%
Estonia	100	100	0
France	50-60	30-50	5-10
Hungary	65-70	70-75	50-90
Latvia	40-80%	30-65%	30-65%
Lithuania	More than half	More than half	More than half
Poland	0 %	25 %	10 %
Portugal	More than half	More than half	Almost none
Romania	49-57	41-47	More than half
Serbia	More then half	n. a.	40%
Slovakia	10-50% (assumed value) 90-100% (verified value)	10-50% (assumed value) 90-100% (verified value)	10-50% (assumed value) 90-100% (verified value)
Spain	<10%	<10%	<10%
Turkey	Unknown	n.a.	<10%