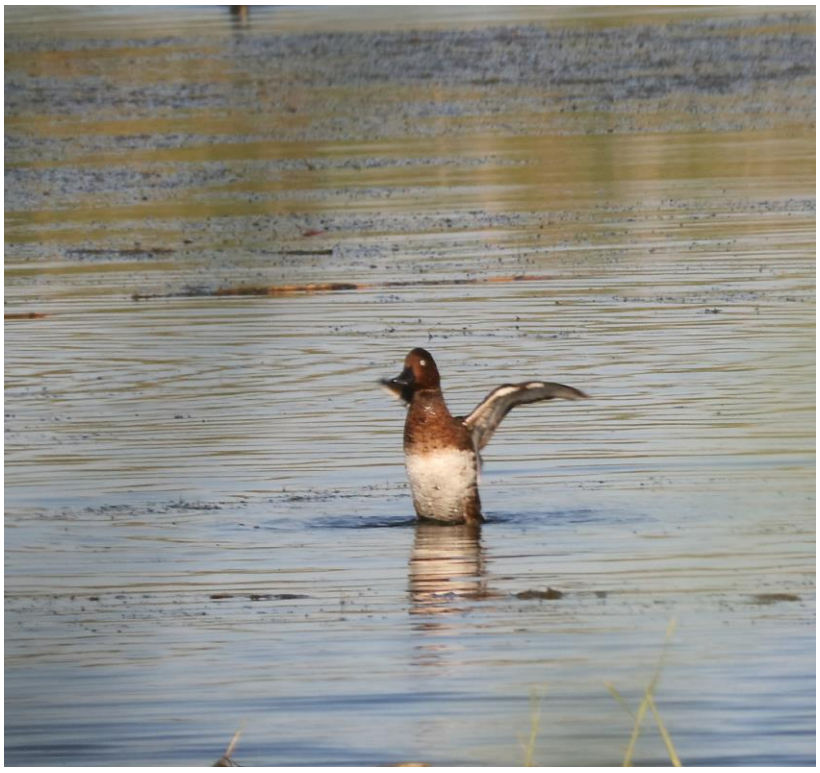
PNR "LITORALE DI UGENTO"

Conservation plan of the Ferruginous Duck *(Aythya nyroca)*



PROJECT "LOW ADRIATIC SPECIES AND HABITAT (LASPEH)"
FINANCED WITH THE FIRST NOTICE FOR ORDINARY PROJECTS OF THE INTERREG IPA CBC ITALY - ALBANIA - MONTENEGRO 2014/2020 PROGRAM, PRIORITY AXIS 3 - SPECIFIC OBJECTIVE 3.1 (CUP F92J18000090006 - CIG Z5624F737A)
WPT1 (Common pilot actions)

SUMMARY

INTRODUCTION

The LASPEH project intends to address the issue of biodiversity loss, defining a common strategy to preserve the natural heritage and the landscape in the Adriatic regions of the South. The project focuses its attention on the protected species included in the annexes of the HABITAT 92/43 / CEE and BIRDS DIRECTIVE 79/409 / CEE, threatened by environmental changes, caused by climate change and / or anthropogenic impacts. Finally, the project aims to create a cross-border conservation network between management bodies of protected areas that cooperate for the conservation of biodiversity and the improvement of Natura 2000 sites, exchanging best practices and developing a common transnational strategy to preserve species and habitats common.

The cross-border partnership of the LASPEH project is in the following ways:

Lead Partner

- Consorzio di gestione provvisoria del Parco Naturale Regionale "Dune costiere da Torre Canne a Torre S. Leonardo" (IT)

Project Partner

- Agjencia Kombëtare e Zonave të Mbrojtura (AL)
- Javno preduzeće za nacionalne parkove Crne Gore (ME)
- Ente di Gestione delle Riserve Naturali Regionali Orientate del Litorale Tarantino Orientale (IT)
- Comune di Ugento (IT)
- Comune di Guardiaregia (IT)

One of the most important activities of the LASPEH project is the drafting of a protection plan addressed to a single species protected by EU Directives and at risk of extinction in each protected area involved, with the aim of identifying objectives, strategies and actions useful for its preservation.

The municipality of Ugento, as the managing body of the Regional Natural Park "Litorale di

Ugento" has identified as a species to which the protection plan is destined the Moretta tabacca "Aythya nyroca", a small diving duck with mainly brown plumage - reddish (hence the name tabaccata), present in the annexes of the BIRDS DIRECTIVE 79/409 / EEC. The general objective of this plan is to implement protection strategies and actions aimed at the conservation of the Moretta tabacca specimens found in the Regional Natural Park "Litorale di Ugento" and the improvement of ecological and faunal conditions useful to determine an increase in consistency and distribution of species of interest.

REGULATORY FRAMEWORK

Ferroginous duck (Aythya nyroca) is included in the IUCN Red List of endangered species. The IUCN classifies the Italian population of Aythya nyroca in a state of "Danger" (EN) due to its small size (presence of few individuals) (criterion D). The European population is classified as Vulnerable and the species is in decline in many European countries.

The Ferruginous Duck appears in Annex I of the "Convention on the conservation of migratory species belonging to wild animals" (also known as CMS or Bonn Convention) which aims to protect migratory land, sea and avian species in all their movements. The Bonn Convention is the only global convention specializing in the conservation of migratory species, their habitats and migration routes. This is an intergovernmental treaty, concluded within the framework of the United Nations Environment Program, which concerns the conservation of wildlife and habitats on a global scale.

