

**Action C.2**  
**REFORZAMIENTO POBLACIONAL**  
**C.2.2 Reintroduction in Sardinia**



ISPRA

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

### **BONELLI’S EAGLE (*Aquila fasciata* Vieillot, 1822) REINTRODUCTION IN SARDINIA**

**Azione C.2.2:** Reintroduction in Sardinia. Report 2020. Elisabetta Raganella Pelliccioni, Massimiliano Di Vittorio, Riccardo Nardelli, Lorenzo Serra, Fernando Spina.

According to a formal agreement with ISPRA, Forestas Agency set up the cage.

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### 1. LOCATION OF THE HACKING CAGE:

For the third year, the cage set in the first selected release site, within Tepilora Regional Park, was used for hacking. The cage stands within an area patrolled by Forestas state agency, which has proven to be a secure site and suitable also for optimal post release observation. Although access to the site was restricted and controlled by Forestas personnel, both during day and night, we put four camera traps along the main tracks towards the cage; these camera traps didn't detect any intrusion by human beings. Occasionally, the presence of sheep, wild cat (*Felis silvestris*) pine martin (*Martes martes*), fallow deer (*Dama dama*) and dogs was detected, but dogs never came close to the aviary. Regional Forestry Corp was also involved in this phase, in order to intensify the patrolling of the whole site.

The cage was built up according to technical instructions from Grefa, which also supervised (J.J. Iglesias) the operations at a later stage of construction, also giving advices for the location of the outer platforms. Two feeding platforms were available inside the aviary as well as two drinking points. Overall three inspection windows with tinted glasses were available, two in the nest and one in the main cage. In the nest, two camera traps were also set, recording three min video every ten minutes. Before the start of 2020 hacking season, the cage was checked by Forestas personnel and fixed, if and where needed.

Outside the cage, five feeding platforms, provided with camera traps, were set up and no drinking point. Drinking point was not needed because several natural water points were available close to the cage in the main valley, notably one along the river down the cage. These natural water points were also used by the eagles for bathing.

### 2. INDIVIDUAL HYSTORIES

In 2020, travel restrictions caused by the Covid 19 epidemic caused a delay of almost two months in hacking activities that started at the begin of August (4), when 5 chicks, one wild captured (Andalucia) and four captive born (three from GREFA and one from France, Pacteau), were released in the hacking cage, at about 100 days of age (form 94 to 116, tab. 1). Two adult males from Grefa were also placed in the cage. These two males were captured in the wild (Cadiz and Granada) at around 50 days of age and kept in captivity for captive breeding purposes. However, after around 13 years of captivity, the two males didn't reproduce and a release in Sardinia was decided by the coordinator Grefa.

The 5 eaglets (Arroyto, Sadonna, Arcantzelu, Zoseppe, Minnena) were kept shortly in the nest section of the cage just upon their arrival and then released in the main aviary. The two adults (Mantzena, Dure) were released directly in the main aviary. All the eagles remained in the cage for 29 days and were released in nature on 02/09/2020 at dawn.

All the animals were tagged in Grefa with E-obs devices, which were set observing the same sampling schedule applied by the other partners of the project, and marked with colored metal rings with individual alphanumeric codes readable at distance (base color yellow, with black inscriptions). Upon arrival in Tepilora RP, they were also ringed with metal rings issued by the Italian ringing center ISPRA.

The name for the all eaglets were chosen by Forestas team who built up the hacking cage.

The arrival of eagles from Spain as well as the start of the hacking season was followed by local media and press release by ISPRA (Fig. 2, <https://www.isprambiente.gov.it/it/istituto-informa/comunicati-stampa/anno-2020/la-pandemia-non-ferma-le-aquile-di-bonelli-in-sardegna-7-nuovi-esemplari>). Besides Ispra, Forestas, CFVA and Anthus were present when Grefa took the eagles in Tepilora RP for the hacking season 2020.

