ACTION
A8

Progetto Life+TEN
Trentino Ecological Network

GUIDELINES
for the conservation of focal species of community interest

EXECUTIVE SUMMARIES

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We are also thankful for the support in redaction to: Antonella Agostini, Daniele Bassan, Valeria Fin, Piero Flamini, Elisabetta Romagnoni and Lucio Sottovia of the Ufficio Rete Natura 2000 of the Autonomous Province of Trento. For the images: Michele Mendi, Mauro Mendini, Karol Tabarelli de Fatis, Michele Menegon, Carlo Frapporti

Project LIFE11/NAT/IT/000187 "T.E.N." (Trentino Ecological Network): *a focal point for a Pan-Alpine Ecological Network*

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AMPHIBIANS

Three are the target species identified in this plan and considered at risk in the province: the *Salamandra atra aurorae* , listed in Annex IV of Directive 92/43 / EEC "Habitat", considered "vulnerable" (VU) within Red List of Italian Vertebrates of 2013 and "critically endangered" in the Red List of the World. The Italian crested newt *Triturus carnifex* who is spread over most of the country and is considered "near threatened" (NT) in the Red List of Vertebrates; and finally, the yellow-bellied toad Bombina variegata in sharp decline in the province during the recent decades in the province and which mantainance requires the creation of Special Areas of Conservation. In Trentino reported observations of *Salamandra atra aurorae* are less than ten and all located on the Vezzena plateau. The presence of the *Triturus carnifex* in Trentino is limited to a single site. Toghether with the Salamandra atra aurorae, it is the rarest amphibian of local herpetofauna and is therefore considered, locally, in danger of extinction. The salamander is a species particularly sensitive to stress and environmental changes. Development of tourism infrastructure and sports, new roads, management of pastures and water intake, the planting of conifer plantations, illegal collection for collecting and especially forest exploitation constitute a serious threat to

this species. The uniqueness of the site identified for Triturus carnifex makes it extremely vulnerable to stress and environmental changes, as well as epidemics or habitat modification. Finally, the yellow-bellied toad, is mainly threatened by the alteration and destruction of breeding habitats due to human interventions such as: control of fast flowing streams, the water collection or processing of temporary wetlands in recreational use areas, leaving pools of pasture or their hyper-exploitation and introduction of predatory species such as fish and ducks.

For the protection of these species, it is important to know their distribution, habitat and genetic characterization provided by monitoring and further studies, aimed to finalize efficiently conservation actions. It is also important:
• to monitor the spread of alien species and parasites that can cause deadly infestations;
• to prevent illegal taking and the actions of environmental degradation;
• identifying suitable areas for recovery of the ecological functions of aquatic and/or land habitats;
• raising awareness through information campaigns and outreach, aimed at farmers, hunters, people who plan and carry out the works of forest management and water supply and the local population.
In particular, we identify as necessary the following actions:
• monitoring populations of Aurora salamander, Italian crested newt and yellow-bellied toad in Trentino to collect information on the state of preservation of these native species and the integrity of their habitats besides the creation of a map of the distribution and of a database;
• identification of areas of intervention through the collection of data on the environmental characteristics of the habitats;
• identification of the main threats posed by non-native species or predators released, sources of pollutants and environmental disturbance (intensive farming, industrial, civil discharges untreated,
forest management or terrestrial areas not adequate, collecting purposes of collection);
• genetic characterization of the species for a more efficient management, especially in the case of eventual reintroduction and restocking;
• management and maintenance (cuts aimed, creating barriers plant protection, maintenance or restoration of the natural substrate of aquatic environments), habitats and creation of refuge areas (hedges, groves, piles of rocks and logs). Recovery of wetlands and forest disappeared as a result of land reclamation;
• create protective barriers to assist migrations and reduce vehicle mortality.

WETLAND BIRD SPECIES

Wetlands are one of the most important habitat for biodiversity conservation and the provisioning of ecosystem services at the global level. However, they have suffered and are still suffering high degree of destruction and alteration, including in the Trento province.
This Action plan is mostly targeted to the conservation of bird species breeding in wetland, and in particular to little bittern, black kite, spotted crake, little crake, kingfisher, tufted duck, grey heron, great crested grebe, little grebe, water rail, moorhen, little ringed plover, yellow wagtail, Cetti's warbler, marsh warbler, reed warbler, great reed warbler, reed bunting. Nearly all these species have an unfavourable status in the Trento province, and many of them also at the Italian and European scale.