The Bonn Convention provides for the conclusion of international agreements aimed at the reconstruction and maintenance of populations and habitats of migratory species in a poor state of conservation. One of these important international agreements is currently represented by the African-Eurasian Migratory Water Bird Agreement (AEWA), an agreement for ecologically dependent migratory bird species from wetlands where Ferroginous duck is also present. The agreement was concluded on 18 June 1995 in The Hague in the Netherlands, and entered into force on 1 November 1999. The treaty is active in 119 European states, parts of Asia and Canada, the Middle East and the Africa. Italy formally adhered to the treaty with the law n.66 of 6 February 2006, "Accession of the Italian Republic to the Agreement on the conservation of African migratory water birds - EURASIA".

The Ferruginous duck is also present in Annex III of the Convention on the Conservation of Wild Life and the Natural Environment in Europe (Berne Convention). The Berne Convention is a binding international legal instrument in the field of nature conservation, which covers most of the natural heritage of the European continent and extends to some states in Africa. Its objectives are the conservation of wild flora and fauna and their natural habitats and the promotion of European cooperation in this field. The Convention focuses on the need to protect natural habitats and endangered, threatened and vulnerable

species, including migratory ones. The Parties that have signed the Berne Convention undertake to adopt all appropriate measures to guarantee the conservation of the habitats of the flora and fauna. Italy has ratified the convention with the law n. 503 of August 5, 1981. The European Union has adopted the principles and the framework through the Habitats and Birds Directives.

The Ferruginous Duck is also present in Annex I of Directive 79/409 / EEC concerning the conservation of wild birds. This Directive represents the first regulatory act of the European Union aimed at the conservation of nature and, in particular, the conservation of wild birds. Together with the Habitat Directive, it is one of the main regulatory instruments for protecting biodiversity in all EU countries.

The Ferruginous duck is one of the species of interest for conservation and recovery in the Regional Natural Park "Litorale di Ugento" in accordance with Regional Law No. 13 dated May 28, 2007. This law provides in art. 2 paragraph 1 letter b) among the management purposes of the protected area: "[...] Conserve and recover the biocenosis, with particular reference to the habitats and animal and plant species contained in the EU directives 79/409 / EEC, of 2 April 1979 on the conservation of wild birds and 92/43 / EEC of the Council of 21 May 1992 on the conservation of natural and semi-natural habitats and of wild flora and fauna, as well as ecological balances, hydraulic balances and hydrogeological ".

The territory of Ugento is characterized by the presence of the Natura 2000 site SIC "Litorale di Ugento" code IT9150009.

With Regional Regulation n. 6 of 10.05.2016 the Puglia Region approved the conservation measures to be adopted in the SIC sites characterized by the presence of typical wetlands birds such as the Ferruginous duck. The conservation measures to be adopted for the defense of these species, and in particular for the Ferruginous Duck are:

- prohibition in the period 1 March -- 15 July (during the reproductive period of the avifauna) of interventions in the arboreal, shrub and herbaceous vegetation within the humid areas, through cutting, mowing, shredding, fire, chemical weeding, superficial soil working;

- obligation to protect the sites occupied with prohibition of modifications to the environmental structure (vegetation, geomorphology, hydrology), which are not aimed at the conservation of the species;
- prohibition of access outside the paths and with boats in the wet areas occupied by the species;
- maintenance of hydraulic circulation and replacement in occupied wet areas;
- maintaining the ecological conditions suitable for the conservation of hydrophyte grasslands and the communities of Lemna sp.pl. at occupied sites and at other suitable sites surrounding them;
- careful management of the reeds, with rotation mowing, of a maximum surface of 30% per year;
- Intensification of controls and hunting supervision;
- Agri-environment payments for the construction of new freshwater wetlands with a reed surface over 10 hectares in suitable areas;
- Agri-environment payments for the maintenance of agricultural areas not treated with rodenticides;
- Monitoring of water quality in which the species reproduces;
- Awareness of the importance of conservation and the danger of extinction of the species.

The Puglia Region with the Regional Regulation n. 12 of 10.05.2017 defined the conservation objectives for the sites of the NATURA 2000 network of the PUGLIA REGION. The conservation objectives of the SIC "Litorale di Ugento" are:

1. Regulating fishing and tourist-recreational use activities, with particular reference to anchorages, waste and trawl for the conservation of habitats (1120 * and 1170) and marine species of community interest;
2. Ensure the efficiency of internal water circulation for the conservation of habitats 1150 *, 1410, 1420 and 3150 and of the species of Amphibians and Reptiles of community interest;

3. Regulate the maintenance and infrastructural interventions of the beaches, as well as the tourist-recreational fruition for the conservation of dune habitats;
4. Promote the adoption of naturalistic engineering techniques in the prevention and reduction of coastal erosion phenomena on beaches, coastal dunes with particular reference to the management of the "banquettes" of Posidonia oceanica;
5. Promote and regulate extensive grazing for the conservation of the 6220 * habitat;
6. Encourage the processes of regeneration and improvement and structural diversification of forest habitats;
7. Contain the phenomena of anthropogenic disturbance on the colonies of Ardeidae, Recurvirostridae and Sternidae.

The activities of protection of the Ferruginous duck depend directly and indirectly on the realization of objectives 2 and 7.

Finally, with Resolution of the Regional Council June 23, 2014, n. 1296 was approved the framework of priority action actions (Prioritized Action Framework - PAF) for the Natura 2000 Network of Puglia relating to the period 2014-2020. This action plan recognizes the critical conservation status of the Ferruginous duck and identifies the environmental monitoring of artificial basins and the creation / maintenance of emerged surfaces suitable for the establishment of reproductive sites among the main protection actions to be implemented in wetlands.