Year	Origin	Release Site	Name	Sex	Birth Date	Arrival Date	Age	Date release form the nest	Date release in nature	Age at release
2018	LPO	Tepilora RP	Abbaluchente	F	04-mag-18	29-giu-18	56	17-lug-18	20-ago-18	108
2018	LPO	Tepilora RP	Helmar	M	05-mag-18	29-giu-18	55	17-lug-18	20-ago-18	107
2018	LPO	Tepilora RP	Posada	F	07-mag-18	29-giu-18	53	17-lug-18	20-ago-18	105
2018	LPO	Tepilora RP	Tepilora	F	09-mag-18	29-giu-18	51	17-lug-18	20-ago-18	103
2018	Grefa	Tepilora RP	Nurasè	F	29-mag-18	24-lug-18	56	02-ago-18	20-ago-18	83
2018	Andalucia	Tepilora RP	Saccaia	F	10-apr-17	15-dic-18	614		21-dic-18	
2019	Andalucia	Tepilora RP	Muscatooglio	M	02-mar-19	27-apr-19	56	15-mag-19	19-giu-19	109
2019	Andalucia	Tepilora RP	Artaneddu	M	27-feb-19	27-apr-19	59	15-mag-19	19-giu-19	112
2019	Andalucia	Tepilora RP	Prenna	F	25-feb-19	27-apr-19	61	15-mag-19	19-giu-19	114
2019	Andalucia	Tepilora RP	Illiorai	M	11-mar-19	27-apr-19	47	25-mag-19	19-giu-19	100
2019	Grefa	Tepilora RP	Pratteri	M	09-mar-19	27-apr-19	49	15-mag-19	19-giu-19	102
2019	Agrigento	Tepilora RP	Battore	M	17-mar-19	12-mag-19	56	25-mag-19	19-giu-19	94
2019	Valencia	Tepilora RP	Ichnusa	F	19-mar-19	13-lug-19	116	14-lug-19	26-lug-19	129
2019	Grefa	Tepilora RP	Inoche	F	19-apr-19	13-lug-19	85	14-lug-19	26-lug-19	98
2020	Cadiz	Tepilora RP	Mantzena	M		04-ago-20	ad		02-set-20 <sup>1</sup>	
2020	Granada	Tepilora RP	Dure	M		04-ago-20	ad		02-set-20 <sup>1</sup>	
2020	Granada	Tepilora RP	Sadonna	F	14-apr-20	04-ago-20	112	05-ago-20	02-set-20	140
2020	Grefa	Tepilora RP	Arcantzelu	M	02-mag-20	04-ago-20	94	05-ago-20	02-set-20	122
2020	Grefa	Tepilora RP	Zoseppe	M	14-apr-20	04-ago-20	112	05-ago-20	02-set-20	140
2020	Grefa	Tepilora RP	Minnena	F	05-mag-20	04-ago-20	91	05-ago-20	02-set-20	119
2020	LPO	Tepilora RP	Arroyito	F	29-apr-20	04-ago-20	97	05-ago-20	02-set-20	125

**Tab. 1** List of the Bonelli's eagles hacked from the beginning of the project in Tepilora Regional Park (NU). Eagles were also fitted with metal/aluminum rings and GPS-tags.

<sup>1</sup> The two adult males were recaptured on 16<sup>th</sup> and 15<sup>th</sup> September respectively. Dure was release again on 29<sup>th</sup> October.





Fig. 2 The start of hacking season 2020. On the top: eagles ringing and newspaper article; above: eagles in the cage.

### 3. HACKING AND RELEASE

#### 3.1 Feeding

During hacking, the birds were fed mainly with quails (97.7% of all prey items offered), but also with partridges (*Alectoris barbara*), seldom with other species (i.e. pigeons, *Columba livia*) dead in the rehabilitation centers of the region. All prey items were carefully checked by Forestas vet before being used as a food for the eagles. The same prey species were offered on the platforms outside the cage, so that the eagles could find food after the release.

As for live preys, quails and partridges have been given to the eagles during hacking. Inside the main aviary, eagles were fed with approx. 1,5 quail/eagle/day (or quails equivalent), and both dead (19%) and alive (81%) preys were given for 29 days. Due to the age of the eagles, alive preys were offered much more often than dead ones.

During both nest and aviary occupancy stages, the animals were monitored during the day to verify food consumption by all of them; they were fed daily but food was adjusted in relation to the degree of consumption of previously given preys.

As in 2018 and 2019, no alive preys were put on the platforms outside the cage. This decision is related to the risk of attracting golden eagles and crows visiting the area, as well as to animal welfare issues, difficult to deal with. However, as observed in the previous years, this choice doesn't seem to have affected in any way the hunting ability or the post-release survival of the released eagles. Feeding platforms were supplied with fresh meat every one-two days, according to GREFA protocol (Fig. 3). Some preys were also placed in the rocks around the cage. When some of the eagles moved in the surrounding of the release site, quails were offered in the new site: this is the case of Dure, which has moved away from the release site on 4 September and some quails were put on the rock near its position.



**Fig. 3:** Zoseppe eating on feeding platform

### *3.2 Behavior in the cage*

Compared to eagles hatched in the previous season, the 2020 eagles showed, both in the nest and in the main aviary, fewer interactions between them and much less vocalizations. These differences could be related to the different period in which the hacking started and therefore to the different age of the eagles.

Eagles spent most of the time resting, while flapping activity increased with time. The nest was constantly used by the animals and the tree trunk inside was strongly used by all the eagles, particularly for flapping, as occurred also in 2018 and 2019.

The two adults, and in particular Mantzena, tended to remain separated from the others as well as from each other, always keeping the same perch and interacting very little with the eaglets.

All the eagles, both young and adult, showed a good state of alert, demonstrating a strong intolerance towards "external" disturbances (for example noises, distant human voices, etc.). Furthermore, quite shortly after their arrival the behavior of young eagles (and, in part, also that of adult Dure) showed an evident degree of restlessness, a marked interest about the territory outside the cage coupled with attempts to leave it (i.e. flying against the net, kicks against it etc.). In this regard, Mantzena appeared much more reactive and more apathetic than the other eagles.

