Joint Meeting of the Bern Convention Network of Special Focal Points on Eradication of Illegal Killing, Trapping and Trade in Wild Birds and the CMS Intergovernmental Task Force on Illegal Killing, Taking and Trade of Migratory Birds in the Mediterranean

(Online, 9 to 11 June 2021)

UNEP/CMS/MIKT4/Inf.8

REPORT, METHODOLOGY AND REGULATORY PROPOSAL ABOUT THE ECONOMIC VALUATION OF CRIMES AGAINST PROTECTED ANIMAL SPECIES

The European Union was recognized as Champion Plus for their generous support and commitment towards addressing Illegal Killing, Taking and Trade of Migratory Birds in the Mediterranean for the period 2018 - 2023. This activity has been funded with the contribution granted by the European Commission under the Migratory Species Champion Programme and through the Global Public Goods and Challenges (GPGC Programme) Cooperation Agreements with UNEP.

GUARDIANES de la naturaleza contra el crimen ambiental

SEO BirdLife

REPORT, METHODOLOGY AND REGULATORY PROPOSAL ABOUT

THE ECONOMIC VALUATION OF CRIMES AGAINST PROTECTED ANIMAL SPECIES

MARCH 2020

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Publication date: March 2020.

This report has been prepared by SEO/BirdLife within the framework of Action A3 of the LIFE Guardians of Nature project (LIFE17/GIE/ES/000630). The project is co-financed by the European Union within the framework of the LIFE program.

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1. CONTENIDO

1. INTRODUCTION

Violations of environmental legislation are one of the main factors posing a threat to the conservation conditions of flora and fauna in Europe and around the world. Just in terms of environmental crime, estimates by Interpol and the United Nations Environment Programme (UNEP)[1] reveal that illegal trade generates a volume of USD 91 to 258 billion dollars annually, thus making it the second most lucrative crime in the world, surpassed only by drug trafficking.

Biodiversity is declining worldwide at unprecedented rates, with an estimated one million animal and plant species now being threatened with extinction[2]. Some 26 million birds die from illegal hunting each year across the Mediterranean[3]. Large numbers of animal species, including birds listed in Annex I of the Birds Directive, suffer the loss of thousands of specimens in Spain and Portugal due to criminal acts such as shooting, intentional poisoning, illegal trafficking and the destruction of their habitat. Illicit wildlife trafficking has become a criminal industry worth millions of euros and is dominated by organised crime groups[4]. One recent study[5] conducted by an international research team concludes that one out of every five species on the planet is currently affected by trade on a global scale, amounting to some USD 20 billion per year[6]. The most severely affected species are birds (23%) and mammals (27%), although the disaster also encompasses reptiles (12%) and amphibians (9%).

This alarming loss of biodiversity comes at a significant cost to countries. Some environmental crimes, such as illegal logging, unlawful mining practices, waste dumping and the illegal trade of species are highly profitable. It should be noted that full implementation of environmental law could lead to savings worth EUR 55 billion per year (in 2018) in health spending and direct costs to the environment. Furthermore, it is estimated that the cost of not implementing European environmental law related to nature and biodiversity amounts to some EUR 13.1 billion per year.[7]

In addition, there is a great degree of impunity when it comes to crimes against wildlife. Few proceedings are able to discern the perpetrators of these crimes and the responsibility for the damage incurred, or the legal framework is insufficient to achieve true environmental justice and restore the value of the damage caused to society.

Environmental liability requires the party that causes ecological damage to pay to remedy the damage based on the "Polluter-Pays Principle", which was first adopted in 1972 by the Organisation for Economic Co-operation and Development (OECD)[8] and has by now become a mainstay in environmental policies worldwide. However, if this principle is not effectively implemented, either the environment will not be repaired or the State and, ultimately, its taxpayers will be the ones to bear the cost of remediation.

A sense of responsibility must be established regarding damage to nature so that the effects of this

1 https://wedocs.unep.org/handle/20.500.11822/7662

2 2019 Global Assessment Report on the State of Nature by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) (IPBES).

3 Brochet, A. L., Van Den Bossche, W., Jbour, S., Ndang'ang'a, P. K., Jones, V. R., Abdou, W. A. L. I., Butchart, S. H. M., López-Jiménez, N. &Al. (2016). Preliminary assessment of the scope and scale of illegal killing and taking of birds in the Mediterranean. Bird Conservation International, 26(1), 1-28.

4 EU Action Plan against Wildlife Trafficking (COM (2016) 87 final)

5 B.R. Scheffers; B.F. Oliveira, University of Florida, Gainesville, FL; B.F. Oliveira, Auburn University at Montgomery, AL; I. Lamb; D.P. Edwards, University of Sheffield, Sheffield, United Kingdom. Global wildlife trade across the tree of life.

6 Spanish Action Plan Against Illegal Trafficking and International Poaching of Wildlife Species: https://www.boe.es/diario_boe/txt.php?id=BOE-A-2018-4891

7 DG Environment - European Commission. March 2019. "Study: The costs of not implementing EU environmental law" https://ec.europa.eu/environment/eir/pdf/study_costs_not_implementing_env_law.pdf

8 Recommendation of the OECD Council of 26 May 1972.

damage are redressed in the same way as when property is damaged or when others' rights are infringed upon.[9] To do this, sound regulatory frameworks are needed that set out environmental liability systems and standards based on the "polluter pays" principle and seeking full recovery of costs, to change the status quo, which often forces society to bear the burden of the costs.[10]

In sum, every effort must be made for the burden of prevention and remediation to fall on the party that caused the damage rather than being borne by the public administrations.

9 European Commission. 9 February 2000. White Paper on environmental liability COM (2000) 66 final.

10 TEEB – The Economics of Ecosystems and Biodiversity for National and International Policy Makers – Summary: Responding to the Value of Nature 2009. http://www.teebweb.org/media/2009/11/National-Executive-Summary_Spanish.pdf

2. AIM OF THIS REPORT

This report was prepared for the purpose of establishing certain criteria and methods to enable an economic valuation to be made of protected wildlife species in Spain and other countries in the European Union.

To do this, first of all, the legal requirements of such a valuation and its implications were examined. Then, diverse valuation systems that have been implemented in the Autonomous Communities of Spain and in other Member States of the European Union were studied. Thirdly, the precedents found in case law set forth in recent years were also examined. In light of all this information, we have concluded that one of the most useful and interesting methodological systems we might propose would be related to the Environmental Liability Supply Model (MORA, Spanish acronym) calculation method. While initially designed for implementation of environmental liability regulations, this method provides certainty, simplicity and adaptation, so that it can be applied to the direct valuation of wildlife specimens, albeit with certain corrections. The system has advantages but needs to be adapted in response to diverse factors based on the legal protection status of the species and certain biological determinants, which must be added to the applicable cost according to MORA and are related to the replacement cost.

In Spain, there is no basic nationwide regulation that stipulates the valuation of a species based on a uniform economic scale so as to be able to establish the sum of pecuniary liability in the event of crimes on animal species and also the corresponding administrative or criminal penalties to be imposed. Some Autonomous Communities do, however, have regulations stipulating the economic value of protected species. Andalusia, Asturias, the Canary Islands, Cantabria, Castilla-La Mancha, Castilla y León, Catalonia, Extremadura, La Rioja, Navarre, the Community of Madrid, Murcia, the Basque Country and the Community of Valencia all have such valuations, but they do not refer to the same range of species, nor can they be deemed uniform, since there are dramatic differences in the different values for the same species. (For example, a bearded vulture is appraised at a value of 2,000,000 pesetas in Valencia but just 700,000 pesetas in Madrid. The valuation in pesetas cited here indicates, in and of itself, how old these regulations are.)

The creation of a single regulation and uniform criteria would ensure a single valuation for each species and the same consequences in terms of equity when imposing penalties or stipulating compensation for illegal acts committed against the species anywhere in Spain and extendable to other EU Member States. For this reason, at this stage of the Project, the valuation scope has been reduced and, for the time being, only species defined as “protected” in this report shall be discussed. We are aware that the use of this term leads to questions in terms of the law, given that all species are in fact protected by law (especially birds), even hunting species, which must be managed in line with sustainability criteria.

However, according to the Spanish Constitution, the Autonomous Communities (AC) have jurisdiction over hunting matters. Thus, for the time being, it has been deemed more feasible to begin the species valuation process with the “protected” species, as defined in Article 56 of Act 42/2007, of 13 December, on Natural Heritage and Biodiversity[11], as justified in the relevant section herein (section 3.2.1). After adjusting the suggested methodology as indicated herein, it could be adopted by the different Autonomous Communities, which could then extend the valuation system outlined in Annex II to hunting species. In addition, because of its objective, universal nature, the proposed methodology could gradually, with certain legal nuances, be adopted by other countries in the EU, offering a tool with which to assess damage to protected wildlife species.

This is precisely one of the objectives sought in the LIFE Nature Guardians project.

11 Official Gazette of Spain. No 299, of 14/12/2007

Moreover, with a view to adopting the proposed methodology, proposals for regulations to be passed in Spain and EU-wide have been included in section 7. *Proposals*.

REPORT PREPARED WITHIN THE FRAMEWORK OF THE NATURE GUARDIANS PROJECT TO FIGHT ENVIRONMENTAL CRIME

This report was prepared within the framework of LIFE Action A3 Nature Guardians against environmental crime(LIFE17/GIE/ES/000630). This project is coordinated by SEO/Birdlife and aims primarily to improve the effectiveness and efficiency of the actions taken to fight against environmental crimes, especially those committed against wildlife species in Spain and Portugal. Funded by the European Union's LIFE programme, the Service for the Protection of Nature (Seprona) of the Spanish Civil Guard, the Regional Government of Andalusia and Sociedade Portuguesa para o Estudo das Aves (SPEA) are beneficiary partners.

To achieve the project goals, efforts are made to guarantee the application of the legal framework that regulates the relationship with the environment by making legislative proposals to improve it, bolstering police action (through training, the creation of specialised units, allocation of resources, researching new investigation methods) and starting and/or participating in legal proceedings on environmental crimes.

Other project actions are aimed at raising awareness in society and among the stakeholders tasked with enforcing the legislation (judges, law enforcement officials, etc.) and other sectors involved in nature management about the important value of natural heritage and the need to defend it from illegal attacks.

Thus, among other outcomes, the project aims to increase the number of legal proceedings brought for environmental crimes by 5% in Spain and 1% in Portugal, to prevent and reduce the crimes committed against fauna, increasing the number of crimes detected by 15% in Spain, to reduce the animal species mortality rate due to crime by 20% in Spain and 5% in Portugal, to enhance the mechanisms for coordination, exchanges of information and experiences among national and EU environmental police forces, and to train 6% of the SEPRONA workforce and more than 130 environmental agents and other forces in the EU.

3. THE ECOSYSTEMIC AND CULTURAL VALUE OF BIODIVERSITY

The proposal for valuation of protected fauna contained in this report would not have been possible had certain progress not been made to develop the ecosystemic valuation of biodiversity. Clearly, ecosystem, ecosystemic or environmental services are resources or processes of natural ecosystems (goods and services) that benefit human beings. They include products like clean drinking water and processes such as waste decomposition. These services were mainstreamed and given formal definitions in the Millennium Ecosystem Assessment (MA)[12] organised by the United Nations in 2005.

