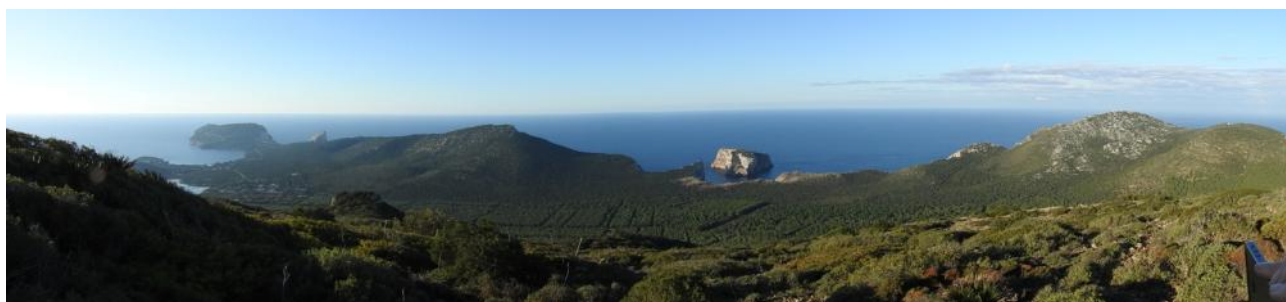


PROJECT LIFE "AQUILA a-life"

Hacking site selection



March 2018

Azione A2: Selección de localizaciones para las liberaciones



LIFE PROJECT “AQUILA a-LIFE” (LIFE16 NAT/ES/000235)

BONELLI’S EAGLE (*Aquila fasciata* Vieillot, 1822) HACKING SITE SELECTION

Azione A2: Seleccìon de localizaciones para las liberaciones

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INTRODUCTION

The LIFE project "AQUILA-LIFE" aims at increasing the distribution of Bonelli's eagle (*Aquila fasciata* Vieillot, 1822) in the western Mediterranean, reversing the negative trend shown by the species, also through its reintroduction in Sardinia where, on the basis of the available knowledge, it went extinct around the end of the nineties. The choice of the release site is of paramount importance for the success of the reintroduction, because the released eagles tend to establish their territories in proximity of the release sites. To select the most suitable release site, in December 2017 and January 2018 several inspections were carried out in Sardinia, with the support of Forestas and Regional Administration staff. In January, the staff of the coordinating beneficiary (Grefa, Ernesto Alvarez and Carlota Viada) also participated to the survey. All visited sites were evaluated on the basis of several characteristics, described in this report, which could define the sites suitability. This approach has allowed us to rank the visited sites, making easier the identification of those that can potentially be used during the project implementation. This report shows the results of the surveys mentioned above and motivates the selection of the release sites.

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1. CRITERIA FOR THE SELECTION OF HACKING SITE

The guiding principles for the selection of the release sites have been the following (not ranked by importance):

- i)* being inside N2000 network, namely within the SPAs already selected within the project or even in SCI;
- ii)* the guarantee of a position as safe as possible, quiet and almost inaccessible to the public as well as near the facilities used to accommodate the operators and store project materials;
- iii)* the location being within public property, in view of the difficulties encountered in other projects to obtain land, in free bailment, to set up structures, even if removable, within private properties;
- iv)* the distance from known nesting sites of the Golden Eagle, which seems to prevent the settlement of released Bonelli's eagles;
- v)* easy accessibility by vehicles for the transport of materials, including those for the construction of the cage;
- vi)* broad perspective on natural habitats from the site, including suitable nesting habitats (e.g., cliffs, rocky slopes, etc.);
- vii)* the suitability of the "micro-site" for the construction of the cage (e.g. low slope) such as not to require an excessive processing of the site;
- viii)* the presence of any risk for the survival of the released eagled (electrical lines, wind power plants, hunting);

According to the feasibility plan (Raganella-Pelliccioni et al. 2018), preys availability is not an issue for the choice of the release site, therefore this point has not been considered for site scoring. In agreement with Forestas, that manages extensive territories throughout the region and with the Regional Administration, seven areas were identified (Porto Conte, Bosa, Marganai, Monte Olia, Crastazza, Genna Silana and Sette Fratelli, Fig. 1) and surveyed, particularly focusing on 18 potential release sites.