Main threats to these species in the Trento province are:
• wetland destruction (all species);
• wetland degradation (all species);
• water pollution (all species);
• removal of marginal habitats (wet grassland, shrubs, etc.) (yellow wagtail, Cetti's warbler, marsh warbler, reed bunting);
• natural evolution (ecological succession) (all species);
• conditions in wintering (African)

quarters (little bittern, black kite, crakes, yellow wagtails, marsh, reed and great reed warblers);
• overhead cables (little bittern, grey heron, black kite);
• human disturbance (hunting, fishing, recreational activities) (all species);
• high habitat fragmentation (most species);
• high population fragmentation/isolation due to habitat fragmentation and location at the edge of species range (most species);
• loss of specific habitats (e.g. *Carex* ; spotted crake, reed bunting);
• prey reduction due to pesticide use (all species);
• change in water level (crakes, water rail, little ringed plover, reed warbler, great reed warbler);
• watercourse artificial regulation (kingfisher, little ringed plover, secondarily all other species);
• exotic species (potentially all species);
• climate change: change in precipitation regimes, raise of temperature, increase in competition, latitudinal shifts.

The main objective of this Action plan is to conserve and, where needed and possible, to restore, suitable habitats for the target species, increasing the chance of long-term survival and decreasing fragmentation and isolation, by means of:
• the conservation of suitable conditions in wetlands, preventing pollution, alteration, disturbance, unfavourable evolution of vegetation;
• the reduction of isolation suffered by wetlands.The specific objectives are the following ones:
• the conservation of relict wetland habitats, by means of a rigorous protection;
• the preservation of suitable conditions within wetlands, by means of dedicated management of:
  - water level;
  - vegetation dynamics;
  - micro-habitat availability.
  - reedbed and Typha, of different age classes;
  - emergent aquatic vegetation;
  - hygrophilic shrubs;
  - disturbance;
• the improvement of conservation status of lakes;
• the ri-qualification of rivers and surrounding habitats;
• the reduction of wetland isolation, through the creation or restoration of wetlands;
• the increase in permeability of the farmed matrix, by means of the creation of small habitats;
• the increase in awareness of the importance of wetland habitats;
• the reduction of sources of pollution;
• the implementation of dedicated research and monitoring efforts.

Therefore, the suggested actions include:

- the rigorous conservation of wetlands;
- the correct management of wetlands, considering in particular:
- water level (particular attention should be given to little bittern, water rail, little crake, *Acrocephalus* warblers);
- vegetation dynamics;
- availability of micro-habitats and of specific habitats or habitat features:
  - reedbed and Typha, which should be flooded and in different age classes;
  - emergent aquatic vegetation (e.g. Nymphea, Nuphar);
  - hygrophilic shrubs.
- the management of lakes:
  - promoting vegetation stages of highest values for biodiversity;
  - preserving from disturbance the sites most important for sensitive wild species;
  - managing vegetation, navigation and recreational use.
- the mitigation of wetland isolation, by the creation or restoration of wetland sites acting as stepping stones;
- a detailed study on wetland birds in the Trento province, with particular emphasis on their ecology, a comparison with past situation (when possible) and a dedicated monitoring.

FOREST BIRD SPECIES

Forest habitats are the most widespread ecosystem type in Trento province. Forests have a long history of interaction with human activities, having being exploited since centuries. Now forest habitats cover 60% of the province, and are managed as multi-purpose resource. Forests with tall trees cover account for 78% of the total extent, and are particularly suitable for species such as Tetraonids, raptors and woodpeckers. This action plan is mostly targeted to capercaillie, hazel grouse, black woodpecker, grey woodpecker, three-toed woodpecker, and secondarily can be relevant also to black grouse. Notably, woodpeckers are keystone species in forest ecosystems, providing habitats and resources used by a plenty of other species.