The increasing loss of biodiversity has either a direct or an indirect effect on human well-being because it compromises the functioning of ecosystems and their capacity to generate essential goods and services for society such as:

- provisioning services (tangible products like food or wood)
- regulating services (such as pollination, pest control, soil formation or water purification)
- cultural, recreational or spiritual services (like ecotourism, aesthetic values or environmental education)

Thus, for example, the Natura 2000 Network, composed of more than 25,000 protected sites across the EU, provides considerable socio-economic benefits arising from tourism and recreational activities, but above all, ecosystem goods and services such as flood control, de-pollution of water, pollination and nutrient recycling[13].

Some ecosystem services are easy to comprehend, such as the supply of clean air and water, and they have been valued in certain cases.

Others, however, such as natural pest control and nutrient cycling (so-called “regulating services”) often operate beyond people’s perception and thus, are neither recognised nor valued. And others, such as aesthetic appreciation of nature and nature as an inspiration for culture and innovation, are difficult to quantify[14].

The economic assessment of the contribution of nature to economic growth is a controversial topic, given that incessant economic growth is a factor in the loss of biodiversity.[15] Still, it has been the subject of widespread debate and ongoing research. Back in 1987, a group of researchers published an economic estimate of the ecosystem goods and services worldwide that exceeded, and could even triple, the gross domestic product of the entire planet[16], focusing the attention at that time on the benefits that nature provides, which still, thirty years later, have not received proper attention in economic policies.

According to the Food and Agriculture Organisation of the United Nations (FAO), in 2014 the value of ecosystem services amounted to an estimated USD 125 billion.In 2000, the United Nations launched the initiative mentioned at the beginning of this section, the “Millennium Ecosystem Assessment”. The first report issued was completed in 2005 and revealed that two thirds of the ecosystem services

12 http://www.millenniumassessment.org/es/
13 Ecosystem Goods and Services. September 2009. European Union.
14 http://www.fao.org/ecosystem-services-biodiversity/valuation/es/
15 https://www.nature.com/articles/d41586-019-02882-0
16 Constanza et al., 1987

around the world were in decline or threatened.Currently, the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES)[17] is working on a global assessment of the value of biodiversity, which will be published in 2022.

The disappearance of just one species can have incalculable consequences because it embodies not only economic values but also ecological, genetic, social, scientific, educational, cultural, recreational and aesthetic values. A decline in biodiversity means the permanent loss of genetic information and even knowledge about each role within an ecosystem, all of which could be highly valuable for use in scientific fields in the medium and long term. Indeed, all the species within an ecosystem are linked to each other and to their surroundings in a dynamic balance, forming a chain that contributes to the functioning of the biosphere. If one species disappears, one link in that chain is broken, affecting the other species that directly or indirectly interact with it, thus modifying or even breaking up the entire ecosystem.[18] One emblematic example of the crucial role that certain species, such as wolves, play in nature and the ecosystem was observed in 1995 in Yellowstone Park in the USA, where a plan to bring the wolves back after 70 years of absence was implemented. The reintroduction of wolf populations led to changes in the behaviour of the forest herbivore species, regulating their populations and, on the whole, prompting a regeneration of the vegetation in that area, changing the dynamics of the course of the rivers and providing habitat for a wealth of forest species that would otherwise have lacked shelter or food.

For a number of years now, the Spanish courts have gradually been latching onto this trend. In 1993, the Spanish Supreme Court[19] mentioned the conservation of protected species, indicating that they were "an asset of interest to humanity as a whole".[20]

Therefore, while the general methodology for valuation of ecosystem services cannot be used directly for the purposes of this report, it must be noted that the methodology proposed herein (and the MORA system itself, included in the proposal) would not have been possible if it were not for the progress made in this regard, as described in section 4 and, particularly, in sub-section 4.2 (VANE Project).

17 https://ipbes.net/global-assessment

18 What is biodiversity? Fundación Biodiversidad, 2010

19 SC Judgment (Criminal Division, Section 1) No 1104/1993, of 1 April 1993

20 Cited in Antonio Mateos Rodríguez-Arias, public prosecutor. "Crimes against natural resources and the environment, flora, fauna and domestic animals, after the 2015 reform of the Criminal Code" in - Anuario de la Facultad de Derecho, ISSN-e 0213-988X, No 32, 2015-2016, pp. 9-9.

4. REGULATIONS ON VALUATION OF FAUNA

This section outlines the Spanish and European regulatory frameworks that justify the need for a methodology for valuation of protected fauna to aid in compliance.

The valuation of damage to wild fauna species conducted by the courts is also examined, analysing the most relevant Spanish case law in this regard in terms of civil liability.

4.1. EU FRAMEWORK

Three blocks of Community environmental law have been used as the foundation for this report: the Directives on nature (birds and habitats), the Directive on environmental liability and the Directive on environmental crime.

4.1.1. THE DIRECTIVES ON NATURE (BIRDS AND HABITATS)

Directive 2009/147/EC, of 30 November 2009, on the conservation of wild birds,[21] or the **Birds Directive**, was first drafted in 1979 and is aimed at the protection, management and regulation of the exploitation of bird species living in the wild, their eggs, nests and habitats (Art. 1). It requires Member States to take the requisite measures to maintain the populations of all bird species at a level which corresponds in particular to ecological, scientific and cultural requirements, while taking account of economic and recreational requirements, or to adapt the populations to that level (Art. 2).

The Directive provides for:

- A general habitat protection system for all wild bird species (art. 3 and 4).
- A system for direct protection of all wild bird species by prohibiting the destruction of nests, trade, hunting, gathering eggs, deliberate disturbance, etc. (art. 5 to 9), with exceptions for the species listed in Annex II and III and other general exceptions.
- A special conservation system for the habitats of the species in Annex I and for migratory species (art. 4).

Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora,[22] or the **Habitats Directive**, was passed in 1992 with the aim of helping ensure biodiversity through the conservation of natural habitats and of wild flora and fauna in European territory (art.2), identifying more than 200 habitat types and 900 species. It creates a biodiversity conservation network called "Natura 2000", which is composed of Special Areas of Conservation (SAC) and special protection areas for birds (SPAs).

The Directive provides for a habitat protection system (art. 3 to 11) and a system for regulating the exploitation of wild birds, including a list of prohibited capture and killing methods and means (art. 12 to 16). Annex V lists the species whose capture and exploitation may be subject to management measures (hunting), while Annex VI lists the prohibited methods and means of capture and killing.

21 OJEU L 20, 26/01/2010, p. 0007 – 0025
22 OJ L 206, 22 July 1992, pages 7 to 50

Neither the Birds Directive nor the Habitats Directive contains any direct provisions about liability or redressing of harmed species in application of the "polluter pays" principle. However, Article 6 of the Habitats Directive does address the requisite assessment of the implications of plans and projects in Natura 2000 sites. And in this context, it refers to the compensatory measures that must be applied if such plans and projects are authorised.

The compensatory measures may consist in work done to improve the biological value of a site (already designated or to be designated), so that the carrying capacity or the food potential are increased by a quantity corresponding to the loss on the site affected by the project. A fortiori, the re-creation of a habitat favourable to the bird species concerned is acceptable provided the created site is available at the time when the affected site loses its natural value[23].

Likewise, compensation could consist in the re-creation of a comparable habitat or the biological improvement of a lower quality habitat within an existing site included on the list or even in the inclusion of a new Natura 2000 site of comparable quality to the original.

In the latter case, it could be said that overall, the project will result in a loss for this habitat type at Member State level but at the Community level there will be a new protected site, thus contributing to the objectives of the Directive[24].

The Habitats Directive does not provide a definition of "compensatory measures". However, the compensatory measures currently applied in the EU in relation to the Habitats Directive also include measures such as:

- The reintroduction of species.
- The recovery and fostering of species, including prey species.
- The creation of reserves (including sharp restrictions on land use).
- The reduction of (other) threats to species in general, acting on a single source of risk or jointly on all the threatening factors (for example, those deriving from overcrowding).[25]

It is within the framework of these compensatory measures that we feel the valuation of fauna species could contribute to improving compliance with these European regulations. Compensation could be more effective if there were valuation criteria in place to enable a comparison of the scenarios in which the measures are to be applied.

4.1.2. THE ENVIRONMENTAL LIABILITY DIRECTIVE

Directive 2004/35/EC of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage (hereinafter, the ELD)[26] was passed sixteen years ago. Its declared objective is "to establish a framework of environmental liability based on the "polluter-pays" principle, to prevent and remedy environmental damage".

During the period prior to the drafting of the ELD, the European Commission requested a study on the valuation and restoration of damage to natural resources[27] which outlines the factors that must be taken

23 Guidance on Article 6(4) of the "Habitats Directive" 92/43/EEC, clarification of the concepts of alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence and the Commission's opinion. 2007/2012https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/guidance_art6_4_es.pdf

24 Idem.

25 Idem.

26 OJEU L 143, of 30 April 2004

27 European Commission Directorate-General Environment - Study on the Valuation and Restoration of Damage to Natural

into account in damage assessment and the monetary valuation factors. Its objective was to guide the European Commission in:

- How to define "significant damage" to natural resources and decide on the "minimum level of restoration";
- How, and to what extent, monetary valuation techniques can be used to estimate the economic value of damage to natural resources; and
- How, and to what extent, the valuation of damage to natural resources must be included in a future directive on liability.

The Directive requires "operators" that perform certain occupational activities to take preventive measures if there is an imminent threat to the environment or to initiate or fund the requisite remedial measures if damage has already occurred. The latter would be aimed at achieving full remediation of the damaged natural resources (protected natural habitats and species, water and soil) and of the services they provide, to restore them to their baseline condition if the damage had not occurred.

It is precisely the definition of the term "operators" that prevents the ELD from being consistently applicable to crimes or violations causing damage to fauna species. According to Article 2(6) the term is defined as "any natural or legal, private or public person who operates or controls an occupational activity or, where this is provided for in national legislation, to whom decisive economic power over the technical functioning of such an activity has been delegated, including the holder of a permit or authorisation for such an activity or the person registering or notifying such an activity".However, because it develops the concepts of damage and remediation, in addition to techniques for the application of these concepts, this directive is still a useful legal instrument for the purposes of this report.

As regards species and habitats, as well as the definition of "protected species" and "protected habitats", the ELD refers to the Habitats Directive and the Birds Directive.

The ELD is applicable whenever any damage occurs that has "significant" adverse effects on reaching or maintaining the favourable conservation status of habitats or species protected pursuant to Article 1.e and 1.i of the Habitats Directive. It also stipulates that the "significance of such effects is to be assessed with reference to the baseline condition, taking account of the criteria set out in Annex I".

The "significance" as per said Annex I must be assessed by reference to measurable data in relation to the "baseline condition" before the damage occurred, with the services provided by the amenities they produce and their capacity for natural regeneration.

In turn, this "baseline condition" must be determined using the existing data on the resource and the damaged site, data on similar sites for which the necessary data is available or can be observed after the incident (reference sites) or data generated using models of resources and services. For example, if damage has been done to wetlands, full remediation would consist in the restoration of all types of habitats and species previously existing within or near the site, or the populations and "services" that the wetland "resource" provided to the public or to other natural resources including recreation, water filtration, food supply, visual enjoyment, storm mitigation or use as a habitat for birds and other species.[28]

The ELD excludes compensation and provides for three types of remedial measures: primary, complementary and compensatory.

Resources for the Purpose of Environmental Liability B4-3040/2000/265781/MAR/B3

https://ec.europa.eu/environment/legal/liability/pdf/biodiversity_main.pdf

28 Idem.

Primary remediation consists in restoring damaged natural resources and/or services to their baseline condition at the damaged site. Primary remediation at the same site is preferable but not always possible or feasible.