The eaglets showed a good level of mixed interactions, but no preferred association could be detected.

All young eagles were highly interested in live preys, always attacking them immediately after they were inserted in the cage. Notably, Zoseppe, throughout the hacking period, was the most reactive bird, the first to start hunting and often killing more preys than that it was able to eat. At the beginning of the hacking period Arroyto and Arcantzelu were the most reluctant hunters, often consuming the prey killed by the other eagles. Within few days, however, they began to hunt properly and to kill the prey they consumed. The two adults (in particular Mantzena) left the perches only to hunt the prey they could eat.

### 3.3 Release in nature

The animals were released in nature all together on September 4<sup>th</sup> at 4.20 a.m..

Arroyto and Arcantzelu were the first to fly outside the cage (6.27 a.m.), followed by Sadonna and Minnena (7.40 a.m.), Mantzena (9.17 a.m.), Dure (9.20). Zoseppe was the latest (11.40 a.m.) to fly away; it kept on perching on the cage door for about two hours. The event was followed by a press release delivered by Ispra (<https://www.isprambiente.gov.it/it/istituto-informa/comunicati-stampa/anno-2020/sette-nuove-aquile-di-bonelli-nei-cieli-della-sardegna>).

Within three days after release, Zoseppe (sure) and Arroyto and Minnena (probably) came to eat on the feeding platforms. Dure left release site after one day, Mantzena after four days, Arroyto, Sadonna, Arcantzelu, Minnena after seven days and Zoseppe after eight days. Overall, 2020 released eagles used very little the platforms outside the cage and none of them came back into the cage, as happened in the previous years.

During the first days after release the birds were located with UHF telemetry and observed several times. The young eagles showed immediately an excellent ability to fly and very soon started the dispersion.

This year, a golden eagle and its juvenile were observed constantly in the cage valley. The rather continuous presence of Golden Eagles, which never fed on feeding platform, has probably caused the eagles to stay in the release area for a shorter period than in previous years. On 10 September, in fact, no eagle was still present in the release area.

Despite the premature departure from the release site, all the young eagles displayed great flight ability and survival skills, supported also by the little use of supplementary feeding. In fact, on 12/09/2020 (just ten days after the release) Arroyto preyed one crow (*Corvus cornix*) more than 70 km away from the release site. Evidence of successful hunting was also detected for the other eagles. On 26/09/2020, Zoseppe was recovered and taken to the Bonassai CRAS. It resulted injured, with a fracture of the left tarsus and a deep wound in the neck were found. The eagle underwent a surgery on 27/09/2020 but died on the same day, about 3-4 hours after surgery-. The wound has caused a diffuse septicemia and a general debilitation.

As for the two adult males, Mantzena and Dure, they moved down along the valley, toward east, but never leaving the valley itself. The two males were constantly monitored and food was place daily to support their survival. However, after around ten days from the release, the two eagles showed reduced movements and low reactivity to human presence. Mantzena was reported to be at the side of a paved road by the police. The two adults were then recaptured (Dure: 15/09/2020; Mantzena: 16/09/2020) and took back in the cage. They were both recaptured during daytime and they didn't try any escape flight. Upon capture they appeared in bad physical conditions, although Dure was quite reactive. In the aviary they were fed again and observed, notably to decide if try another release or not. Mantzena appeared apathetic and less prone to capture live preys in the aviary. This eagle was therefore taken to the CRAS of Bonassai (Forestas), where it will be used, in a



suitable aviary, for educational purposes, while a new release was planned for Dure. The release took place on 29/10/2020 (Fig. 4), when full physical condition was attained again by the bird. Personnel of the Regional Forestry Corp was also present upon the release. We decided for an “hard release” in a completely new area, Coghinas lake (Fig.4), characterized by a great availability of prey species of any size, in order to provide the male with good condition for hunting. In the same area Pratteri – a 2019 released male – appears to have settled. Dure was again constantly monitored even with camera trap; and given dead preys for the first 6 days. However, it never ate at the feeding points. Sites of positions cluster were also checked to verify any predation event. Some left over was detected, but there isn't any certainty that Dure has really preyed those species. Parts of *Bubulcus ibis*, a *Buteo Buteo* wing, fur of hare *Lepus capensis* and feathers of Turdides were found in several clusters of Dure positions. Furthermore, within a cluster, a regurgitated pellet was also recovered (which has yet to be analyzed to identify prey species). On 11/11/2020, Dure left the lake site and was recovered dead three days later (11/14/2020). The necropsy showed strong weight loss and poor physical condition. It is very probable that Dure fed on poor quality food, notably left over from other raptors, and never really hunted. The two adult males (Mantzena and Dure) did not show any ability to adapt to life in the wild. This inability stays probably more in the lost capacity to search for prey, due to long captivity, than in the act of killing itself which has been kept intact, as demonstrated in the aviary. Moreover, 10-15 days are a significant post-release period of time: within this period, it is clear if an eagle is able to adapt or not.



**Fig.4** Dure, second release (above) in the area of Coghinas lake (below)