THE HABITATS OF FERRUGINOUS DUCK IN THE REGIONAL NATURAL PARK (PNR) "LITORALE DI UGENTO".

The reproductive habitat of the Ferruginous duck is represented by wetlands characterized by eutrophic, transparent waters, with depths ranging between 30 and 100 centimeters and good coverage of floating and submerged hydrophytes. These hydrophytes provide food with their green parts, with seeds and through small animals that live on the leaves of plants. The basins frequented by the Ferruginous duck are delimited by formations of helophytes such as Cladium mariscus, Sparganium erectum, Carici Carex spp., Cannuccia palustre Phragmites communis, Tife Thypha spp., Scirpi Bolboschoenus maritimus, Schoenoplectus spp. The Ferruginous duck nests on dense floating banks of vegetation or on the ground, more rarely in hollows of trees and in any case always very close to the water.

In the Regional Natural Park "Litorale di Ugento" and in the "Litorale di Ugento" SCI, the Ferruginous duck finds shelter in the habitats that characterize the artificial basins and canals managed by the “Consorzio di bonifica Ugento e Li Foggi”.

The Ugento basins are artificial and are created to reclaim the surrounding areas. They arise in a coastal area called "Palude dei Giunchi" and "Lacco Della Marina". The areas surrounding the basins, remnants of the marshy environments of the past, are partly occupied by hygrophilous and halo-hygrophilous vegetation, depending on the degree of salinity of the soils. The table below shows the 7 basins of the PNR "Litorale di Ugento" and their areal extension:

Basin	Area (sq.m.)
Suddenna Basin	16.912
Bianca Basin	18.107
Ulmo Basin	15.385

Rottacapozza Nord Basin	36.925
Rottacapozza Sud Basin	117.044
Spunderati Nord Basin	61.702
Spunderati Sud Basin	146.510

Figure 1: The 7 basins of the Regional Natural Park "Litorale di Ugento"

The halophilic vegetation that develops along the edge of the basins is characterized by formations of Spartina juncea and Juncus maritimus that form part of the Junco maritimi-Spartinetum junceae Biondi 1992 of the class Juncetalia maritimi Br.-Bl. 1952.

Halophilic grasslands with a prevalence of Plantago crassifolia and Schoenus nigricans are part of the association Schoenus nigricantis-Plantaginetum crassifoliae Br.-Bl. (1931)

1952, which develops in the most elevated sandy and suborganic areas of the edges of the basins and in the dunes. This association is also part of the Juncetalia maritimi class.

Where the substrate has a low salinity level, there is a hygrophilous vegetation of Phragmites australis (marsh reed) which is part of the Phragmitetum australis Allorge association.

The floating or submerged vegetation of the basins is mainly made up of Potamogeton pectinatus and is part of the Potametum pectinati association.

The habitats that characterize the natural environments of the Natural Park of Ugento and which are of interest for the Ferruginous duck are:

HABITAT PRIORITIES OF DIRECTIVE 92/43 / EEC

1150 *: Coastal lagoons

It is a habitat present only in the area of the Basins, characterized by a submerged and fluctuating vegetation with Potamogeton pectinatus and Ruppia cirrhosa which fits in the association Chaetomorpho ruppietum Br.-Bl. 1952 of the Ruppietea Class J. Tx. 1960. These are basins of artificial origin, built during the reclamation period to facilitate the outflow into the sea of the stagnant waters along the retrodunal strip, but which had spontaneously re-naturalized over the years, only to be improperly cemented some years later are, with loss of acquired natural characteristics.

1510 *: Mediterranean salt steppes (Limonietalia)

The site shows two different types of salt steppes. A more halophilic type is represented by large extensions of salicornieto with Arthrocnemum glaucum. This vegetation, typical of salted and periodically flooded soils, forms part of the phytosociological class Arthrocnemetea Br.-Bl. et R. Tx. 1943 and seems to be an impoverished stage of the association Puccinellio festuciformis-Arthrocnemetum glaucii (Br.-Bl.1931) Gehù 1976. It is a type of alo-hygrophilous vegetation typical of marshy lands with waters whose salinity increases progressively with the arrival of the season dry and appear almost dry in summer, showing the formation of characteristic salt crusts. Another type of vegetation

with salt steppe, with less pronounced characteristics of halophilia is found on soils with less water stagnation and consists of the characteristic species Schoenus nigricans and Plantago crassifolia that identify the association Schoeneto-Plantaginetum crassifoliae Br.-Bl. (1931) 1952 of the Class Juncetea maritimi Br.-Bl. 1952. This type of vegetation is also found in a retrodunal environment, near the basins.

HABITAT OF COMMUNITY INTEREST IN DIRECTIVE 92/43 / EEC

1410: Mediterranean salt meadows (Juncetalia maritimi)

It is a habitat with high halophilic characteristics, diffused in a retrodunal position near the basins and characterized physiognomically by thick expanses of rushes with a prevalence of Juncus maritimus (marine rush). It is part of the Juncetea maritimi class.

VEGETABLE SPECIES OF THE NATIONAL RED LIST

Ipomoea sagittata Poiret (fam. Convolvulaceae)

It is a halophyte typical of high coastal marshlands characterized by a high salinity substrate. These rare species, very showy for its pinkish campanulate flowers, are also distinctly thermophilic species. Currently it is among the threatened species because its characteristic habitat, represented by the coastal marshes, is in serious danger of destruction. In Italy Ipomoea sagittata is known for Lazio (Lago di Fondi near Latina), Sicily (near Trapani) and Puglia (Rauccio, Cesine, Alimini, Ugento, "Li Foggi" of Gallipoli, Palude del Conte and Bacini di Ugento). Two known stations for the Tarantino (Pantano del Tara and Isolotto di S. Nicolicchio) are currently considered extinct.