When primary remediation cannot fully restore the damaged site to its baseline condition, complementary remedial measures must be adopted at a different site and/or species, which may be equal to or sufficiently similar to the damaged site/species, with a view to ensuring that, between the two sites, a similar level of natural resources and/or services is reached.

Compensatory remediation calls for compensation for lost natural resources or services during the recovery period. It may be undertaken at a different site, improving the conditions of the damaged species or of a sufficiently similar species. As an alternative, compensatory remediation may consist in continuing with primary remediation to generate benefits beyond the baseline condition at the affected site (the part in excess counts as a compensatory remediation credit).[29]

HOW IS THE SCOPE AND MAGNITUDE OF THE REMEDIATION DETERMINED?

To establish primary remediation measures, options for actions to directly restore the natural resources and services towards baseline condition on an accelerated time frame, or through natural recovery, shall be considered.

To determine which type of complementary and compensatory remedial measures are needed, an equivalence approach shall be taken. In other words, actions that provide natural resources and/or services of the same type, quality and quantity as those damaged shall be considered first and the amount that must be remedied (credit) shall be quantified so that it is equal to the loss owing to the damage (debit).

If it is not possible to use equivalence criteria, alternative valuation techniques shall be applied, such as monetary valuation, using:

- Value-to-value and value-to-cost equivalence: when the debit and credit are expressed in monetary terms (value-to-value).
- If valuation of the lost resources and/or services is practicable, but valuation of the replacement natural resources and/or services cannot be performed in a timely manner or at a reasonable cost, the competent authority may choose remedial measures whose cost is equivalent to the estimated monetary value of the lost natural resources and/or services.

It is clear, therefore, that developing species valuation systems or criteria will also have an impact on proper implementation of the ELD.

4.1.3. THE DIRECTIVE ON ENVIRONMENTAL OFFENCES

Environmental damage is not regulated only in the ELD. Just four years later, the European Union decided to include criminal law as an instrument for environmental protection due to its dissuasive power and the potential to strengthen and guarantee the penalty systems existing in the Member States. In 2008 Directive 2008/99/EC of the European Parliament and of the Council, of 19 November 2008, on the protection of the environment through criminal law was passed[30](hereinafter, the Directive on Environmental Offences). This regulation requires Member States to ensure that effective, proportionate and dissuasive criminal

29 Idem.
30 OJEU L 328, of 6 December 2004

penalties are imposed when the most serious infringements of European regulations on environmental protection are committed intentionally or with serious negligence. The offences against wildlife provided for include:

- The killing, destruction, possession, taking or trading of protected wild fauna or flora species, except for cases where the conduct concerns a negligible quantity of such specimens and has a negligible impact on the conservation status of the species. Protected species refers to:
  - Annex IV of the Habitats Directive and
  - Annex I, referred to in Article 4(2) of the Birds Directive.
- Trading in specimens of protected wild fauna or flora species or parts or derivatives thereof, except for cases where the conduct concerns a negligible quantity of such specimens and has a negligible impact on the conservation status of the species. This applies to the species listed in Annexes A and B to Council Regulation (EC) No 338/97 of 9 December 1996 on the protection of species of wild fauna and flora by regulating trade therein, (CITES).
- Any conduct which causes significant deterioration of a habitat in an area classified as a special protection area pursuant to Article 4(1) and (2) of the Birds Directive or any natural habitat or a habitat of species for which a site is designated as a special area of conservation pursuant to Article 4(4) of the Habitats Directive.

Taking into account the fact that, according to the Spanish procedural system, penalties imposed by criminal courts also include a sentence in terms of civil liability or compensation, and that, as shall be discussed below, certain offences are classified based on the value of the damage done, it would obviously be hard to have criminal penalties that are "effective, proportionate and dissuasive" if there are no realistic uniform valuation criteria. Thus, once again, progress in this valuation can be considered a contribution to improved compliance with Community environmental law.

4.2. SITUATION IN SPAIN; THE NEED FOR VALUATION IN THE ADMINISTRATIVE, CIVIL AND CRIMINAL SYSTEMS

Spain is outstanding within the EU in terms of its natural capital, boasting a wealth of biodiversity and contributing the largest land area (about 27% of its territory)[31] to the EU's Natura 2000 network, which contributes assets worth an estimated EUR 200 to 300 billion each year to the EU as a whole.[32]

Despite these natural values and despite having a considerable body of biodiversity protection regulations, this biodiversity and fauna in particular are still subject to attacks that are not punished in an effective, fair and proportionate manner, even though they amount to regulatory violations.

There is evidence of more than one hundred thousand violations (although the actual figure is probably much higher) of rules protecting fauna in Spain each year[33]. The vast majority of these infringements is classified as administrative infringements - 97 to 98 per cent of the total alleged unlawful acts - whereas environmental offences, those prosecuted according to the Criminal Code, have stood at around two

31 European Commission. "The EU Environmental Implementation Review 2019 Country Report - SPAIN" https://ec.europa.eu/environment/eir/pdf/report_es_en.pdf

32 https://ec.europa.eu/environment/efe/node/11_es

33 Study on the dissuasive, effective and proportional nature of criminal penalties imposed in Spain for environmental offences and their alignment with Directive 2008/99/EC on the protection of the environment through criminal law. UJA, UGR, UP, SEO/BirdLife. LIFE Guardianes de la Naturaleza. March 2020

percent for the past decade.[34]

A trend seems to be emerging in recent years, showing a relative drop in administrative offences accompanied by a gradual increase in criminal offences. Within the latter group, crimes against fauna represent approximately one third of all the cases known to the Civil Guard SEPRONA unit as possible environmental offences.According to data from the Civil Guard, most of the criminal offences related to flora and fauna are for poaching and cruelty to animals, whereas known criminal acts related to illegal fishing and trafficking remain at low levels. Of all these items, a downward trend has only been seen since 2013 in poaching (at its lowest point there is a 50% drop compared with 2009).[35]

One of the reasons behind the relative impunity of the offenders may be that the penalties or fines imposed are only very rarely exemplary in nature, as well as the fact that compensation or remediation is not usually attached to the criminal penalties, despite the fact that this is allowed in administrative, civil and criminal proceedings. In addition, when it comes to both administrative and criminal proceedings, the determination of the penalty sometimes depends of the value of the damage incurred. And if there is no value, there is no penalty.

Therefore, in this section the contents of the rules in the basic national system relating to this matter shall be summarised briefly.

4.2.1. FRAMEWORK OF NATIONAL LEGISLATION

Article 45 of the Spanish Constitution establishes "the right to enjoy an adequate environment for human development, and the duty to conserve it". The public authorities shall "safeguard the rational use of all natural resources in order to protect and improve quality of life and to defend and restore the environment, with the indispensable solidarity of society". It also states that the corresponding "criminal or, where appropriate, administrative penalties, as well as the obligation to repair the damage caused" shall be established for those who violate environmental protection rules.

Such penalties are correctly established in the system, as is the obligation to repair the damage caused. But the lack of valuations, or inconsistent and inadequate ones, pose an obstacle (one of many, but a substantial one nonetheless) to the proper functioning of the system.

4.2.2. ADMINISTRATIVE REGULATIONS

Act 42/2007, of 13 December, on Natural Heritage and Biodiversity (hereinafter referred to as NHBA) provides the basic legal system for the conservation, sustainable use, improvement and restoration of natural heritage and biodiversity in Spain. Two relevant aspects of its contents can be highlighted for the purposes herein:

THE LIST OF WILD SPECIES UNDER THE SPECIAL PROTECTION SCHEME

Article 56 establishes the "List of Wild Species under the Special Protection Scheme" and section one therein states that it shall be composed of species that are classified as such according to regulations, after consulting with the Autonomous Communities, and that it shall include species, subspecies and populations that merit special attention and protection based on their scientific, ecological and cultural

34 https://www.seo.org/2019/07/31/los-delitos-contra-el-medio-ambiente-se-han-mas-que-cuadruplicado-en-la-ultima-decada-en-espana/

35 Idem.

value, their uniqueness, rarity or threat level, in addition to those thatare listed as protected in the Annexes to Directives and in international conventions ratified by Spain

The General State Administration (hereinafter, GSA) is granted jurisdiction over the contents, management and effects of this list, and for this reason precisely we shall focus on these powers in this report. Protection of fauna in hunting-related matters falls within the jurisdiction of the ACs due to the distribution of powers between the state and the ACs under the constitution.

In this Article the GSA keeps a Spanish Catalogue of Endangered Species (hereinafter, SCES, currently contained in Royal Decree 139/2011, of 4 February, for the development of the List of Wild Species under the Special Protection Scheme and the Spanish Catalogue of Endangered Species[36]) which includes taxa or populations of endangered biodiversity in the following categories:

- In danger of extinction: taxa or populations whose survival is unlikely if the factors that gave rise to their current situation continue to act.
- Vulnerable: taxa or populations that run the risk of becoming "in danger of extinction" in the immediate future if the adverse factors acting on them are not corrected.

The List currently contains 963 taxa, 337 of which are found in the Catalogue, with 139 falling in the "Vulnerable" category and 198 in the "In danger of extinction" category. The ACs are required to maintain a degree of protection that is equal to or higher than that set forth in the SCES when, or if, they prepare their own catalogues.

Another important element of the aforementioned List is found in a Resolution passed in 2017[37], which approves guidance criteria for the inclusion of taxa and populations in the SCES.This Resolution contains a list of threats that could affect animal populations, which must be analysed when it comes to calculating the price for replacing damage to the environment.

THE PENALTIES OF THE NHBA, LINKED TO THE VALUE OF THE DAMAGE DONE.

Article 80 "Definition and classification of offences", section 1, indicates that certain conducts listed thereinshall be considered administrative offences. Section 2 thereof states:

> *2. The offences listed above shall be classified as follows:*
>
> *a) The offences described in paragraphs a), b), c), d), e), f), g), g bis) and t) shall be considered very serious if the valuation of the damage exceeds EUR 100,000; additionally, those listed in paragraphs b), k), n), t), u) and v), when the benefits obtained exceed EUR 100,000; and those listed in any other paragraph, if the valuation of the damage exceeds EUR 200,000; and recurrence, if a serious offence of the same type as that which led to a previous penalty is committed within two years after notification of such prior offence, provided that the penalty decision handed down by the administrative courts has become final.*
>
> *b) Those listed in paragraphs a), b), c), d), e), f), g), g bis) h), i), j), k), 1), m), n), o), t), u), v) and w) shall be considered serious when not deemed very serious; those in paragraphs p), q), r), s) and x), if the valuation of the damage exceeds EUR 100,000; and recurrence, if a minor offence of the same type as that which led to a previous penalty is committed within two years after notification of such prior offence, provided that the penalty decision handed down by the administrative courts has become final.*

36 Updated by Order TEC/596/2019, of 8 April, which amends the annex thereto

37 Resolution of 6 March 2017 by the Directorate General of Environmental Assessment and Quality (Official Gazette of Spain No 65, dated 17 March 2017)

> *c) Those listed in paragraphs g bis), p), q), r), s) and x) shall be considered minor, if no damage occurred or if the valuation thereof does not exceed EUR 100,000.*

However, there is no nationwide regulation on valuations. And as we shall see below, not all the ACs have valuations, nor do they include all the species in the list, and there is no consistency in the valuations, thus leading to a situation of unjustified disparity for identical offences.