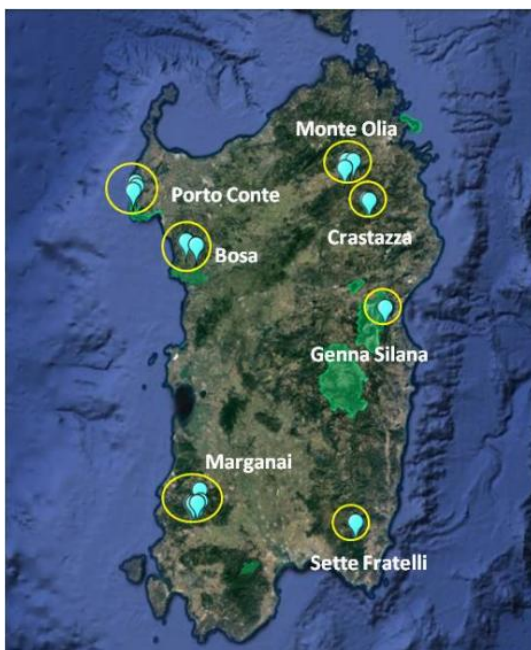


Fig. 1. Location of potential release sites. The placeholders indicate the sites surveyed within each area. The green shaded areas represent the SPAs selected in the context of the project

All sites were ranked based on overall suitability (Tables 1 and 2) defined primarily upon ecological (i.e. distance from known sites of nesting of the Golden Eagle) and logistical aspects (i.e. points II and III of the list above). The presence of power lines and wind farms, including mini wind turbines, was estimated visually during the survey and using the maps downloaded from the Sardinia Regional Administration website (<http://webgis2.regione.sardegna.it>). Electrocutation risk was more carefully evaluated based upon maps of the electric lines within 3 and 5 km from the site selected for the first release (e-distribution data I).

The description of the sites is given in the following paragraphs, while the main features and deriving ranks are reported in Tables 1 and 2, respectively.

2. SETTE FRATELLI MASSIF

The massif of Sette Fratelli is within a regional park that extends to the south-east of the province of Cagliari, in a scarcely populated area; the only inhabited centre is Burcei, which is completely surrounded by the park. The main road which crosses the protected area is the Strada Statale 125 Orientale Sarda, while there is a single dirt road that enters the Massif. Almost all mountains of the massif do not reach 1000 meters altitude, with the exception of Mount Serpeddì (1069 m asl) and Punta Sa Ceraxa (1016 meters), one of the “seven brothers”, the seven peaks featuring the profile of the massif.

2.1 Baccu Malu

Property: public

Protected area: Sette Fratelli Regional Park; oasi “Sette Fratelli”

N2000: ZPS ITB043055 “Monte dei Sette Fratelli”, SIC ITB041106 “Monte de Sette Fratelli e Sarrabus”

Altitude: 1000 m asl

Description:

The site lies in the heart of the massif and is reachable through the only dirt road present, open to the transit and accessible; the entire area and the site are touristic hot spots, therefore frequently visited, particularly during the spring-summer period. The prospect of the site is wide and the substrate is stony with bushes, but suitable for setting the cage. There are facilities for project staff and material within an acceptable distance. Among the possible prey species, wild rabbit and hare are not reported in the area. There is a nest of Golden Eagle within a short distance from the site (less than 3 km). Electrical lines and wind power plants are absent within a radius of 5 km from the site. This is the only site available in the massif for the cage placement and the only reachable with vehicles.