Orchis palustris Jacq. (fam. Orchidaceae)

It is a rare spontaneous orchid which is present in the hygrophilous vegetations in general, especially in the reeds and in the giuncheti. It is a very rare species in Puglia, where it is found in a few locations such as: Rauccio, Cesine, Palude "Li Tamari", Alimini Fontanelle,

"Li Foggi" of Gallipoli, Palude del Conte. At the Bacis Orchis palustris is present in environments with subalophilous vegetation.

VEGETABLE SPECIES OF THE REGIONAL RED LIST

Vitex agnus-castus L. (fam. Verbenaceae)

It is a shrub species typical of humid environments, where it participates in the formation of a characteristic riparian vegetation.

Linum maritimum L. (fam. Linaceae)

It is a typical annual cycle of brackish wet muds. It is very rare in Puglia. It is found in the wet areas around the basins

THE FERRUGINOUS DUCK IN THE REGIONAL NATURAL PARK "LITORALE DI UGENTO"

The Ferruginous Duck (Aythya nyroca) is a species with a Palearctic distribution. The reproductive area is characterized by a fragmented distribution and extends from western Europe to China and western Mongolia; some isolated populations are found further south, including Morocco, where nesting was first ascertained in 1997 (Green and El Hamazoui, 1998) and northern Pakistan. The Ferruginous Duck is a migratory species even if it is believed that some nesting populations in southern parts of the area can be residents. The wintering distribution area is between Europe and western Africa in the west and southeast Asia in the east, and in the latitudinal sense between sub-Saharan Africa and central Europe (Robinson and Hughes, 2006). The minimum estimate of the world population is 100,000 individuals (Robinson and Hughes, 2006). The most important known reproductive contingents are those of Romania (5500 - 6500 pairs), Azerbaijan (1000 - 3000 pairs), Croatia (2000-3000 couples) and Kazakhstan (2000 - 3000 pairs). However, there are certainly more numerous nesting populations, since they are known contingents of winterers of 21,000 individuals in Bangladesh and of 70,000 individuals in Turkmenistan, whose origin is unknown.

Distribution and status in Italy

Fenologia

In Italy, the species is present regularly during the migratory period, in winter and during the breeding season. Migrations occur between August and November and between February and April. There are few bibliographic informations on Italian populations. In fact, there are only three reports of individuals ringed abroad and recaptured in Italy: two individuals ringed with chicks in the Czech Republic on 10/8/1961 and 30/6/1963 were taken back on 12/24/1961 respectively Porto Tolle (RO) and on 3/15/1964 in Fucecchio (FI); an individual ringed as an adult in Camargue on 11/26/1969 was recaptured in the Venice lagoon on 3/19/1972. Costa and Bondi (2002) hypothesize a partial sedentariness

of the species in the Ravenna area and this seems likely also for other nesting nuclei in Italy.

Population

In Italy, the National Action Plan of the Ferruginous duck drafted by the Ministry of the Environment estimates a nesting population of 60-100 couples, whose distribution is very fragmented.

During the winter, the ministerial action plan states, the species is more widespread in the national territory even if in recent years it is very concentrated in Sicily where there have been registered contingents in excess of 50% of the population (In this phase of the annual cycle and during the migratory transits there are contingents of international importance, as they exceed the threshold of 1% of the reference biogeographical population (for Ferruginous duck this value is equal to 30 individuals, Wetlands International, 2002) .In Italy the trend of the contingents is nesting that winter visitor looks positive.

The Population in the Regional Natural Park "Litorale di Ugento"

In the wetlands of the Regional Coastal Park of Ugento, Ferruginous duck sightings date back to 2007.

Between October 2004 and October 2007 a study was carried out called "Census and Mapping of Water Birds" (La Gioia G. and Prato L., 2009) with the aim of evaluating the annual cycle of aquatic birds present in wet areas of the Province of Lecce. The study included a total of 53 censuses; during the censuses the internal areas have always been counted with a frequency of one or two times a month, while the coastal areas have been surveyed only 23 times, mainly once a month, but never in the period July-September. The censuses were always made in two, maximum three consecutive days in order to reduce the probability of birds moving between the different areas, especially during the migration period, and thus avoiding over-estimating the populations.

In the area of the Natural Park of Ugento, species belonging to 12 families / groups have been observed, of which:

- 2 dominant families (with relative abundance greater than 5% of the total): Laridae and Rallid;
- 5 sub-dominant families (with relative abundance between 2% and 5%): Podicipedi, Ardeidae, Anatidae, Falacrocoracidi, Limicoli.

The specimens surveyed belong to 71 different species of which:

- 4 dominant species: Common gull, coral gull, coot and Mediterranean herring gull with a dominance index of 47.1%;
- 4 sub-dominant species: Tuffetto, Cormorano, Moorhen and Gray Heron.

The table of the census carried out between October 2004 and October 2007 shows the presence of the Ferruginous duck in the basins of the PNR "Litorale di Ugento".

The LASPEH project included among its concrete actions for the protection of the Moretta also the realization of a monitoring in order to provide useful and updated data on the presence of the species of interest. The activities carried out starting from July 2019 confirmed the presence of the duck with at least 6 potentially nesting pairs present in the Rottacapozza Nord and Rottacapozza Sud basins. These basins are characterized by less salt water and by a suitable vegetation for the Ferruginous duck.