Finally, Article 83 of the NHBA refers to the Environmental Liability Act (which shall be discussed herein below) and its implementing provisions in relation to the valuation of ecological damage required to classify offences and penalties and to the remediation of the damage caused by the offender. If the damage cannot be redressed, the offender must pay compensation in the terms of the corresponding resolution.

THE ENVIRONMENTAL IMPACT ASSESSMENT ACT

Another basic environmental law that requires species valuation for proper enforcement is Act 21/2013, of 9 December, on the environmental impact assessment (hereinafter EIAA), which stipulates that plans, programmes and projects that are subject to environmental assessment must foresee measures aimed at preventing, correcting and compensating any adverse effects the environment that may occur and must establish effective mechanisms for correction or compensation.

These correction or compensation mechanisms include the compensatory measures described in Article 3, section 24, of the NHBA, which defines them as those "specific measures included in a plan or project that are intended to compensate, as precisely as possible, any negative impact on the affected species or habitat". While there are numerous types of compensatory measures and many methods for applying them, it is clear that having proper scales for valuation of wild animal species would afford a tool that would aid in improving the design and application of these compensatory measures. To consider this, reference should be made to the Environmental Liability Act, analysed below, which also employs the concept of the compensatory measure applicable to the subject matter herein, although it goes further into detail.

It is also appropriate to discuss the Environmental Liability Act because the EIAA itself, in Article 56.4, indicates that if the punishable conduct causes damage or loss to the environment, when there is no specific provision in sector-specific legislation, the resolution to the court proceedings shall declare:

> *...a) The offender shall be required to return the situation altered by the infringement to its original condition. In this regard, when the perpetration of one of the offences set forth herein causes environmental damage, action shall be taken in accordance with the Environmental Liability Act or, b); Compensation for loss and damage incurred, when the sum thereof was determined during the proceedings.*

THE ENVIRONMENTAL LIABILITY ACT

Act 26/2007, of 23 October, on Environmental Liability[38], implements the ELD at the national level. As seen in Section 3.1 in reference to the ELD, the law only applies to what it defines as "operators", in other words:

> *"Any natural or legal, public or private person who engages in a business or occupational activity*

38 Partially implemented in the Regulation passed in Royal Decree 2090/2008, of 22 December (Official Gazette of Spain No 308, of 23 December 2008, pages 51626 to 51646) (hereinafter, the Regulation), it was amended by Act 11/2014, of 3 July, amending Act 26/2007, of 23 October, on Environmental Liability

or by any means controls such activity or exercises decisive economic power over its technical functioning. To establish such status, the terms of sector-specific, national or regional legislation governing the holders of permits or authorisation, registry entries or reports to the Administration for each activity shall be taken into account" (Article 2, 10 ELA).

These "operators" are required to perform any actions that may be necessary to prevent the risk of environmental damage and to carry out the requisite tasks to remedy any damage that is incurred.

There are a few differences between the European Directive and the Spanish law[39], in that the latter:

- Further defines the liability of operators that cause damage.
- Adds protected species and habitats declared as such by the ACs and the State to the natural resources covered in the ELD. Therefore, all wild species are considered subject to coverage in the ELA.
- Expands the definition of contaminated land to include any that prompts damage to human health and the environment.
- Makes the financial securities established in the Directive compulsory.

Article 11 of the Regulation implementing this Act[40] clearly states the intention and scope of quantification of damage. This quantification shall consist in estimating the degree of exposure of the recipients affected by the agent causing the damage and measuring the effects of the damage on them. To this end, the extent, intensity and time scale of the damage shall be identified, described and assessed. The result of this quantification is a numerical expression in biophysical units of the damage experienced by the natural resources, or the services of these natural resources, covered by the law (Articles 11, 12, 13 and 14 of the Regulation).

It regulates only what is known as "pure ecological damage", that is, the damage done to the environment as such. It does not encompass property damage incurred on individuals or their assets, but rather specifically addresses the prevention and remediation of damage to the natural resources provided for in this Act.

The obligation of remediation (or prevention, as the case may be) undertaken by the responsible operator consists in returning damaged natural resources to their original condition and bearing all the costs[41]incurred for the corresponding preventive or remedial actions. By placing the emphasis on complete restoration of the natural resources and the services they provide, priority is given to the environmental value, which is not deemed as reached with mere monetary compensation.

Therefore, when environmental damage occurs, the operator shall, without delay and without any need for advance warning, summons or administrative procedures, notwithstanding any additional criteria established at AC level for the same purpose:

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39 Flórez de Quiñones, C. 2015-2016. Legal Regulations and Environmental Liability: Act 26/2007, of 23 October, on Environmental Liability.https://docplayer.es/62732246-Normativa-legal-y-responsabilidad-ambiental-la-ley-26-2007-de-23-de-octubre-de-responsabilidad-medioambiental.html

40 Idem.

41 Any expense justified by the need to guarantee an adequate, effective application of this Act in the event of environmental damage or the threat of environmental damage, regardless of the sum thereof. In particular, this includes all expenses entailed in correctly implementing preventive measures, expenses aimed at preventing further damage and remedial expenses, those involved in the assessment of environmental damage and the imminent threat of occurrence of such damage, those aimed at establishing the possible options for action and choosing the most appropriate ones, those arising from procuring pertinent data and aimed at ensuring surveillance and oversight. Such expenses shall be deemed to include administrative and legal costs, and expenses for the material and technical activities needed for the performance of said actions.

Adopt any provisional measures as may be necessary to immediately remedy, restore or replace the damaged natural resources and the natural resource services, in accordance with the criteria set forth in Annex II. It must also inform the competent authorities of the measures taken.

Submit a proposal for remedial measures in response to the environmental damage caused, prepared as set out in Annex II,for approval by the competent authorities in accordance with the terms of Chapter VI.

When several types of environmental damage have occurred and it is not possible to implement all the remedial measures at the same time, the resolution shall set the order of priorities that is to be followed. To this end, the authorities shall consider, among other issues, the nature, scope and severity of each type of damage and the possibility of natural recovery, prioritising measures aimed at eliminating risks to human health.

Annex II of the Act contains a classification of environmental damage remediation methods, which are defined as methods that aim to remedy, restore or replace, to their baseline condition, the damaged natural resources and natural resource services, including damage to wild species[42]. The r**emedial measures** are the same as in the ELD, which also include eliminating all significant threats to human health. They are as follows:

- Primary remediation: restores or brings the resource as close as possible to its baseline condition. Example: Introduction of species as components of the food chain of fish and wild fauna, such as communities of essential invertebrates for insectivorous fish and wild fauna, and communities of essential small mammals for birds of prey and carnivorous mammals.
- Complementary remediation: when full restoration is not possible, meaning the damage is irreversible.
- Compensatory remediation: all actions taken to compensate for temporary losses of natural resources until the primary restoration takes effect.

Some examples of complementary and compensatory remediation are as follows:

- Restoration of the functional nature of the habitat in its historical range, such as wetlands on drained farmland.
- Improving the reproductive success of species by protecting the nesting sites of birds from predators or from human disturbance, for example.
- Opening up additional habitat areas for fish by removing barriers to migration.

Therefore, the damage done to wild fauna species must be restored through complementary remediation along with compensatory remediation that counteracts the temporary losses. In order to identify and determine the scale of such complementary and compensatory remedial measures, resource-resource or service-service equivalence criteria shall be used, according to which the following shall be considered:

- Actions that provide natural resources or natural resource services of the same type, quality and quantity as those damaged.
- If this is not possible, alternative natural resources or natural resource services shall be

42 "Wild species" are the species of flora and fauna mentioned in Article 2.3.a of Directive 2004/35 or those protected under Community, national or regional legislation, or by international treaties to which Spain is a party, provided that they are found in the wild within Spanish territory, whether permanently or seasonally. In particular, wild species shall include those listed in the Spanish Catalogue of Endangered Species or in endangered species catalogues created by the Autonomous Communities in their respective territorial scopes. Excluded from this category are invasive alien species (those introduced intentionally or accidentally beyond their natural range and that pose a threat to the local habitats or wild species) (Article 2.4).

provided.

If it is not possible to use the criteria above, **alternative valuation techniques** shall be applied. The competent authorities may prescribe the method for determining the scale of the complementary and compensatory remedial measures required. If valuation of the lost natural resources or natural resource services is possible, but valuation of the replacement resources or services cannot be performed in a timely manner or at a reasonable cost, the competent authority may choose remedial measures whose cost is equivalent to the estimated monetary value of the lost natural resources or natural resource services.

TABLE 1. TABLE 1. ORDER OF PRIORITY OF EQUIVALENCE CRITERIA.

ORDER	EQUIVALENCE CRITERION
1st	Resource-resource
1st	Service-service
2nd	Value-value
3rd	Value-cost

Source: Annex II of the Environmental Liability Regulation

The complementary and compensatory remedial measures must be designed in such a way that they foresee that the additional natural resources and natural resource services are in line with the priorities over time and the timeline of the remedial measures. For example, the longer it takes to reach the baseline condition, the greater the compensatory remedial measures to be taken shall be (if the other conditions are equal).

The acting administration may decide not to adopt further remedial measures if:

- The remedial measures already taken ensure that there is no longer a significant threat of negative effects for human health, water or the wild species or habitats; and
- The cost of the remedial measures that must be implemented to reach the baseline condition or a similar level is disproportionate in relation to the environmental benefits to be obtained, in which case evidence of this must be detailed in an economic report that is available to the public.

The ecological damage valuation method is set out in Article 24 of this Act, based on the compulsory financial security for the operators detailed in Annex III and voluntary for the rest, with a view to enabling them to respond to the environmental liability inherent to the activity they seek to perform.

The minimum amount that must be secured shall be determined by the operator based on the intensity and extent of the damage that the operator's activity could cause, according to the criteria established in the Regulation. The sum of this security shall be set according to the environmental risk assessment for the activity, or the scale tables, which shall be designed in accordance with the methodology established in the Regulation.

4.2.3. CRIMINAL LEGISLATION

CRIMINAL CODE

The Spanish Criminal Code[43] defines the types of environmental crimes and the punishments for committing them. Within Book II, Title XVI, entitled "Regarding crimes related to land-use planning and the protection of historical heritage and the environment", Chapter IV is devoted to "crimes related to the protection of flora and fauna and domestic animals".

Obviously, criminal and administrative penalties are mutually exclusive, being subject to the non bis in idem principle that guarantees that a single act cannot be punished twice.

For the purposes of this report, the most interesting topic to focus on is the civil liability incidental to the crime.Anyone with criminal liability for a crime also has civil liability and therefore, in addition to the punishment for the criminal conduct in question, the guilty party is also required to compensate the victim, remedying the damage caused. This is known as "ex delicto civil liability" (Art. 110 Criminal Code), and consists in:

1. Restoration: whenever possible, the same item could be returned, paying for any wear and damage determined by the judge or court.
2. Remediation of the damage: the obligation to give, do or not do what the judge or court orders in light of the nature of the damage and the guilty party's personal and financial situation.
3. Compensation for material and non-material damage.

When the environmental damage cannot physically be remedied, or the economic value of this cannot be borne by the liable party, **accessory measures** must be taken, such as those set forth in Article 125 Criminal Code. According to said article, the convicted party shall be ordered to make certain regular payments of a sum of money over a period of time when such party lacks sufficient resources to settle the entire financial liability at once.