All the target species, except for black woodpecker, in Italy occur only in the Alps, and many have an unfavourable conservation status in Italy. All these species largely rely on mature forests, with tall trees and a complex structure. The main threats to the target species are the following:

- harvest of trees harbouring woodpeckers' nesting holes;
- trees removal along river banks, keeping riverine woodland in young and poorly developed stages;
- disturbance caused by forestry;

• loss of clearings and increase in tree density, negatively impacting especially on capercaillie
• habitat fragmentation;
• overhead cables;
• disturbance during the breeding season;
• disturbance due to recreational activities, both in winter and in spring-summer;
• climate change, also acting in synergy with other impacting factors (e.g. abandonment of ruralareas).

The main objective of the Action plan is to maintain and, where needed and possible, to increase the suitable habitats for the target species, leading to a long-term better survival probability and to a less fragmented distribution, throughout:
• the conservation of trees with woodpeckers' nesting holes;
• the improvement of forest structure, favouring an increase in the amount of dead wood;
• the reduction of human disturbance in forest habitats, especially during the breeding season;
• the (re)creation of a fine-scaled mosaic of habitats, improving connectivity between mature and
regenerating forests, with presence of areas with low tree density, in order to favour the presence of capercaillie and to provide hunting ground to owls;
• the conservation and/or implementation of ecological connectivity among forests, mitigating
fragmentation and increasing resilience to climate change.
The specific objectives of the Action plan are the following:
• conserving trees with holes during forestry;
• allowing some forest patches to naturally evolve, promoting an increase in dead wood;
• preserving clearings and other semi-open habitats in forests;
• continuing conservation and restoration of habitats required by capercaillie during the different phases of its life-cycle;
• increasing awareness among forest workers about the importance of trees with holes and dead wood;
• reducing fragmentation and mitigate the existing barriers;
• investigating the ecological needs of the less known species;
• monitoring population trend and conservation status of the species.
Therefore, the proposed actions for the conservation of the target species are:
• the conservation of trees with holes excavated by woodpeckers (e.g. with marking of individual trees);
• the definition of "Areas with High Ecological Value" ("Aree ad Elevato Valore Ecologico" - AEVE), such as forest portions with more than five trees with woodpecker holes (of which at least one excavated by the black woodpecker), to be managed according to conservation criteria;

• the definition of portions left to natural evolution;
• the conservation of dead wood (e.g. at least three tree per hectare in SCIs, SPAs and AEVE);
• the education and training of forest workers and of the large public;
• a specific management options in areas potentially important for capercaillie;
• the reduction of disturbance within the period 1st March - 15th July;
• given the common selection for slopes bordering roads by nesting capercaillie, close to traffic some roads when needed to preserve the species reproduction;
• contrasting land abandonment;
• preserving small wetland patches interspersed within the forest matrix, also outside of protected areas;
• reducing the risk of impact with suspended cables;
• reducing disturbance by recreational/outdoor activities by dedicated regulation and path definition;
• mantaining or recreating ecological connectivity among forest patches, through dedicated management when needed;
• monitoring the effects of the above actions.

The increase in knowledge about the species' ecological needs should consider in particular:
• the evaluation of the impacts of human activities (both favourable and negative);
• the post-breeding ecology of Tetraonids;
• the general knowledge about distribution and ecology of hazel grouse in the Trento province;
• a regular monitoring of the availability of trees with woodpecker holes;
• the increase of knowledge about ecology of nocturnal raptors.

GRASSLAND BIRD SPECIES

Forest habitats are the most widespread ecosystem type in Trento province. Forests have a long history of interaction with human activities, having being exploited since centuries. Now forest habitats cover 60% of the province, and are managed as multi-purpose resource. Forests with tall trees cover account for 78% of the total extent, and are particularly suitable for species such as Tetraonids, raptors and woodpeckers. This action plan is mostly targeted to capercaillie, hazel grouse, black woodpecker, grey woodpecker, three-toed woodpecker, and secondarily can be relevant also to black grouse. Notably, woodpeckers are keystone species in forest ecosystems, providing habitats and resources used by a plenty of other species.