Figure 2: Ferruginous Duck in the basins of the Regional Natural Park "Litorale di Ugento" - 2019 monitoring campaign

Figure 3: Ferruginous Duck in the basins of the Regional Natural Park "Litorale di Ugento" - 2019 monitoring campaign

Feeding

This duck feeds mainly on seeds and green parts of aquatic plants (*Potamogeton, Carex, Ceratophyllum, Hydrocharis, Polygonum, Bolboschoenus, Echinochloa, Nymphaea alba, Chara and Lemna*). However, an animal component is present, especially important in the reproductive period, which consists of small fish, Amphibians and their eggs, Molluscs, Crustaceans and Insects. In general, the species feeds by diving or partially diving, keeping the back of the body emerged (up-ending) or swimming on the surface, keeping the head submerged. Such foraging activities occur mainly in ponds rich in submerged and floating aquatic plants. However, the Ferruginous Duck is also able to exploit waters poor in macrophytes, feeding on benthic invertebrates.

Reproductive biology

The couple's bond, monogamous and of seasonal duration, is formed starting from

January. This species lays from 2 to 19 eggs (frequently 7-10); incubation, lasting 25-27 days, takes place from early May with delays until mid-June for late or replacement broods. Young people fly away at the age of 55-60 days when they reach independence.

Molt

The post-reproductive molt of the adult is complete and takes place between June and August in the male, while in the female four to six weeks later. The pre-reproductive molt is partial (body, head and scapulars) and takes place between August and November. In the female the two suits partially overlap. The post-juvenile molt is partial, very variable in extension and duration: generally, the feathers of the body are replaced from July to October, sometimes until December, the feathers of the tail by October-November, the tertiaries and some internal cover in spring. As with other Anatidae species, Ferruginous duck adults also replace all remiges simultaneously, remaining completely incapacitated for 3-4 weeks. This period (July-August for males, August-September for females) is a particularly critical phase of the annual biological cycle that must be spent in a safe area with respect to the danger represented by predators, without forms of anthropic disturbance and able to provide adequate food resources.

PROTECTION AND PRESERVATION ACTIVITIES IN THE "LITORALE DI UGENTO" REGIONAL NATURAL PARK

The managing body of the Regional Natural Park "Litorale di Ugento" is carrying out two important projects in the area of the Ugento basins which are aimed at increasing the biodiversity and faunist suitability of the wetlands of the protected area.

The first project is called "EXECUTIVE DESIGN AND PERFORMANCE OF THE WORK OF VALORISATION AND INTEGRATED REQUALIFICATION OF THE COASTAL LANDSCAPES OF THE UGENTO MUNICIPALITY" and realizes in the area of the basin southern head of the following interventions:

1. substitution of the bitumisonous material of the roads present in the perimeter of the basin and replacement with permeable and natural materials;
2. elimination of the cemented embankment of the Rottacapozza SUD basin and remodeling of the embankment itself by providing a new profile necessary to create areas of protection, rest and feeding of the fauna; the areas of new expansion of the basin will have different depths compared to the main area with a maximum depth of 40 cm, to favor the development of vegetation and the presence of shorebirds;
3. creation of artificial islets in order to create an ideal habitat for nesting and shelter for birdlife.

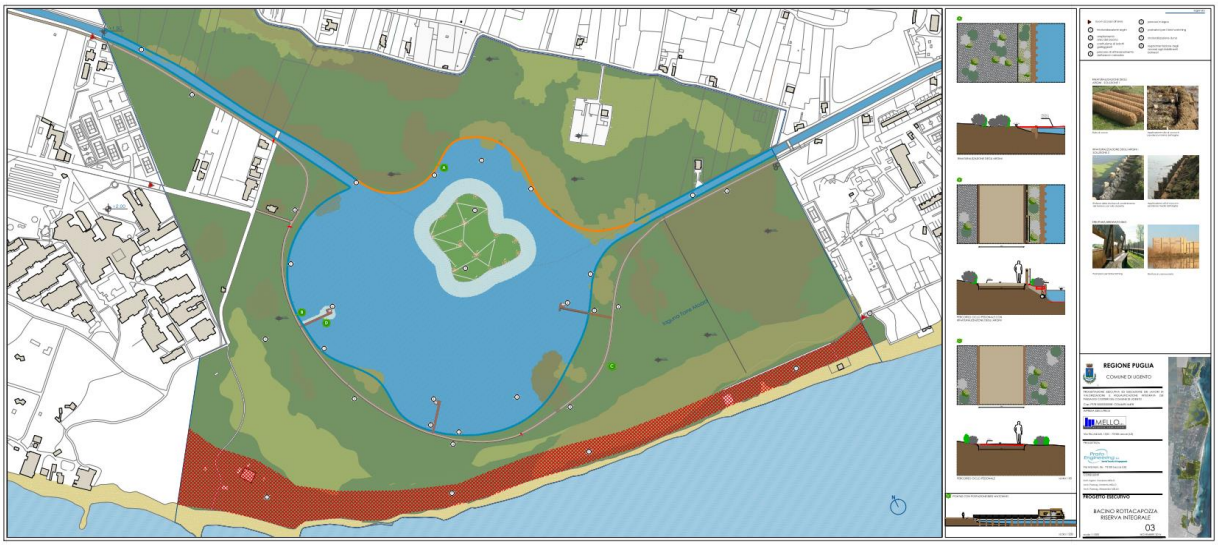


Figure 4: Table of the project called "EXECUTIVE DESIGN AND PERFORMANCE OF THE VALORISATION AND REQUALIFICATION OF INTEGRATED LANDSCAPES OF THE COASTAL LANDSCAPES OF UGENTO"