Thus, the Criminal Code grants judges and courts the power to rule that measures be adopted as needed with the aim of restoring the disturbed ecological balance and any other precautionary measures required to safeguard the protected assets, even without a request in this regard by either of the parties. In their decisions, they must justify the grounds on which the quantification of the damages or compensation is based, and they may set this amount in the decision itself or in the enforcement proceedings.

Civil liability may be settled in the criminal proceedings or actions may be reserved and brought before the civil jurisdiction.

If the criminal conduct affects protected wild fauna species, the compensation shall be payable to the Administration.

TRAFFICKING ACT

Organic Act 12/1995, of 12 December, on the Suppression of Traffickingoffers protection for endangered species since the criminal offences for trafficking are not found in the Criminal Code, but instead have been regulated in this special criminal legislation[44].

43 Organic Act 10/1995, of 23 November, of the Criminal Code (Official Gazette of Spain No 281, dated 24/11/1995).

44 Given that the Criminal Code defines the trade or trafficking of protected animal species as a crime, it is possible that a single act could, at the same time, fall under the criminal classification defined in the Criminal Code and that set out in the

Therefore, pursuant to the Convention on International Trade in Endangered Species of Wild Fauna and Flora(CITES) and the corresponding Community Regulation, this act defines and punishesas a trafficking crime any import, export, trade, possession and distribution transactions involving wild flora and fauna specimens[45] and their parts and derivatives, provided that the value of the goods, merchandise, products or stock is equal to or greater than EUR 50,000 and does not meet the requirements established by law.

Parties that commit the aforementioned crime of trafficking with wild fauna and flora shall be punished with prison sentences of 1 to 5 years (imposed in the upper half) and a fine amounting to six times the value of the goods, merchandise, products or stock.

Once again, as seen above, it is therefore necessary to establish valuation mechanisms that make it possible to comply with the terms of the legislation.

4.2.4. CIVIL LEGISLATION

When environmental damage does not represent a crime or an administrative offence, it is still possible to demand liability for environmental damage through civil proceedings,provided that the conduct that harms or endangers the environment causes loss or damage to the rights or property of a person. Therefore, the focus is on property damage (assessed in monetary terms and encompassing both injuries sustained and loss of profits) and psychological damage (for example, the right to good reputation, life, health, well-being, etc.).

Although protected species have a complex legal status due to the fact that they lack an owner, it must not be forgotten that they are part of the "Natural Heritage", which is a collective asset subject to collective use with no need for a deed of acquisition or use. The key element in the legal classification of environmental damage is its impact on the realm of the personal rights of a specific person. However, all citizens are actually in some way the owners of the rights to these resources, and the Public Administration is the intermediary that safeguards them and, as such, the collective channel for protecting them. For this reason, remediation of this damage could take place by means of civil liability, through the connection to the personal rights of citizens[46].

There are two types of liability: contractual and non-contract, and environmental damage falls under the second category, given that there is no contractual relationship prior to the occurrence of the damage.

Lacking a specific law on civil liability for damage to the environment, this matter is governed by the general regime in the Civil Code[47](hereinafter, CC). Art. 1902 CC stipulates that "*any person who, through act or omission, causes damage to another, involving fault or negligence, is obliged to compensate for the damaged caused*". As seen, in order to incur non-contract civil liability, there must be an act or omission, a specific damage, a subject causing the damage and an intention by the subject or objective civil liability.

The trend in case law relating to the environment currently tends towards subjective civil liability where the absence of fault or negligence does not release the party causing the damage from liability for it, but rather the mere existence of the damage implies that the party was negligent. The Spanish Supreme Court

Trafficking Act. In this case the two laws would enter into competition and the Trafficking Act would prevail, as a special law, over the Criminal Code.

45 Wild fauna and flora specimens and their parts and derivatives of species listed in the Washington Convention of 3 March 1973 or in Council Regulation (EC) 338/1997 of 9 December 1996.

46 ANDRÉS BETANCOR RODRÍGUEZ. MADRID, 2018. Liability and insurance for environmental damage. The Prestige case. Environmental Economic Law. Economic-environmental law collection. National Agency for the Official State Gazette. https://www.boe.es/biblioteca_juridica/abrir_pdf.php?id=PUB-DA-2018-84

47 Royal Decree of 24 July 1889, whereby the Civil Code is published ("Gazette of Madrid" No 206, dated 25/07/1889).

has, on several occasions, handed down rulings of negligence in reference to the "risk theory" for "any act or omission that generates indemnifiable damage, and compliance with regulations shall not suffice to disprove it, given that this does not alter the liability of the compliant parties when safety measures and guarantees prove insufficient to actually prevent harmful events"[48].

Making an economic assessment of environmental damage in quantifiable terms is especially complex. There are no specific rules for setting compensation; rather, civil courts are free to establish this amount according to the evidence provided by the plaintiff and the sum is often determined at the enforcement stage of the proceedings and cannot, in principle, be reviewed in an appeal to the Supreme Court.

4.2.5. REGIONAL REGULATORY FRAMEWORK[49]

The Spanish Constitution grants the State exclusive powers to define the basic legislation on protection of the environment, and the ACs are competent for establishing any additional rules on protection and management in terms of environmental protection. Thus, the ACs are allowed to draw up their own catalogues of endangered species, establish specific new categories in addition to those in the SCES, determine supplementary bans and actions deemed appropriate and even increase the degree of protection over species in the SCES, including them in a higher threat category.

In addition, they can - and do - establish their own administrative regulations for the economic valuation of protected species, which are used as the basis for determining the civil liability for damage to wild fauna or classifying the administrative penalties foreseen in the basic national or regional regulations.

Given that there is no national regulation offering guidance on how to establish these valuation criteria, there is significant leeway when it comes to creating the scales linked to their respective regional catalogues of endangered species of wild flora and fauna. In this regard, fifteen out the sixteen Autonomous Communities (specifically, Andalusia, Asturias, Balearic Islands, Canary Islands, Cantabria, Castilla-La Mancha, Castilla y León, Catalonia, Extremadura, La Rioja, Community of Madrid, Murcia, Navarre and Community of Valencia) have such regulations in place, as listed and detailed in the Annex to this report.

Furthermore, it should be noted that many of the species recovery or conservation plans contain specific provisions on valuation, thus creating further confusion in terms of regional regulations. As an example, the Autonomous Community of Aragon does not have general regulations for valuations but does include applicable values in its recovery plans for certain species (the western capercaillie- *Tetrao urogallus*- and Bonelli's eagle - *Hieraaetus fasciatus*- EUR 16,000).[50]The Community of Castilla y León does not include valuations in its recovery plans but does establish the value of the wolf (*Canis lupus*) at EUR 9,000, adjustable according to the CPI[51].

As seen below, some of these regulations refer to hunting species. Some of the regulations cited herein even refer exclusively to these species. Furthermore, the substantive contents of these regulations also vary. Thus, there is a constantly changing assortment of regional regulations governing this matter, as shown in Table 2.

48 SC Judgment (Civil Division, Section 1) No 497/93, of 24 May 1993 (Reporting judge: Francisco Morales Morales)

49 This section contains excerpts from the report titled "Economic valuation of wild species. Legal report for the establishment of a universal model through analysis of the regional legislation in Spain," prepared by Ana Gorro.

50 Sole additional provision in Government of Aragon Decree 300/2015, of 4 November, whereby a protection scheme is established for the western capercaillie and the related habitat conservation plan is approved. Official Gazette of Aragon No 220, 13/11/2015, and sole additional provision of Decree 326/2011, of 27 September, whereby a recovery plan is established for Bonelli's eagle (Hieraaetus fasciatus).

51 Final provision one of Decree 28/2008, of 3 April, which approves the plan for conservation and management of the wolf in Castilla y León. 6484 Wednesday, 9 April 2008 Official Gazette of Castilla y León - No 68

TABLE 2. TABLE 2. SCOPE AND TOOLS IN REGIONAL REGULATIONS ON SPECIES VALUATION

AUTONOMOUS COMMUNITY	SCOPE OF APPLICATION ACCORDING TO SPECIES	TOOL AND PURPOSE FOR USE THEREOF
Andalusia	Protected	Compensation scale applicable to the remediation of damage caused to wild species and their habitats. Cost of remediation.
Asturias	Protected	Compensation payable to the Principality Administration for loss and damages incurred. Restoration of the natural environment to its condition and status prior to the time of damage.
Balearic Islands	Hunting, protected and alien	Ranking of penalties. Returning the situation altered by the damage to its original condition. Compensation for loss and damages incurred.
Canary Islands	Hunting and protected	Compensation for loss and damages incurred as a result of the infringements committed.
Cantabria	Hunting and protected	Ranking of penalties.
Castilla-La Mancha	Endangered	Loss and damage perpetrated against the public interest.
Castilla y León	Hunting and protected	Ranking of penalties Cost of replacement in the case of protected species.
Catalonia	Endangered	Civil liability and potential compensation for loss and damages. Remediation of the environmental damage incurred.
Extremadura	Hunting and protected	Ranking of penalties and compensation to the administration.
La Rioja	Hunting and protected	Ranking of penalties and compensation to the administration.
Madrid	Hunting and protected	Compensation for loss and damages.
Murcia	All wild fauna	Restoration of the natural environment to its condition and status before the act that caused the damage.
Navarre	All wild fauna	Ranking of penalties, restoration of the natural environment.
Basque Country	Hunting and protected	Penalties and compensation.
Community of Valencia	Protected and unprotected	Penalties and compensation.

As seen, in the absence of basic nationwide legislation containing up-to-date values and precise species valuation criteria to be used as a guideline for determining the severity of the penalties or the sum of compensation payable for damage to fauna, there exists tremendous, unjustified differences not only in the values assigned to a species but also in the aim of the valuations (ranking of penalties, compensation, remediation, etc.) and even in the scope of application (endangered, hunting, protected, wild species...).

Certain ACs,such as Asturias and Castilla-La Mancha, have criteria for setting the respective scales (see the Table containing the case study of Castilla-La Mancha, detailed below, which is particularly interesting), as shown in the sections above, but this is not widespread.

In some cases, enormous differences are found between the values indicated from one region to the next, and there is also a varying range of protection levels. Many ACs also have outdated values shown in pesetas that have not been adjusted or increased in proportion to the Consumer Price Index (CPI). In addition, in certain instances, in the Basque Country and Galicia, for example, the values assigned to wild fauna species can be increased up to double the established baseline, but based on different criteria.

In the two ACs that do not have valuation scales, Aragon and Galicia, their respective laws on both conservation and hunting also set forth the offender's obligation to remedy the damage caused for the purpose of restoring the environment to its condition before the infringement was committed. However, this obligation is set at the discretion of the reasoned technical criterion laid out in the resolution that brings the disciplinary proceedings to an end, and in Galicia's case[52], there is a maximum limit with regard to the value of the economic benefits obtained by the offender.