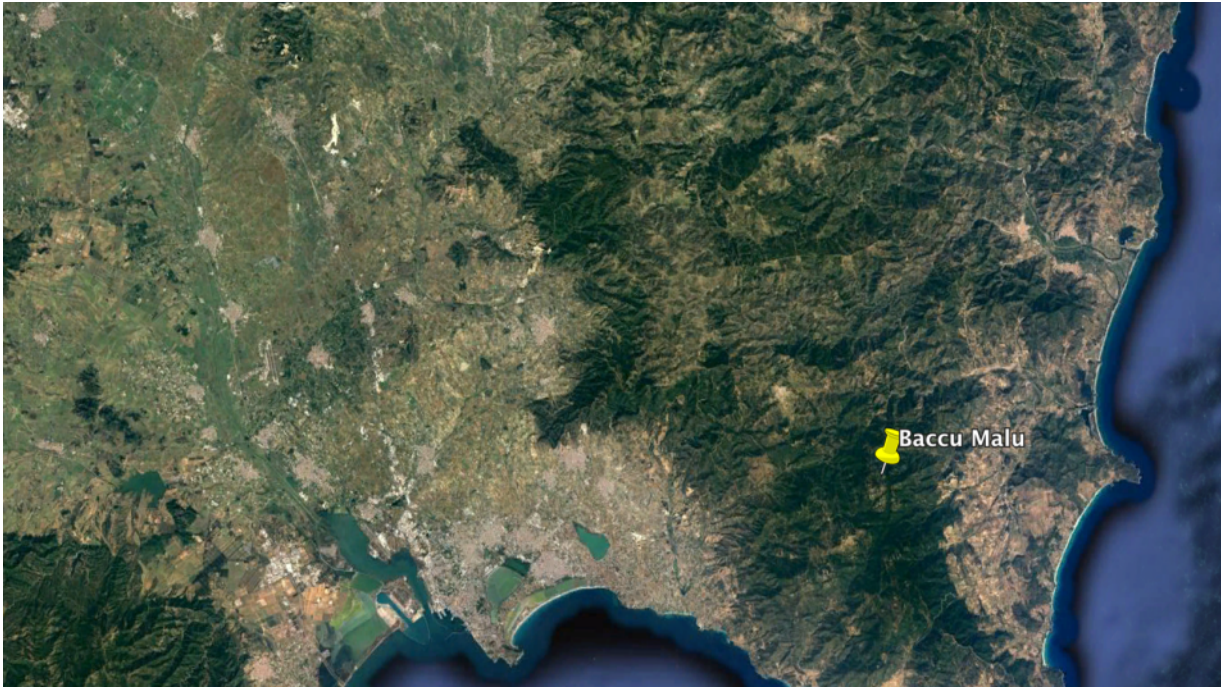


Fig. 2. Sette Fratelli Massif

3. MARGANAI

The state-owned forest of Marganai is currently managed by Forestas and, according to the regional law 31/89, falls within the area which is part of the "Natural Park of Monte Linas, Marganai-Orida, Montimannu" and considered as an area of interest for landscape according to D. Lgs 490/1999 (already the 1497/39), art. 139 and 146. The aerial firefighting team has its headquarter in the forest of Marganai; the team plays an important role in the context of the regional plan for firefighting and it is particularly active during the summer. The forest is an important hot spot for tourists and schools; it can be visited following several paths and routes, although only Forestas personnel can access with vehicles. The area is covered by forests; hares, partridges and pigeons are present. In this area 5 potential sites were visited (Fig. 3).

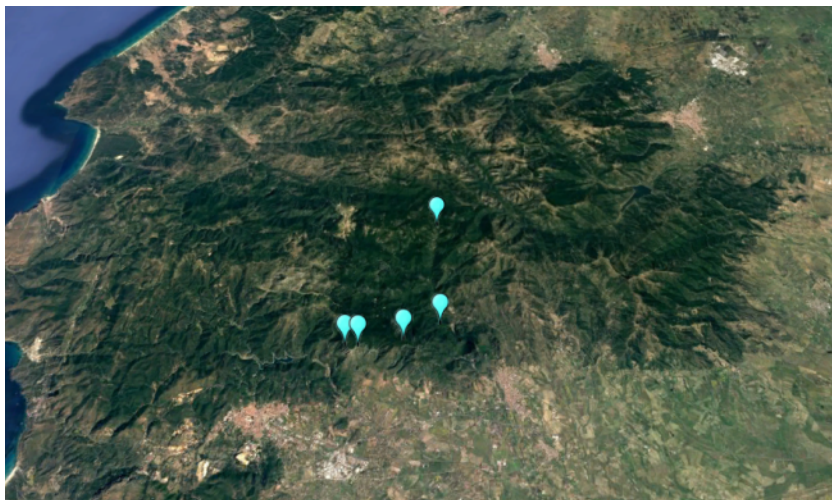


Fig. 3. Marganai sites. The densely populated area (Iglesias) is located in the south.