The second project is called "Conservation and protection of wetlands and dunes in P.N.R. Coast of Ugento and R.N.R.O. Eastern Tarantino Coast of Manduria ". The project plans to re-naturalize the cemented banks of the Ulmo basin and the two channels connected to it, using naturalistic engineering techniques. In particular, the remodeling of the banks of the Ulmo Basin will have the task of:

- restore the transition zone between the emerged earth and the deep water;
- restore the earth banks with a slope much less pronounced than the current one;
- allow the development of submerged and emerged aquatic vegetation. In fact, the "Riparian Community" habitat will be rebuilt at the edge of the basin with the planting of native species belonging to habitats 1410 and 1420. The proposed interventions will contribute to increasing biodiversity in the Regional Natural Park "Litorale di Ugento ".

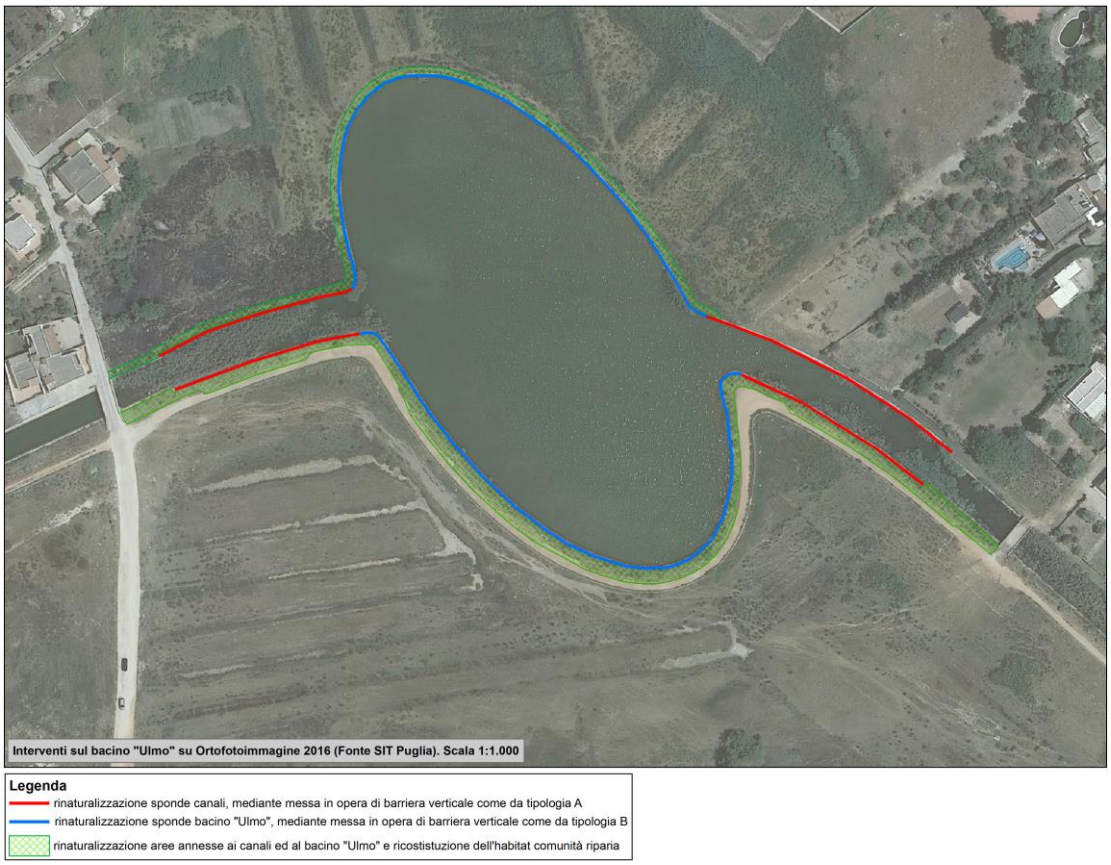


Figure 5: Table of the project called "Conservation and protection of wetlands and dunes in the P.N.R. Coast of Ugento and R.N.R.O. Eastern Tarantino Coast of Manduria "

ANALYSIS OF THREATS AND LIMITING FACTORS FOR RESTOCKING (FOR SPECIES) OR CONSERVATION

The categories of threats used in this section are consistent with those found in the Survival Commission Authority Files, a tool for identifying threats of the Red List of species of the International Union for Conservation of Nature (http: //www.iucn. org / themes / ssc / sis / authority) and those included in the Ferruginous Duck National Protection Plan.

Habitat loss / degradation

The Ferruginous Duck is an anatid particularly linked to the freshwater wetlands with reed-bed vegetation. In the Natural Park of Ugento these environments are highly limited. The reed beds of the Bacini system, in particular, are the subject of cutting interventions by the "Ugento and Li Foggi" reclamation Consortium with little attention to the ecological function of this vegetation. Furthermore, the Ugento basin system is subject to numerous inputs of organic substances coming from the waste water treatment plants of two accommodation facilities and from illegal discharges of the houses present in the areas adjacent to the basin system. These discharges are made directly in the aquifer which is superficial in these areas and which is in close communication with the basins. Numerous inputs of organic and chemical substances come from intensive agricultural activities, mainly vegetables, which are found upstream of the basin system. Through the washing away of the ground or through the communication with groundwater, these substances come into contact with the basins, generating degradation phenomena.