By way of illustration, a comparative table is shown below (Table 3) containing several species selected according to the SCES threat level and their equivalent values in Euros after conversion (without adjusting for the CPI) for values stated by the AC

52 Act 13/2013, of 23 December, on hunting in Galicia (Official Gazette of Galicia No 4, dated 8 January 2014).

TABLE 3. COMPARISON OF VALUES ASSIGNED TO CERTAIN SPECIES IN THE ACS

	AC													
SPECIES	AN.	AST.	BA	CA	CANT.	CLM	CYL	CAT.	EXTRE	LA RIOJA	MADRID	MURCIA	NAVAR.	PV	VALEN.
MAMMALS															
Iberian wolf[53]		-	-	-	90	18.000	9.261[54]	-	12.020	-	751[55]	3.005	90	901	90
IN DANGER OF EXTINCTION															
Iberian lynx		-	-	-	90	90.000	6.010	6.000	90.152	-	4.207	6.010	90	3.005	2.000
Brown bear		18.030	-	-	60.000	-	9.015	6.000	1.202	-	9.015	9.015	60.101	3.005	1.000
VULNERABLE															
Bat		300	150	601	120	1.500	180	300	1.202	30	60	60	120	60	500
OF SPECIAL INTEREST															
European wildcat		-	-	-	2.400	1.000	1.202	2.000	601	1.202	1.202	1.502	1.803	1.803	1.803
Otter		1803	-	-	2.000	3.000	2.404	6.000	6.010	2.404	2.404	4.207	12.020	2.404	500

53 With the approval of Ministry Order TEC/596/2019, of 8 April, which amends the annex to Royal Decree 139/2011, of 4 February, for the development of the List of Wild Species under the Special Protection Scheme and the Spanish Catalogue of Endangered Species (Official Gazette of Spain No 134, of5 June 2019, pages 58611 to 58615), the entire range of the species to the south of the Douro River (Extremadura, Andalusia, Madrid, Castilla y León and Castilla-La Mancha) is now under special protection and included in the List of Wild Species under the Special Protection Scheme.

54 Value according to valuations of big game kills in Decree 32/2015, of 30 April, which regulates the conservation of hunting species in Castilla y León, the sustainable exploitation thereof and wild fauna population control.

55 Since Ministry Order TEC/596/2019, of 8 April, which amends the annex to Royal Decree 139/2011, of 4 February, for the development of the List of Wild Species under the Special Protection Scheme and the Spanish Catalogue of Endangered Species, the Iberian wolf populations to the south of the Douro River in Castilla y León and Madrid are included in the List of Wild Species under the Special Protection Scheme.

AC														
MURCIA		AST.	BA	CA	CANT.	CLM	CYL	CAT.	EXTRE	LA RIOJA	MADRID	MURCIA	NAVAR.	PV	VALEN.
BIRDS															
IN DANGER OF EXTINCTION															
Iberian imperial eagle	30.000	-	-	-	-	60.000	2.404	-	90.152	-	3.906	4.207	481	3.005	481
Red kite	5.000	-	-	4.207	6.000	18.000	360	2.000	1.202	361	-	901	601	901	601
VULNERABLE															
Cinereous vulture	10.000	-	6.010	-	6.000	18.000	2.404	6.000	60.101	-	3005	4.207	481	-	481
OF SPECIAL INTEREST															
Golden eagle	500	1202	6.010	4.207	6.000	18.000	1.202	2.000	60.101	2.404	2404	3.005	6.010	2.404	6010
White stork	500	-	901	-	1.800	1.000	601	2.000	6.010	902	1051	901	1803	1.803	1803
Peregrine falcon	500	1202	3.005	3.005	6.000	18.000	1.202	2.000	30.051	-	3005	3.005	6.010	1.803	6010
INVERTEBRATES, FISH, AMPHIBIANS AND REPTILES															
Crayfish	5.000	-	-	-	60	150	-	300	-	300	-	-	30	24	500

THE CASE OF CASTILLA-LA MANCHA

DECREE 67/2008, OF 13 MAY, WHICH ESTABLISHES THE VALUATION OF ENDANGERED WILD FAUNA SPECIES

According to the legislation of Castilla-La Mancha, "damage to wild fauna shall be assessed in relation to the conservation conditions of the species at the time when the damage occurs and its capacity for natural recovery". The economic valuation of the species contained in Annex I of this decree (see the annex to this report) is carried out by applying the valuation criteria set forth in Annex II therein, assessing eggs in the same way as adult specimens and with potential to increase the value assigned to each specimen of the different species of endangered wild fauna up to double the indicated amount by applying the valuation criteria for damage established in Annex II. In this regard, it sets forth certain criteria that are used to determine the negative effects:

- The number of specimens and their density in the area where the damage occurred.
- The rarity of the species or its threat level.
- The role of the affected specimens in relation to the population of the species.
- The feasibility of the species or the capacity for natural recovery.

In turn, Act 9/1999, of 26 May, on Nature Conservationstipulates that estimates of loss and damages may include damage against the public interest when it affects public goods and services not subject to the market, including damage to the appearance of the landscape, its recreational use and other uses that do not consume natural resources. In the ranking of penalties, when they are not part of the definition of the infringement, the following aggravating factors shall be taken into account:

1. 1. Its repercussions and significance with respect to the health and safety of humans and their assets.
2. The qualitative and quantitative impact and the harm caused to the natural resources subject to this law, particularly protected resources, and the objective risk of diverse forms of contamination of the environment.
3. The irreversible nature of the damage.
4. The protected nature of the site where the infringement is committed or that is affected by it.
5. The circumstances of the perpetrator, such party's intentions, aim of profiting and degree of malice and participation, and the benefits obtained.
6. Recurrence, when more than one infringement of the same nature is committed within a period of one year and declared as such in a final decision. If this circumstance arises, the sum of the fines may be increased by up to 50 per cent, as long as they do not exceed the highest limit set for very serious offences.

4.2.6. SPANISH CASE LAW OF INTEREST IN TERMS OF CIVIL LIABILITY

As seen above, according to the Criminal Code, any person held liable for a crime in a criminal sense is also liable in terms of civil liability. Civil liability is always aimed at restoration of the damaged assets, remediation of the damage or compensation for material and non-material damage. This relationship of causality between the criminal conduct and the resulting loss and damage is an essential condition for a sentence of ex delicto civil liability. Besides the complexity involved in proving this cause-effect relationship in cases of crimes against wild fauna, civil liability can only arise if a result or damage exists, so any crimes in which there is a risk but the results of the criminal conduct are not seen must be excluded.

The Supreme Court case law on civil liability for environmental damage has always ruled that, above all, the remediation of the species should be sought and only when this is not possible should compensation be opted for[56]. It takes into account, therefore, that restoration of environmental damage is not always feasible.

One of the Supreme Court judgments that most explicitly describes the circumstances in which environmental remediation is impossible [57]took place in 1990, in which an ecological offence was tried based on the defunct Article 347 bis for contamination of 30,000 hectares of forest by a power plant.In this case, the Supreme Court asserted that damage can be considered irreversible and, thus, impossible to redress in kind when remediation thereof in nature, even if physically possible, would be lengthy and very costly.

Therefore, when the damage incurred on an element of nature is irreversible and full restoration cannot be achieved, such as in the case of the death of a wild fauna species, the civil liability is reduced to payment of compensation. In effect, one common feature of convictions for crimes against wild fauna is sentencing the offender to pay the victim or the party harmed by the crime a monetary sum as compensation for loss and damages arising from the crime.

Thus, compensation may be aimed at meeting expenses for rehabilitation centre veterinary services provided to captured species[58] but could also be applied under other circumstances:

1. Where the dead animal was a domestic animal owned by a natural person. The civil liability usually consists in compensation payable to the owner of the animal.[59]
2. Where the dead animal was a hunting animal owned by the Administration or a private game reserve. The sum of the compensation usually varies depending on the value of the hunting animal and the purpose of the compensation; such sums may be quite considerable, as was the case in a judgment from 2017[60] in which the defendant was sentenced to compensate the Government of Aragon with a sum of EUR 12,435 for bringing down a “Spanish ibex”, a species which may be hunted with proper authorisation, and for injuring another specimen of the same species.
3. Cases in which the affected animal is not a hunted species, in which the compensation is always payable to the corresponding administration. As an endangered species, the sum of the compensation depends on said value or on the threat level.

56 SC Judgment of 23 September 1988 (RJ1988/6853).
57 SC Judgment of 30 November 1990 (Criminal Division, Section 1), No 3851/1900
58 Judgments handed down by Criminal Court No 3 of Vilanova i La Geltrú No 256/10, of 5 March 2012, and by Criminal Court No 26 of Barcelona No 206/2019, of 22 May 2019.
59 Judgment No 455/2011 by Criminal Court No 3 of Murcia, of 7 December 2011
60 Judgment No 69/17 by the Criminal Court of Teruel, of 16 June 2017

With regard to both non-endangered species and to the endangered species focused on in this analysis, diverse criteria are used to determine the exact amount payable in terms of civil liability:

- According to the **species valuation scales** published in the administrative regulations of the AC in force at the time of occurrence of the acts. While this is a practical, objective tool, as we shall see below there are discrepancies from one AC to the next and many of the implementing rules are outdated. In this regard, one judgment from 2013 by the Provincial Court of Jaén[61] set the value of an Iberian lynx specimen at EUR 6,010.12, according to the administrative scale in the Community of Andalusia, revoking the judgment handed down at the criminal court level, which had set it at EUR 115,428.84 as petitioned by the counsel for the prosecution based on dividing the investment efforts made by the Government of Andalusia and other administrative agencies in the maintenance and conservation of the species (through a LIFE Naturaleza Project from the EU in this case, with an annual budget of EUR 25,971,489) by the number of Iberian lynx specimens in the AC, which came to 225 according to the 2009 census.
- According to the **replacement value of the specimens**, as in a 2011 judgment by the Criminal Court of Palma de Mallorca[62], which stipulated a compensation of EUR 11,600 for expenses incurred for the death of three red kits and one western marsh harrier as well as the replacement costs thereof.
- At other times, reference is made, for example, to the **reproductive nature of the affected specimens**, applying a valuation instrument other than the regional species valuation scale published in the regional regulations. In one case that took place in Aragon[63], in which SEO/BirdLife exercised the actio popularis right, compensation amounting to EUR 33,015.90 was established for the death by poisoning of two Bonelli's eagle specimens "given that they were two reproductive specimens of a species in danger of extinction". This case is particularly interesting because it occurred in an AC that lacks administrative regulations that stipulate a regional scale for valuation of protected wild fauna species. Instead, a conservation instrument such as the Bonelli's eagle species recovery plan[64] is used to quantify the economic value of the specimens based on an assessment of the conservation interest or urgency in such plan, setting a minimum monetary value of EUR 16,000 for each specimen, exclusively for the purposes of the valuation of the compensation for loss and damages. This valuation is conducted by experts in the corresponding administration (such as the biologist and the head of the biodiversity team in the Department of the Environment)[65].

In turn, it is worth mentioning cases in which the judge sets **bails** for the defendant in order to secure the civil liability arising from the criminal proceedings. This precautionary measure is taken prior to or during the preliminary enquiry when the record of preliminary investigations shows signs of criminality by the defendant, ordering, in the same writ, the attachment of sufficient assets to cover this liability should the bail not be raised.

The most emblematic case, due to the severity of the amount ordered in the ruling, in which SEO/BirdLife (in conjunction with WWF) also exercised its actio popularis right, is seen in the decision handed down

61 Judgment 150/2013 of the Provincial Court (Section 2) of Jaén, of 6 June 2013

62 Judgment No 244/2011 by Criminal Court No 6 of Palma de Mallorca, of 9 June 2011

63 Judgment No 397/2011 by Criminal Court No 5 of Zaragoza, of 24 September 2012, ratified by Judgment 93/13 of the Provincial Court (Section 1) of Zaragoza, of 22 March 2013

64 Decree 326/2011, of 27 September, establishing a protection scheme for the Bonelli's eagle (Official Gazette of Aragon dated 6 October 2011) and the Order from 16 December 2013, amending the scope of application of the Bonelli's eagle (Hieraaetus fasciatus) recovery plan (Official Gazette of Aragon dated 8 January 2014)

65 The crimes of "hunting" using poison, from a case law perspective: Judgment of 24 September 2012 by Criminal Court No 5 of Zaragoza, and the related appeal to the Provincial Court. Mertxe Landera Luri. http://www.derechoanimal.info/es

by a court in Valdepeñas[66], which set bail at EUR 800,000 for a stockbreeder accused of poisoning six Iberian imperial eagles on a farm in Encomienda de Mudela. This figure was calculated by applying the value established in the valuation scale for endangered wild fauna species in Castilla-La Mancha, which appraises each imperial eagle at EUR 60,000. However, this value was doubled for each specimen based on the significance of the damage done, not only because of the number of birds killed but also because they are classified as being in danger of extinction.