All the target species, except for black woodpecker, in Italy occur only in the Alps, and many have an unfavourable conservation status in Italy. All these species largely rely on mature forests, with tall trees and a complex structure. The main threats to the target species are the following:

- harvest of trees harbouring woodpeckers' nesting holes;
- trees removal along river banks, keeping riverine woodland in young and poorly developed stages;
- disturbance caused by forestry;

• loss of clearings and increase in tree density, negatively impacting especially on capercaillie
• habitat fragmentation;
• overhead cables;
• disturbance during the breeding season;
• disturbance due to recreational activities, both in winter and in spring-summer;
• climate change, also acting in synergy with other impacting factors (e.g. abandonment of ruralareas).

The main objective of the Action plan is to maintain and, where needed and possible, to increase the suitable habitats for the target species, leading to a long-term better survival probability and to a less fragmented distribution, throughout:
• the conservation of trees with woodpeckers' nesting holes;
• the improvement of forest structure, favouring an increase in the amount of dead wood;
• the reduction of human disturbance in forest habitats, especially during the breeding season;
• the (re)creation of a fine-scaled mosaic of habitats, improving connectivity between mature and
regenerating forests, with presence of areas with low tree density, in order to favour the presence of capercaillie and to provide hunting ground to owls;
• the conservation and/or implementation of ecological connectivity among forests, mitigating
fragmentation and increasing resilience to climate change.
The specific objectives of the Action plan are the following:
• conserving trees with holes during forestry;
• allowing some forest patches to naturally evolve, promoting an increase in dead wood;
• preserving clearings and other semi-open habitats in forests;
• continuing conservation and restoration of habitats required by capercaillie during the different phases of its life-cycle;
• increasing awareness among forest workers about the importance of trees with holes and dead wood;
• reducing fragmentation and mitigate the existing barriers;
• investigating the ecological needs of the less known species;
• monitoring population trend and conservation status of the species.
Therefore, the proposed actions for the conservation of the target species are:
• the conservation of trees with holes excavated by woodpeckers (e.g. with marking of individual trees);
• the definition of "Areas with High Ecological Value" ("Aree ad Elevato Valore Ecologico" - AEVE), such as forest portions with more than five trees with woodpecker holes (of which at least one excavated by the black woodpecker), to be managed according to conservation criteria;

• the definition of portions left to natural evolution;
• the conservation of dead wood (e.g. at least three tree per hectare in SCIs, SPAs and AEVE);
• the education and training of forest workers and of the large public;
• a specific management options in areas potentially important for capercaillie;
• the reduction of disturbance within the period 1st March - 15th July;
• given the common selection for slopes bordering roads by nesting capercaillie, close to traffic some roads when needed to preserve the species reproduction;
• contrasting land abandonment;
• preserving small wetland patches interspersed within the forest matrix, also outside of protected areas;
• reducing the risk of impact with suspended cables;
• reducing disturbance by recreational/outdoor activities by dedicated regulation and path definition;
• mantaining or recreating ecological connectivity among forest patches, through dedicated management when needed;
• monitoring the effects of the above actions.

The increase in knowledge about the species' ecological needs should consider in particular:
• the evaluation of the impacts of human activities (both favourable and negative);
• the post-breeding ecology of Tetraonids;
• the general knowledge about distribution and ecology of hazel grouse in the Trento province;
• a regular monitoring of the availability of trees with woodpecker holes;
• the increase of knowledge about ecology of nocturnal raptors.

HIGH ELEVATION BIRD SPECIES

Species living at high-elevation are commonly threatened by environmental and climatic changes acting at large scales; temperature increase, land abandonment and forest recovery in particular are causing or will cause the decline of several species.
This plan focuses on habitats comprised between the tree-line (1800-2200 m a.s.l.) and the lower limit of glaciers and perennial snow (2600-3500 m a.s.l.). Semi-natural habitats (pastures) created and maintained by human action are also considered, as they harbour largely the same species and suffer the same pressures.
Target species include some 'flagship species' for mountain habitats, as golden eagle, bearded vulture, ptarmigan, black grouse and rock partridge, and less known ones, such as water pipit, alpine accentor, wheatear, rock thrush, and snowfinch. The main threats include climate warming, tree expansion towards higher elevation and shrub and tree encroachment over open habitats (both favoured
by both warming and abandonment), habitat degradation due to human infrastructures (e.g. ski-pistes, hydroelectric power), direct human disturbance (e.g. winter sports, tourism, climbing), overhead cables, overgrazing, slopes alteration due to systems for

avalanche prevention and similar anthropic structures.