Frequent during the summer period are the phenomena of eutrophication caused by the stagnation of water caused by the obstruction of the mouths of the basin system, mainly caused by the accumulation of Posidonia oceanica leaves and sand, the lack of maintenance of riparian vegetation and the introduction in water of considerable quantities of organic substances due to the presence of numerous users.

Relevance: high

Tourist and recreational activities.

The recreational function of wetlands is known and important, and its usefulness for conservation purposes is recognized by the international scientific community (Ramsar Convention). However, some activities can lead to significant habitat modifications.

Within the Ugento basins, illegal fishing has been repeatedly reported through the use of motor boats and fishing nets. Along the banks of the basins the numerous sport fishermen present cause environmental degradation and destruction of the bank vegetation.

Relevance: high

Invasive alien species.

The invasion of alien animal or plant species is currently one of the main threats to biodiversity, second only to habitat destruction (IUCN, 2000). Native species can be indirectly damaged through the degradation of their habitats. Some invasive species can transform ecosystems, sometimes irreversibly, by changing the physical structure (vertical structure of vegetation), taxonomy (change in the composition of plant and / or animal communities) and functional (alteration of food webs and pyramids) of biocoenoses.

Numerous specimens of *Carassius auratus*, a species belonging to the *Cyprinidae* family, have been introduced into the basin system of the Natural Park of Ugento, which, having found favorable situations and the total absence of predators, reproduced in large numbers. With reference to the Ferruginous Duck it is necessary to start studies and monitors to verify if the presence of this invasive alien species causes negative impacts on it.

Relevance: average

Inappropriate management of biotopes.

Marsh ecosystems are transitional environments, whose vegetation associations in a short time naturally tend to evolve towards successions that are increasingly terrestrial. This is due to the rapid growth of the vegetation that tends to invade the mirrors of water, reducing its extension thanks to the large quantity of organic substance produced that turns into soil, burying the flooded areas. Consequently, it is necessary to remove this biomass, to maintain over time the fundamental ecological characteristics of these ecosystems

Relevance: high

Accidental mortality from fishing nets

Within the Ugento basins, illegal fishing has been repeatedly reported through the use of motor boats and fishing nets that can cause incidents of accidental mortality.

Relevance: low

Pollution

Water pollution from agricultural activities. The amount of detectable chemical substances in the waters that cross areas subject to intensive agriculture is considerable and certainly impacts at least on some components of ecosystems. Unfortunately, however, the assessment of the damage caused by pollution on biotic communities is complex, expensive and rarely performed. Even the natural park basins are characterized by intensive agricultural activities. Through the washing away of the ground or through the introduction into the groundwater, the chemical and organic substances used in agriculture come into contact with the basins, generating degradation phenomena.

Relevance: unknown

Anthropic impact

Tourist and recreational activities. Within medium-small biotopes such as those that characterize the Ugento Natural Park, some recreational activities are incompatible with the presence of nesting contingents, even modest ones, of Ferruginous duck. It is necessary to investigate the role of anthropic impact on the target species.

Relevance: high

Lack of knowledge on the biology of the species

Although it is not a threat or a directly limiting factor, the lack of information on the salient aspects of its biology and ecology represents a serious limitation in the management and creation of new habitats and therefore in the implementation of effective conservation actions. In particular, important shortcomings concern: 1) productivity; 2) survival; 3) ecological characteristics determining the choice of nesting sites; 4) ecological characteristics determining the choice of wintering sites.

Relevance: high

IDENTIFICATION OF DECISION MAKERS AND STAKEHOLDERS DIRECTLY INVOLVED IN THE MANAGEMENT OF THE HABITAT/SPECIES

Decision Makers

Type	Mode of interaction with the habitat and with the species
EU	The European Community, through its strategies, its rules and its financial instruments, directly influences the planning, management and planning of protection interventions in the territory
Puglia Region	The Puglia Region through its strategies, its rules and its financial instruments, directly influences the planning, the management and the planning of interventions of protection on the territory
Municipality of Ugento	The municipality of Ugento, as the managing body of the Natural Park of Ugento, has among its aims dictated by the art. 2 of the L.R. 13/2007 *"[...] conserving and recovering the biocoenoses, with particular reference to the habitats and animal and plant species contained in the community directives 79/409 / EEC of the Council, dated 2 April 1979, relating to the conservation of wild birds and 92 / 43 / EEC of the Council of 21 May 1992 on the conservation of natural and semi-natural habitats and of wild flora and fauna, as well as ecological balances, hydraulic and hydrogeological balances "*
Consorzio di Bonifica "Ugento e li Foggi"	The "Ugento and Li Foggi" Reclamation Consortium is the Public Law Entity, subject to the control of the Puglia Region, which has the task of managing the system of canals and basins present in the Regional Natural Park "Litorale di Ugento".

STAKEHOLDERS

Tipologia stakeholders	Modalità di interazione con l'habitat e con le specie
Farmers	Numerous are the agricultural actions that surround the basins of the Natural Park of Ugento and that have direct and indirect effects on the chemical-physical state of the basins.
Homeowners in neighboring areas	The owners of the houses that border the system of canals and basins or that are adjacent to them, have changed the state of the places eliminating portions of the natural landscape.
Sport fishermen	Sports fishermen who frequent the basins, rich in euryhaline fish, have a significant impact on the avifauna present through the destruction of portions of reeds (to ensure a fishing post along the banks) and visual disturbance actions
Users / tourists	Tourists / users of the basins can produce disturbing actions on the species of birdlife through the production of noise sources
Tourism structures	The tourist structures that surround the basins can have a significant impact on the basins and on the birdlife due to the production of noises, during the day, through the extraction of large quantities of water through the wells present in the structures and (only some) by introducing purified organic waste into the canals.