Furthermore, in addition to paying the monetary value of the affected wild fauna, it is also necessary to remedy the damage incurred on ecological processes. Indeed, the protected legal right in these crimes is the environment, defined as an ecological balance in which all species take part, which is harmed by the actions of hunting or fishing banned species or using destructive methods[67].

In these cases, the environmental damage is usually limited to paying the price of the remedial measures, thus representing a kind of compensation for the ecological imbalance caused. The enforcement of these measures is therefore subject to the procedural activity of the administration itself or of ecological organisations.

When it comes to identifying **measures for restoring the upset ecological balance**, a few cases have stipulated measures aimed at restoring the ecological balance to be met by the offender, such as one judgment from 2019 by a court in Pamplona.[68] The case involved the mass poisoning of 117 birds of prey under special protection, some in danger of extinction, in Navarre.

The offender was ordered to compensate the Community of Navarre with the sum of €67,538.65 based on the administrative valuation of the killed species, as well as paying for the expenses arising from the investigation of the events and the measures required to restore the upset ecological balance. These measures, estimated at EUR 6,000, consisted in establishing feeders for birds of prey in an area measuring 5km and tagging the birds using radio-tracking to monitor the progress of recovery of the affected populations.

Along the same lines, another judgment from 2019, handed down in Castilla y León[69], ruled that due to a lack of independent scientific reports backing the classification of the wolf as a hunting species, the district-wide wolf exploitation plans on hunting reserves located north of the Douro River were declared null and void for the 2016-2019 season, in which 173 wolves were brought down, according to the Association for the Conservation and Study of the Iberian Wolf (Ascel). The court sentenced the administration to redress the damage caused to nature by allowing wolves to be hunted starting in 2016, at a rate of EUR 9,261 per specimen (based on the valuation of big game kills established by the Government of Castilla y León[70]), leading to a total of EUR 1,602,153 and the obligation to submit a programme outlining the actions to be taken for the recovery and conservation of the Iberian wolf and dissemination about the importance of the species.

Also of interest is a 2015 judgment by a court in Santander[71] for the poisoning of 24 animals, which ordered compensation for a total of EUR 118,770 in civil liability, calculated on the basis of the valuation of the affected species according to the administrative scale, equal to a total of EUR 90,270, plus an additional EUR 28,500 to compensate for the measure agreed upon to restore the ecological balance, consisting in tracking the wintering red kite population and surveying during the reproductive season in the historical range of this species for a three-year period.

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66 First instance trial court No 2 of Valdepeñas (Ciudad Real) P.A. 29/13-G, of 24 April 2014

67 SC Judgment (Criminal Division, Section 1) No 1104/1993, of 1 April 1993

68 Judgment No 126/2019 by Criminal Court No 2 of Pamplona/Iruña, of30 April 2019

69 Judgment No 1458/2019 of the High Court of Justice of Castilla y León (Administrative Litigation Chamber), of 12 December 2019

70 Decree 32/2015, of 30 April, which regulates the conservation of hunting species in Castilla y León, the sustainable exploitation thereof and wild fauna population control.

71 Judgment No 145/2015 by Criminal Court No 3 of Santander, of 8 June 2015

Finally, it is common to find that judgments handed down in relation to Article 336 of the Criminal Code leave the specific identification of the damage recovery measures for the enforcement stage of the proceedings. Some choose to call upon the administration for technical and professional expertise[72] while others[73] make reference to whatever the administration decides in the exercise of its powers, separating themselves from the enforcement of the ruling.[74]

4.3. OTHER EU MEMBER STATES

Most legal systems governing these matters at the international level, both within and outside the EU, follow the patterns set out in the legal systems of many English-speaking countries. These patterns consist mainly in providing the courts (and their experts) with sources of information adjusted to the "state of the art" in relation to each species or eco-system. Therefore, the legal systems do not generally contain specific monetary valuations, which vary according to the specific cases to which these information sources or generally accepted references are applied[75].

In the absence of consistency across EU Member States with respect to how ecological damage affecting biodiversity is assessed, it is at least worth distinguishing, among the countries analysed below, as an example, those that are based on the discretion of the court (based on the guidelines referred to in the preceding paragraph) and those that provide a specific valuation system or a price list of the different animal species that judges can use to calculate the economic compensation to be ordered in each specific case.

Among the former group, i.e. cases that grant the courts broad discretion in decision-making, based on scientific sources with technical consensus, the following could be listed:

The case of **France**, where pure ecological damage was recognised as a result of the ecological disaster caused by the sinking of the oil tanker Erika in 2012, following the decision by the French Constitutional Council in 2011, which admitted an obligation of vigilance, the infringement of which entailed civil liability for the perpetrator. Subsequently, this concept was mentioned frequently in case law, until it was included in the Civil Code through the approval of the law on biodiversity in August 2016.

The National Office of Hunting and Wildlife (ONCFS, French acronym) has just one official scale[76] containing the reference economic values for some thirty hunting species based on the replacement cost of the animals.

According to the French Civil Code, ecological damage must preferably be remedied in kind by restoring the deteriorated environment. If this is not possible, remediation shall be monetary, as compensation aimed at restoration of the environment or, failing this, protection thereof. The monetary assessment of pure ecological damage is determined by the judge, taking into account the geographic extent of the contamination, the number of animals affected and their replacement price.

This was the case in the judgment of 26 September2019 by the Court of Appeals of Bordeaux in relation to

72 Judgment No 206/2013 by Criminal Court No 4 of Pamplona, of 19 July 2013; Judgment No 141/13 by Criminal Court No 1 of Don Benito, of 17 June 2013

73 Judgment No 275/2012 by Criminal Court No 5 of Zaragoza, of 24 September 2012.

74 Cited by Bodega Zugasti, D. de la (Ed.). 2014, Illegal use of poisoned bait. Investigation and legal analysis. SEO/BirdLife-Proyecto Life+ VENENO. Madrid

75 A highly interesting example is the EVRI (Environmental Valuation Reference Inventory), a database that lists thousands of studies on environmental valuations conducted since the 1980s. Countries such as the USA, Canada, Australia, United Kingdom and EU countries like France are EVRI members, with free access and permission to update the database.

76 http://www.oncfs.gouv.fr/IMG/pdf/Bareme_valeur_gibier_19062012.pdf

an incident of oil contamination in the Gironde estuary in 2007, an area bearing Natura 2000 classification with a rich eco-system that hosts a wide range of protected migratory bird species and flora in danger of extinction. Following a tough 12-year legal battle, the company responsible for the spill, Sociedad Petrolera de Bec d'Ambès (SPBA), a subsidiary of Total and Esso, was sentenced to pay compensation of nearly EUR 150,000 to the civil parties in the case (LPO,SEPANSO Gironde, ASPAS, FNE and the City Council of Macau), allocating €29,400 specifically to an ecological organisation devoted to bird protection - LPO (Ligue pour la Protection des Oiseaux) - as ecological damages for the death of 420birds, each appraised at a value of EUR 70.

In **Cyprus** there is no specific price list to determine civil liability either. However, the 2017 amendment to the Nature and Wildlife Protection and Management Law (N. 153 (I) 2003), transposing the Birds Directive, introduced an on-site penalty system for each wildlife crime, depending on the species.

For instance, possessing wild birds, the hunting and trapping of which is prohibited, carries an initial fine amounting to EUR 2,000[77], apart from an additional fine consisting of either EUR 10, EUR 100 or EUR 4,000 per bird, depending on the species.

In mid-August 2017 the first on-site deterrent penalty was imposed on an individual for poaching and illegal trapping of birds, for which he had to pay EUR 21,586.

From July to December 2017, a total of 89 on-site fines were issued (69 by the Game and Fauna Service and 20 by the Anti-Poaching Unit of the Cypriot Police), amounting to EUR 267,000, about 60% of which were paid by the offenders.[78] After a full year in force, 242 fines had been issued under this system, totalling EUR 793,593. By the end of 2018, 53% of them had been paid, 15% were pending and 32% had been disputed. In addition, a significant reduction in bird trapping was observed[79].

In the case of **Sweden**, there is also no regulation establishing compensatory measures in the event of environmental damage. However, attention should be drawn to a ruling by the Supreme Court (NJA 1995, s. 249)[80] whereby the illegal hunting of two wolf cubs was found incurring in civil liability.

The Swedish state claimed SEK 100,000 for the loss of these animals based on a Hungarian list that links the value of an endangered species to its rarity. According to this list, the value of a wolf cub was SEK 50,000. Lower courts (the district court and court of appeals) had ruled that the animals had to be assessed on the basis of their recreational value and that the loss of this value had to be compensated for as if it were an economic loss.

These courts had deemed that the fair value of each wolf cub was SEK 20,000. Ultimately, the Supreme Court judged that SEK 20,000 was a fair value for each animal. To this end, given that wolves are an endangered species that is not subject to hunting licences, the Supreme Court weighed the State's obligation to protect and preserve endangered species based on International law. Being as they are a protected species, wolves have no economic value, and therefore the Supreme Court ruled that this damage had a hybrid economic/non-economic nature. On the other hand, considering that the State's investment in the preservation of the species had been rendered partially useless due to the death of the animals, causing a decline in the likelihood of the species' reproduction, it was judged that the

77 https://birdlifecyprus.org/news-details/in-the-press/future-of-birds-at-parliament

78 BirdLife Cyprus. (March 2018).UPDATE on illegal bird trapping activity in Cyprus covering the autumn 2017 findings of BirdLife Cyprus' continuing monitoring programme for illegal bird trapping in Cyprus and providing an overview of the latest developments regarding the problem. https://www.rspb.org.uk/globalassets/downloads/documents/positions/wild-birds-and-the-law/birdlife-cyprus---trapping-report.pdf

79 Cassinis, N. (25 November 2018). Wildlife crime in Cyprus. Scale and efforts to control it. Retrieved from:http://www.lifethemis.eu/sites/default/files/announcements/Kassinis_willdife%20Crime%20in%20Cyprus%20and%20efforts%20to%20control%20it%20NK.pdf

80 Environmental Damage in International and Comparative Law: Problems of Definition and Valuation by Alan Boyle and Michael Bowman.

compensation measure had to be reasonable, in line with the breeding value and taking primarily into account the conservation expenses.

In turn, the second group of countries analysed (those with standardised evaluation methods, whether through a specific valuation system or through a list of prices assigned to each species based on certain variables, usually biological indicators such as diversity or population deficits) show a wide range of disparity in the applied criteria, which leads to different valuations for the same species, as seen in Table 4 below.