3.1 Marganai 1 and 2

Property: public

Protected area: Monte Linas, Marganai-Orida, Montimannu Natural park; oasi "Marganai";

N2000: SIC ITB0411111 "Monte Linas – Marganai"

Altitude: 740 m asl

Description:

These sites are located at some distance from the lodge and are reachable only by a forest dirt road. A flat area sufficiently large for the installation of the aviary is lacking and both sites are located in close proximity of Golden Eagle nesting sites. The sites overlook directly a heavily populated area, the plain of Iglesias, therefore not offering an adequate prospect.

Wind turbines are absent within 5 km from the site. Power lines are abundant in the plain, within about 3 km from the site.

3.2 Monte San Michele

Property: public

Protected area: Monte Linas, Marganai-Orida, Montimannu Natural park; oasi "Marganai";

N2000: SIC ITB0411111 "Monte Linas – Marganai"

Altitude: 845 m asl

Description:

This site does not have an area suitable for the construction of the cage because of the steep slopes and, like the other sites, because it overlooks the heavy populated valley of Iglesiente. It has the same problems reported for Marganai 1 and 2.



Fig. 4. Marganai sites 1 and 2 (left) and San Michele (right).

3.3 Perda Niedda

Property: public

Protected area: Monte Linas, Marganai-Orida, Montimannu Natural park; oasi "Monte Linas"

N2000: SIC ITB0411111 "Monte Linas – Marganai"

Altitude: 740 m asl

Description:

Located at the north of the other sites, this site is more remote than the others, surrounded by forests and mountains, thus at a considerable distance from the available facilities. Although the site is characterized by a good perspective on a rocky valley, covered with Mediterranean maquis, and with view on M. Linas, it is reachable with a paved road which makes it easily accessible to the public. The site is about 7 km far from a known Golden Eagle nesting site; while another nesting site is known to be present in the area although its exact location is unknown.

3.4 Marganai 5

Property: public

Protected area: Monte Linas, Marganai-Orida, Montimannu Natural park; oasi "Marganai"

N2000: SIC ITB0411111 "Monte Linas – Marganai"

Altitude: 355 m asl

Description:

The site overlooks the valley at NE of Domusnovas and is within walking distance from the service road of Forestas; accessibility is limited only to the staff of the Agency. It is quite far from the available facilities. Although very panoramic on the valley, it does not have a proper perspective on rocky areas and it is next to a densely populated area in the valley (0.5 km). There is no suitable place for setting the cage.

4. PORTO CONTE

The area extends from the promontory of Capo Caccia to Punta del Giglio, including part of the hinterland and falls within the territory of the Regional Park of Porto Conte. The area is characterized by communities related to coastal systems and to small islands with garrigue, Mediterranean maquis, woodland and wetlands. In this area wild rabbits, partridges and corvids are common. It is worth mentioning the presence of Raven, which could compete for the food offered to the eagles. There are facilities for overnight and storage of materials. The whole area has a high tourist vocation especially during spring and summer. Wind farms are absent, while power lines are not abundant but present within 5 km from the site. In this area three potential sites have been inspected, described below. Facilities are at a reasonable distance from all the sites.