DEFINITION OF GENERAL AND SPECIFIC OBJECTIVES ENSURING CONSERVATION OF HABITAT/SPECIES IN THE SHORT, MEDIUM AND LONG PERIODS.

The general objective of this protection plan is to implement protection strategies and actions aimed at the conservation of the Moretta tabacca specimens and the increase in consistency and distribution of the species.

Specific objectives		Actions	
Os1	*Improve and restore the habitats of the Natural Park of Ugento where the Ferruginous duck specimens are present*	A1	Increase surveillance and monitoring in key areas
		A2	Purchase of interested areas: 1. from the presence of habitat 1410: Mediterranean salt meadows (Juncetalia maritimi) and 1420: Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetiea fruticosi) 2. from the presence of reeds (Phragmithes australis) in all areas adjacent to the system of canals and basins of the consortium of bonfica ugento and Foggi them
		A3	Conservation interventions: experimental ecological restoration actions with the creation of areas suitable for nesting also through the creation of small islands (artificial and / or natural)
		A4	Removal of cemented sides, reconstitution with natural materials and suitable slopes
Os2	*Improve knowledge of the migration strategies and ecology of Ferruginous duck in the Park*	A5	Start annual monitoring in key areas
		A6	Intensify catch and ringing programs
		A7	Radio mark exemplars during the reproductive period
Os3	*Evaluate the impact of pollution on water and sediment in the basinsi*	A8	I Investigate the presence of pollutants in wet areas and on tissue samples
		A9	Monitor the status of the habitat on key sites

Os4	*Raising public opinion and decision makers*	A10	Propose seminars to "decision makers"
		A11	Produce audiovisual dissemination material
		A12	Organize an information campaign in schools
		A13	Creation of information panels near the Ferruginous duck habitats

COST OF THE PROTECTION ACTION PLAN

Specific objective	Action	Cost	Duration	Source of financing
Os1	A1	€ 5,000,00 (Agreement with local associations)	Every year	Protected area management funds
	A2	€ 1.500 ad Ha ca	/	Protected area management funds, municipal funds, regional and community funds (PO FESR, LIFE, etc.)
	A3	€ 5.000,00	Every year	Protected area management funds, municipal funds, regional and community funds (PO FESR, LIFE, etc.)
	A4	€ 400,00 per linear meter (of the cost includes the costs of demolition, transport and disposal of rubble and reconstitution of the embankment with planting)	/	Regional and community funds (PO FESR, LIFE, etc.)
Os2	A5	€ 2.500,00	Every year	Protected area management funds, municipal funds, regional and community funds (PO FESR, LIFE, etc.)

	A6	€ 2.500,00	Every year	Protected area management funds, municipal funds, regional and community funds (PO FESR, LIFE, etc.)
	A7	€ 2.500,00	Every year	Protected area management funds, municipal funds, regional and community funds (PO FESR, LIFE, etc.)
Os3	A8	1,500,00	Every two years	Protected area management funds, municipal funds
	A9	1,500,00	Every year	Protected area management funds, municipal funds
Os4	A10	€ 1.000,00	Every year	Protected area management funds, municipal funds
	A11	€ 5.000,00	Every two years	Protected area management funds, municipal funds, regional and community funds (PO FESR, LIFE, etc.)
	A12	€ 2.500,00	Every year	Protected area management funds, municipal funds, regional and community funds (PO FESR,

				LIFE, etc.)
	A13	€ 1.500,00	Every year	Protected area management funds, municipal funds, regional and community funds (PO FESR, LIFE, etc.)

PLAN MONITORING INDICATORS

Specific objective	Context indicators	Performance indicators	Result indicators
Os1	N ° protection measures present	N° of protection measures implemented	Increase in the surface area of re-naturalized habitats
	Control activities carried out on the territory	Number of reintroductions made	
	Surface burned areas	N° prevention interventions implemented	Increase in surface natural habitats
			Surface of re-naturalized areas
			Ecological corridors area increase
Os2	No. of observed individuals	N ° of animal species surveyed / species existing previously (wildlife census)	Increase / preservation of species richness

	Index of qualitative diversity[1]	N ° of plant species surveyed / species existing previously (floristic-vegetational census)	
	N ° of existing monitoring stations	N ° of annual environmental surveys carried out	
Os3	Indicative Level Macrodescriptors[2]	N° of detractors eliminated	Extension of the re-naturalized areas
	Surface of the areas to be recovered / total surface area	Surface affected by landscape and environmental recovery	
	N ° risky assets present in the territory / total assets		
Os4	Already carried out awareness-raising activities	N ° of information meetings organized	Increase in the number of people who participated in events aimed at raising awareness of the total resident population
	N ° of information campaigns carried out in the park area	N ° of organized seminars	Increase in guided visits of the school population
	N ° of seminars organized by the	N ° of projects aimed at environmental	Increase in the number of television, radio and / or

[1] Qualitative diversity = S + / S-. S + = characteristic species; S- = adventitious species.
[2] Ammoniacal nitrogen, nitric nitrogen, dissolved oxygen, BOD, COD, total phosphorus, Escherichia Coli UFC / 100

	Park Authority, environmental associations, universities, research centers	awareness	journalistic interviews / services on the Park
		N ° of people who have participated in environmental education activities	
		N ° of local schools that have participated in educational activities	
		N ° of schools outside the park area that have participated in educational activities	
		N ° of educational projects carried out	
		Number of multimedia products and studies carried out	