The general objective of the Action plan is to maintain suitable conditions for the long-term survival of populations and to reduce fragmentation across them, by means of:
• increase in the resilience to climate change;
• preservation of processes needed to keep suitable habitat traits and structures (e.g. adequate grazing pressure);
• reduction of human impact on high-elevation species.

Specific objectives are:
• reducing disturbance to Tetraonids in winter and late spring;
• reducing disturbance to nests and breeding pairs (spring-summer);
• conservating pastures;
• modulating grazing pressure, in order to keep suitable grassland structure;
• addressing strategically the efforts of research and monitoring,, e.g. by investigating less known species and factors affecting distribution and abundance of priority species, with particular emphasis on the potential effects of climate change and on the consequences for an effective planning, monitoring population trend of target species.

The concrete actions suggested are the following ones:
• conserving unaltered the high-elevation habitats with natural traits;
• reducing the impact of recreational activities and tourism in alpine areas, e.g. by preventing disturbance in wintering sites of Tetraonids and cliffs hosting breeding raptors, or by creating no-access patches to create refuges for birds (e.g. for black grouse in areas with ski runs);
• reducing the other impacts of human activities at high-elevation sites (e.g. waste management,
overhead cables);
• promoting an adequate grazing activity, preventing both abandonment and overgrazing;
• increasing knowledge on high-elevation birds, with particular emphasis at:
  – the definition of potential suitability of areas and habitats, and of main management measures for transitional belts between forested and open habitats;
  – the evaluation of likely impacts of climate change, to promote a rigorous conservation of areas that will remain suitable also in the future, and to ensure ecological connectivity among suitable sites;
  – a detailed definition of refuge areas for Tetraonids in winter;
  – the evaluation of the impacts of human disturbance on occurrence and reproduction of target species, definition of non-access area, and regulation of outdoor activities;
  – the analyses of potential impacts of transformations and alterations due to human activity at high elevation, and potential measures to reduce or mitigate impacts.

CRAYFISH

The freshwater crayfish *Austropotamobius pallipes* is currently present in 18 countries of Central and Eastern Europe, from Scotland to Spain and Montenegro. In Italy the species is widespread in all regions with the exception of Sicily and the smaller islands.
The crayfish is included in the IUCN Red List and classified as "Endangered A2ce" (population reduction of more than 50%). The decrease of population is mainly due to a decline of available habitats and the introduction of alien parasites and competitors. In Trentino, the species has been experiencing a sharp decrease in the last 50 years, mainly due to the degradation of aquatic ecosystems, overfishing, competitive pressure from invasive alien species, illegal fishing and the spread of the plague of crayfish. Maintenance of native species is based on establishment of new protected areas for the conservation of populations and implementation of environmental restoration and sustainable management of aquatic ecosystems, in order to restore their natural ecological features.

More in detail, this Action Plan identifies the following actions as strategic in a conservation perspective:
• increasing knowledge about the historical and current distribution of the

species; identification of the main threats;
• providing molecular studies aimed at maintaining the genetic heritage;
• defining of protection areas for storage; requalification of potential suitable habitats; facilitation of the expansion of populations through restocking or reintroductions; monitoring and containing the spread of alien species;
• organizing information campaigns for fishermen and local people and tourists.
• monitoring species to optimize conservation actions;
• using monitoring data to create maps of distribution and database of species;
• sampling each individual populations;
• defining biotic and abiotic characteristics of water bodies hosting populations aimed at efficient pacification of future conservation actions and at identification of intervention areas;
• identification of populations of non-native crayfish, pollution sources and possible environmental disturbances (intensive farming, hydroelectric power plants, industrial, civil discharges untreated) located upstream of the populations of native crayfish;
• genetic characterization of indigenous populations.