4.1 Vultures cage

Property: public

Protected area: Porto Conte Regional Park; oasi "Tramariglio"

N2000: ZPS ITB013044 "Capo Caccia"; ITB010042 "Capo Caccia (con isole Foradada e Piana) e Punta del Giglio

Altitude: 112_m asl

Description:

Access to the area is restricted to Forestas personnel. In this area there are a pre-release cage and an active feeding point for Griffon Vultures which currently attracts several (20-30) Ravens. The presence of crows could negatively interfere with the reintroduction of the Bonelli's Eagle, in particular when juveniles are released. However, the already existing cage may be used for the release of adults Bonelli's eagle, as these would be able to compete more effectively with the crows than juveniles. Although located in the Capo Caccia cape, the site has a good view towards the inland and the cliffs facing the sea (Fig. 6).



Fig. 6. Location of the "Vultures cage" site with flying Ravens

4.2 Monte Timidone

Property: public

Protected area: Porto Conte Regional Park; oasi "Tramariglio"

N2000: SPA ITB013044 "Capo Caccia"; SCI ITB010042 "Capo Caccia (con isole Foradada e Piana) e Punta del Giglio

Altitude: 358 m asl

Description:

The site is located at the top of Monte Timidone, the central and highest point of the promontory of Capo Caccia. The site has an excellent perspective; however, it is close to a fire surveillance tower and it is highly frequented during the summer. Moreover, the road is open and it is not possible to introduce any restriction. The area represents a strong tourist attraction thanks to the scenic position overlooking the bay. Given this position it is also windblown.

4.3 Tramariglio

Property: public

Protected area: Porto Conte Regional Park; oasi "Tramariglio"

N2000: SPA ITB013044 "Capo Caccia"; SCI ITB010042 "Capo Caccia (con isole Foradada e Piana) e Punta del Giglio

Altitude: 113 m asl

Description:

The access to the site is restricted and the road is almost impassable. This makes the transport of the material for cage setting extremely hard, as well as the monitoring of animals during the hacking phase. In addition, an area sufficiently large and flat for setting the cage is lacking; although the site is characterized by a good prospect, it is located immediately above a populated area.

5. BOSA

The area, within the territories of Bosa, Suni and Montresta, hosts the most important Italian colony of Griffon Vulture *Gyps fulvus* and it is the project site of the Life project " Under Griffon Wings" LIFE14 NAT/IT/000484, which envisages, among other activities, the release of 60 vultures and important actions of outreach and awareness. The release of Bonelli's eagle in this area could therefore benefit from the communication activities already carried out and from a local human dimension which is already well aware of this kind of conservation activities. Nesting sites of the Golden eagle in the area are known with certainty and they are located as follows:

- along the road Bosa-Alghero, nearby Capo Marangiu;
- on the eastern slope of Monte Minerva;
- along the mid-Temo Valley, nearby the dam (M. Crispu).

In this area three potential cage sites have been identified; all enjoy a wide view on the rocky walls and canyons, among which the canyon of the river Temo is of considerable importance. Here, in the locality of Silva Manu, the last nesting site of Bonelli's eagle in the area of Bosa is reported, dating back to 1975. The last animal was killed and stuffed. Wild Boar is widely distributed. All sites lie outside the SPA ITB023037 "Hinterland of Bosa, Suni and Montresta" although bordering its northern boundary.

The sites in Bosa was also visited with the coordinating beneficiary GREFA (Carlota Viada and Ernesto Alvarez).

5.1 Montresta

Property: public

Protected area: -

N2000: SCI ITB020041 "Entrotterra e Zona Costiera tra Bosa, Capo Marangiu e Porto Tangone"

Altitude: 395 m asl

Description:

Although this site is characterized by excellent features for perspective and orography (availability of plane ground for the installation of the cage), there are several factors of disturbance. The area is open to hunting and grazing, with no possibility to restrict these activities and/or the local

access. Although these activities may be compatible with the hacking protocols, the hunting period overlaps with the post-release phase of animals, a very sensitive period during which it would be appropriate to minimize any source of disturbance. Also, a guest house which houses a traditional festival twice a year during the summer is very close to the site, contributing to a moderate level of disturbance. While wind farm is far from the site, although the distance from dangerous power lines needs to be more carefully assessed.

5.2 Bosa 1 and 2

Property: public

Protected area: Cantiere Forestale Forestas

N2000: SCI ITB020041 “Entrotterra e Zona Costiera tra Bosa, Capo Marangiu e Porto Tangone”

Altitude: 480 m asl

Description:

Both these sites - a short distance from one another - belong to land property of the Professional Institute for Agriculture of Bosa and are currently managed by Forestas. The area is thus closed to hunting, tourism and transit and it is patrolled by the Regional Forestry Corp who has the station in the same place and is responsible for the fire fighting activities. The prospect from the possible release site is wide and embraces the valley, cliffs, the mountain chains, with Monte Minerva and the canyon of Temo river (Fig. 7). The facilities are at an acceptable distance; in the same complex, there is a heliport - supporting firefighting activities - and an artificial tank for water supply. Hares and partridges are common in the area, while the Wild Rabbit is locally absent. The closest nesting site of a Golden Eagle is at a distance of 4 km, located on the eastern slope of Monte Minerva. One of the two sites is placed at a greater distance from the heliport, however the view does not include the cliffs and it is more windblown.



Fig. 7. Sight view from Bosa 1 and 2 sites. In the background, Mount Minerva

6. GENNA SÌLANA

The forest of Silana is located in Sa Portiscra, between the canyon of Gorropu and the Codula di Luna, in the municipality of Urzulei, public property. The area is formally within the Parco Nazionale of Gennargentu, but the park is currently not established yet. The forest dockyard managed by Forestas belongs to the forest complex of the Supramonte Ogliastrino and hosts an enclosure with Sardinian Red Deer. Only one site has been identified in this area. Both wind farm and power lines are located at a distance > 5 km.

6.1 Genna Silana

Property: public

Protected area: Cantiere Forestale Forestas

N2000: SPA/SCI ITB020014 " Golfo di Orosei";

Altitude: 650 m asl

Description:

The site is located within the area managed by Forestas; the access is therefore allowed to authorized personnel only. There are several possibilities of placing the aviary, after preparatory activities (drawing of stony and irregular soil, cuts of stain etc); all sites are reachable with unpaved roads. These sites have a wide perspective toward the east, on the central portion of the Codula di Luna, rich of cliffs along each side (Fig. 8).



Fig. 8. View from the site of Genna Silana.

The area surrounding the site is divided between an area closed to hunting and another where hunting is allowed (hunting unit of Urzulei); hunting is practiced mostly towards migratory birds without fixed hunting posts and particularly addressed to Wood Pigeon. The site is outside, but close, to the SPA/SCI ITB022212 "The Supramonte of Oliena, Orgosolo, Urzulei - Su Sercone". Accommodation is available close to the site; a water tank for firefighting activities, with steep sides, is present nearby. Breeding sites of Golden Eagle in the area are not known, but the species is present.

7. CRASTAZZA

The forest of Crastazza-Tepilora falls inside the Regional Park of Tepilora, aimed to the conservation and protection of natural resources. The territory extends over an area of great naturalistic value of approximately 8,000 hectares that includes the mountain of Tepilora (528 m asl), the state-owned forest of Crastazza and part of the state-owned forest of Sos Littos in the territory of the municipality of Bitti, the forest complex of Sant'Anna in the municipality of Lodè, the state-owned forest of Usinavà in the municipality of Torpè, and the course of the Rio Posada up to its mouth, in the Posada municipality. The Sardinian Hare and Partridge are reported in the area, while Wild Rabbit is not present. Both sites are located in areas with restricted access and limitation to touristic activities. Two possible sites for setting the hacking cage have been identified; both are located at a distance of 5-7 km from a known nesting site of the Golden Eagle, along the valley of the Rio Posada.

The area of Crastazza was also visited with the team of the coordinating beneficiary. During the visit, the team of GREFA was also introduced to our collaborators and supporter (Forestas and Regional Administration- Fig. 9 a and b)

7.1 Crastazza 1

Property: public

Protected area: Cantiere Forestale Forestas, Tepilora Regional Park

N2000: none

Altitude: 700 m asl

Description:

The site is located within the area managed by the Forestas Agency, within the Regional Park of Tepilora, on the orographic right side of the Rio Posada valley. It can be reached through a fire track and it is at approximately one km from the available facilities. The site has an excellent perspective that extends over a valley rich in rocky outcrops, but it is also exposed to the wind. Cage placing is problematic, due to the steep slopes and the rough terrain. In the vicinity there are isolated mini-wind towers, in particular along the mountains which limit the valley to the south.