SALMO TRUTTA MARMORATUS

Up to fifty years ago Salmo trutta marmoratus was a characteristic species of the main waterwaysthat flow in the high Adriatic zone. This species inhabits the middle and middle-upper section of the
main waterways, while in the smaller mountain streams is replaced by Salmo trutta fario. Clear waters
and a rocky substrate, rich in shelters and holes in which to hide, represent its perfect habitat. The specie is mentioned in Annex 2 (animals whose protection requires the designation of Special Areas of Conservation) of Directive 92/43/EEC (Habitats Directive) and in the Red List of the Vertebrates as critically endangered (CR) and today its distribution is severely reduced. This decrease is mainly due to alteration of alpine watercourses: artificialisation of river beds, weirs and dams that prevent the way back for reproduction, the abstraction of water for irrigation and hydroelectric use with the resulting pollution of the scarce residual capacities. Another threat is represented by the crossing of the two species with Salmo trutta fario, which is typical of the smaller tributaries. The two forms can result in individuals with a wide range of intermediate characters.

The main conservation actions identified in this Action Plan are:

• release of the residual water (DMV) downstream of the leads on the river courses, construction of fish passes at the dams, the re-naturalization of river beds and improvement of sewage;
• control entering of new individuals and fishing pressure;
• for each repopulation, providing a selection of sun and fry eggs choosing those obtained from specimens of trout caught in the wild;
• control of avifauna predation.

More in detail it is important:
• to create appropriate fish ladders in the areas with artificial barriers;
• re-naturation of river beds for restocking of the trout by: planting of willow and alder cuttings,
training paranatural systems and expansion of flood plains;
• periodic positioning of a few cubic meters of gravel for the restoration of the “zona di frega”;
• limit the flares periodic earth material downstream of hydroelectric reservoirs and modulate these in accordance with the turbidity and dissolved oxygen in the water, in order to contain alterations in the quality of river waters;
• control sport fishing in collaboration with the fishermen Association;
• use only certified individuals from local farms for restocking;
• protect the main breeding areas and size the closed areas of repopulating and fishing, as appropriate to the local population;
• monitor populations and habitat in a targeted way to structure the plans for Fisheries Management and the Carta Ittica.

BATS

Based on their preferences for breeding sites, bats are divided into three main groups: phytofile species mainly breed in trees, troglofile species breed in caves or cavities, and anthropofile species, who choose man-made artefacts. Their dependence on specific structural and microclimate characteristics of roosts makes it difficult conservation of the species in the long period. Half of the 32 Italian species of bats are in the higher categories of the Red List of Italian Vertebrates (2013) and all the European species,
in the last decades, have shown a high decrease in numbers. In Trentino live several species with high conservation value and many of these need further studies to be better understand their ecology and distribution. These include *Rhinolophus hipposideros*, which is the most important from a conservation point of view. With a dozen of nursing sites, it is the largest nationwide for numerical consistency.
Other are *Myotis daubentoni*, *Pipistrellus pygmaeus*, *Hypsugo savii*, *Eptesicus serotinus*, *Eptesicus nilssoni*, *Vespertilio murinus*, *Nyctalus noctula*, *Nyctalus leisleri*, *Plecotus auritus*, *Plecotus austriacus* and *Plecotus macrobullaris*, *Barbastella barbastellus*, *Tadarida tenioti*.

The decrease of these species in the area is mainly due to:
• a strong decline in the availability of insects associated recently with a heavy change of agricultural landscape, eroded progressively by urban areas, and with the use of pesticides that have reduced the insects biomass;
• the decrease in breeding colonies, affecting the whole of Europe, with consequent process of "genetic drift";
• the increase of competition between different species for similar trophic niches and/or wintering sites;
• the loss and/or alteration of breeding sites, due to rapid changes in the alpine landscape and decreasing variety of the valley bottom landscapes.
To provide and promote an efficient conservation of all these species, in this Action Plan the following conservation actions are identified as necessary:
• protection of breeding and wintering sites;
• increase of knowledge on the biology and ecology of the species housed and, on the base of these, finalization of precise management actions, directed to the areas overlooking the colonies;
• monitoring of nursing and wintering sites;
• implementation of specific educational and cultural projects to raise awareness and provide information to the public about the colonies of bats through appropriate awareness materials.