7.2 Crastazza 2

Property: public

Protected area: Cantiere Forestale Forestas, Tepilora Regional Park

N2000: none

Altitude: 720 m asl

Description:

As the previous one, this site is located inside the area managed by Forestas Agency, located in the southern portion of the Regional Park of Tepilora, on the orographic right side of a valley where a tributary of the Rio Posada flows. The site is about 2 km from the accommodation facilities and is reached by a forest road leading at about 300 mt from the site itself. Isolated mini-wind towers are present to the south. The site is about 3 km from Mamone penitentiary, immediately to the south of Crastazza, with large farming areas. Electric lines of medium voltage are scarcely present in the area and at a distance > 3 km from the site. The potential release site is particularly favourable because it is located in an isolated area with a wide view over the underlying wild valley, partially sheltered from the wind and from disturbance by a pinewood. Nearby the prevailing habitat is Mediterranean maquis alternated with rocky areas. There are also open areas, like extensive pastures, rich in favourite preys and thus suitable to hunting.



Fig. 9a. Project staff (GREFA and ISPRA) and collaborators (Forestas) at the cage location (below).



Fig. 9b. Project staff meeting (ISPRA and GREFA) with Regional Administration and Forestas, at Forestas headquarters (Cagliari).

8. MONTE OLIA

The Forest of Monte Olia is a large property of the Sardinia Region. It is located in the Monti and Berchidda (SS) municipalities, in the north-eastern part of the island, on a surface of 2236 hectares, between 365 m asl and the higher Monte Olia, 811 m. asl. Part of the forest is managed by Forestas and is characterized by Ilex woods, artificial pinewoods, large portions of Mediterranean maquis and rocky areas. Three sites have been considered in this area. An important wind plant is located not far from the sites (between 4 and 8 km). Golden Eagle is present, but the location of nesting sites is unknown. The sites are accessible to the public.

8.1 Monte Olia 1

Property: public

Protected area: Cantiere Forestale Forestas

N2000: none

Altitude: m asl

Description:

Located inside the area managed by Forestas, the site can be reached through a forest dirt road. The site is located on a plateau, with a view not particularly panoramic on the valley below. There is a large wind power plant situated in the south of the area, 7-8 km far from this site. There is also a hunting estate adjacent to the area of Forestas. Several tanks for fire fighting are also present. The main lodge is located not far from the SS389 (section Ala dei Sardi to Monti), approximately 10 km away.

8.2 Monte Olia 2

Property: public

Protected area: Cantiere Forestale Forestas, oasi "Monte Olia"

N2000: none

Altitude: 600 m asl

Description:

As the previous site, it falls within the wider area of M. Olia managed by Forestas, but at the border of a hunting area, along a firebreak. The site overlooks a wide valley (apprx. 1 km away) with some pastures and cultivated areas up to M. Limbàra. In the surroundings there are rocks and potential roosts. There are several tanks for firefighting. The site is 9 km far from the lodge and, like the previous one, is reachable through a dirt road. Cage setting would require major management of the site.

8.3 Bolostiu

Property: public

Protected area: Cantiere Forestale Forestas, oasi "Bolostiu"

N2000: none

Altitude: 575 m asl

Description:

The site, which can be reached through a dirt road from the nearby Bolostiu lodge, is facing north and the prospect covers a broad valley, rich in rocky outcrops, at a distance of about 1 km. The dirt road is open and access restriction is impossible. The main critical aspects are represented by the presence of a large wind power plant, located at 3-4 km to the south, and the considerable distance from the lodge (15 km), as well as the unsuitability of the site for setting the cage, mainly due to the strong unevenness of the ground, and by the presence of fire fighting tanks.