TABLE 4. COMPARATIVE ASSESSMENT OF SEVERAL EUROPEAN COUNTRIES

SPECIES	CROATIA	HUNGARY	FINLAND	MONTENEGRO
White-tailed eagle *(Haliaeetus albicilla)*	€5,377	€3,021	€7,400	-
Black kite *(Milvus migrans)*	€1,452	€1,510	€1,514	-
Peregrine falcon *(Falco peregrinus)*	€5,377	€1,510	€4,037	-
Eurasian lynx *(Lynx lynx)*	€2,685	€1,510	-	-
Wolf *(Canis lupus)*	€5,370	€756	-	€500
Brown bear *(Ursus arctos)*	-	€756	-	€10,000
Eurasian otter *(Lutra lutra)*	€4,027	€756	-	-
European wildcat *(Felis silvestris silvestris)*	€1,342	€756	-	€400
Egyptian vulture *(Neophron percnopterus)*	€5,370	€756	-	-
Northern goshawk *(Accipier gentilis)*	€5,370	€151	-	-

In **Croatia**, any natural or legal person that causes damage to a protected species is required to pay compensation, as a violation of the Environmental Protection Act of June 2013.

The *Ordinance on the amount of damages payable to compensate illegal actions against protected animal species(* OG 84/1996)[81] regulates how to determine the amount of compensation for the damage caused by unlawful action in relation to individual protected animal species, i.e. the compensation price list.

TABLE 5. VALUATIONS OF PROTECTED ANIMAL SPECIES IN CROATIA.

SPECIES	VALUE IN HRK	APPROX. VALUE IN EUR [1 HRK = 0.13 EUR]
White-tailed eagle	40.000	5.377
Peregrine falcon	40.000	5.377
Black kite	10.800	1.452
European wildcat	10.000	1.342
Eurasian lynx	20.000	2.685
Wolf	40.000	5.370
Otter	30.000	4.027
Common dolphin	40.000	5.370
Red kite	14.800	1.987
Egyptian vulture	40.000	5.370

81 http://digarhiv.gov.hr/arhiva/263/18315/www.nn.hr/clanci/sluzbeno/1996/1504.htm

SPECIES	VALUE IN HRK	APPROX. VALUE IN EUR [1 HRK = 0.13 EUR]
Griffon vulture	40.000	5.370
Swallow	2.400	322
Northern goshawk	2.400	322

This regulation was used in 2002 to levy a fine on Italian poachers that were transporting 85,488 dead protected birds in a truck coming from likewise protected areas in north-eastern Croatia, bound for the Italian food market. The amount of compensation for the confiscated birds was almost EUR 14 million. This sum was calculated by multiplying the number of birds per species by the value of each species[82].

In **Finland**, compensation is imposed on the grounds of both administrative violations of the Nature Conservation Act and of breaches of the Criminal Code.

According to Section 59 of the Nature Conservation Act (1096/1996), of 20 December 1996, parties found guilty of any of the infringements referred to in Section 58 shall be sentenced to forfeit to the State whatever they gained by committing the offence or to pay the monetary value of the damaged protected species, pursuant to the values established by the Ministry for the Environment or otherwise by the Criminal Code. The Ministry for the Environment will set the standard monetary values.

There are, therefore, standard monetary values for protected species of mammals, birds, amphibians, molluscs, butterflies, beetles and dragonflies. Originally proposed in 1991, the applicable price list was published by the Ministry for the Environment under *Decree 9/2002*[83], including the recommended monetary values for protected animal and plant species, following the proposal of the Finnish Museum of Natural History. This Decree establishes the minimum values, not excluding higher ones. The different species are assessed every ten years by groups of experts led by the Ministry for the Environment.

TABLE 6. MINIMUM MONETARY VALUES FOR PROTECTED SPECIES IN FINLAND

SPECIES	VALUE
Taiga shrew (*Sorex isodon*)	€50
Northern goshawk (*Accipiter gentilis*)	€757
Eurasian curlew (*Numenius arquata*)	€118
Black kite (*Milvus migrans*)	€ 1,514
Hermit beetle (*Osmoderma eremita*)	€1,682
Peregrine falcon (*Falco peregrinus*)	€4,037
White-tailed eagle (*Haliaeetus albicilla*)	€7,400
Saimaa ringed seal *(Pusa hispida saimensis*)	€9,755

The Decree includes values for 27 mammals, 217 birds, 9 reptiles and amphibians and for some butterflies, beetles and molluscs. These values apply to adult individuals of the species. If a species is not listed, the value of the nearest species would apply.

A litter of mammals or a part thereof is valued as an adult specimen, as is a group of eggs or hatchlings or a part thereof. For mammals and birds that appear in Finland only occasionally, the highest value of the systematically related species is applied. Values for plants are calculated on a case-by-case basis.

82 https://www.prijatelji-zivotinja.hr/index.en.php?id=460
83 http://www.finlex.fi/fi/laki/alkup/2002/20020009

The objective of these values was to determine compensation for the incurred expenses, whether related to species conservation efforts or to the replacement of the lost specimens.

The criteria to adopt these specific values was based on a formula using the following variables:

- Population size (P) in the relevant country/area. Higher values are applied to sparse populations and lower values to large populations, as can be seen in Table 7.

TABLE 7. DISTRIBUTION OF VALUES OF INDICATOR (P)

	PAIRS OF BIRDS	MAMMAL SPECIMENS
2	<100	<200
3	101-1,000	201-2,000
4	1,001-10,000	2,001-20,000
5	10,001-100,000	20,001-200,000
10	100,001-1M	200,001-2M
20	>1M	>2M

- Reproduction capacity (R), as a logarithm of the specific weight in grams. The greater the difficulty and slowness of reproduction, the higher the applied values are, and vice versa.
- Need for protection (S) applied to the IUCN Red List categories. The greater the protection, the higher the value:
  - S= 1 Least concern
  - S= 5 Near threatened
  - S= 10 Vulnerable
  - S= 20 In danger of extinction

For birds and mammals, the following formula was used in the calculation:

V (Standard monetary value) = (R x S / P)x €201.60

Consequently, the more endangered a species is and the more difficult and slower its reproduction, the higher the value, reaching a maximum value of EUR 9,755 for a ringed seal from Lake Saimaa, a species with a population of approximately 250 individuals.

Only one week after the entry into force of the Decree, customs seized 110 bird eggs hidden inside a car at the Finnish-Russian border. The man behind the operation was a Norwegian taxidermist, famous for having committed several crimes involving protected species. Given that the accused was convicted for participation in organised crime with respect to protected species, he was sentenced to a one-year probation service. Among those affected there were rare species according to CITES, such as eagles and falcons. The total monetary value lost amounted to FIM 150,000[84].

Other later examples include a case in which an individual cut the wings off of a dead white-tailed eagle on an island and took them home in 2010. The Vaasa Court of Appeals sentenced him to a fine of EUR 880 for a nature protection violation and other infringements. It was also ordered that the eagle's wings were to

84 Miettinen, V. (5-6 November 2001). Value Confiscation – Monetary Compensation in Crimes against Protected Species. Retrieved from: https://www.traffic.org/site/assets/files/10711/wildlife-trade-controls-eu.pdf

be confiscated by the State, as well as a EUR 3,500 compensation for the value of the animal. In this case, the full value for an eagle according to the price list in the Decree was not applied, adjusting the amount instead to account for only the wings of a dead individual.

In 2016 a taxidermist had collected some 8,700 bird eggs without a permit. He had collected part of those eggs himself in Finland and other countries, and the rest had been exchanged or obtained from other people. He had also collected dead animals without a permit, some for use in taxidermy. He was sentenced to 1 year and4 months conditional imprisonment for a nature protection offence. The seizure of the eggs was ordered, as well as a EUR 250,000 compensation to the State for the eggs (and other specimens found in his collection). The value according to "the price list" would have been EUR 561,180, but the Court of Appeals adjusted the confiscation. The value was determined not only considering the eggs that had been collected by the perpetrator himself, but also those imported eggs and the old collections that he had kept in his possession without a permit[85].

In **Hungary**, species are declared "protected" or "highly protected" by the Minister for the Environment. The number of protected species is close two thousand while there are 272 highly protected species.

Decree 13/2001 of the Ministry for the Environment on protected and specially protected animal and plant species, the list of specially protected caves and the catalogue of important animal and plant species for the conservation of nature in the European Community establishes a price list[86] in HUF, whereby a nature conservation value is assigned to every animal and plant species according to its level of protection, ranging from a minimum HUF 1,000 to a maximum HUF 1,000,000.

TABLE 8. WILD ANIMAL SPECIES PRICE LIST IN HUNGARY

SPECIES	VALUE IN HUF	APPROX. VALUE IN EUR
Red-breasted goose (*Branta ruficollis*)	1,000,000	3,021
White-tailed eagle (*Haliaeetus albicilla*)		
Saker falcon (*Falco cherrug*)		
Short-toed snake eagle (*Circaetus gallicus*)		
Black kite (*Milvus migrans*)	500,000	1,510
Peregrine falcon (*Falco peregrinus*)		
Eurasian lynx (*Lynx lynx*)		
Wolf (*Canis lupus*)	250,000	756
Brown bear (*Ursus arctos*)		
Eurasian otter (*Lutra lutra*)		
European wildcat (*Felis silvestris silvestris*)		
Griffon vulture (*Neophron percnopterus*)		
Northern goshawk (*Accipier gentilis*)	50,000	151

These values are used directly by the civil courts to calculate compensation for damage caused in nature. One example is case P. 21.719/2010/33, heard by the Zala County Court, relative to a dam operator that had drained a reservoir, causing irreparable damage to the habitat, specifically the death of protected species and the loss of ecosystem services. To determine the compensation, the value of each affected species was multiplied by the number of dead specimens, resulting in a total amount of HUF 33,120,000

85 Rintala, J. (20-21 September 2017). Understanding the intrinsic value of birds and habitats &cost recovery – Finnish Price List. [PowerPoint slides] Retrieved from: https://app.azavista.com/event_website_pages/view/58c00d2f-65b8-402f-9c8b-2261ac110002/58be9791-fbf0-42f5-81f9-1ac4ac110002/6fef9ad8d7

86 http://www.termeszetvedelem.hu/index.php?pg=sub_685

to compensate the damage.

In the criminal jurisdiction, by contrast, courts rely only indirectly on the list of values, which therefore do not apply to individual penalties, even though they are given consideration by the courts. Thus, these price lists are taken into account to determine the severity of the penalty or fine to be imposed, given that the total amount shows how serious the crime is.

In **Montenegro**, Regulation 52/08, on the price list for compensation of damage caused by natural and/or legal persons in hunting areas as a result of poaching or any other illegal hunting method, contains a small table of valuations ranging from a minimum of EUR 50 to a maximum of EUR 10,000.Below are some examples:

TABLE 9. VALUATION OF WILD ANIMAL SPECIES IN MONTENEGRO

SPECIES	VALUE IN EUR
Brown bear (*Ursus arctos*)	10,000
Western capercaillie (*Tetrao urogallus*)	1,500
Wolf (*Canis lupus*)	500
European wildcat (*Felis silvestris*)	400
Least weasel (*Mustela nivalis*)	250

Lastly, in **Luxembourg**, the Law of 18 July 2018 on the protection of nature and natural resources introduced a digital system of ecological assessment of projects that determines the scope of compensation measures through ecological points, or so-called 'eco-points'. This system is developed through the Gran Ducal Regulation of 1 August 2018 establishing a digital system of assessment and compensation by ecological points.

The digital system assigns each biotope, habitat or other land use a numerical value per area unit, depending on the rarity and restoration potential of the different land use types according to their biotope. Therefore, a species of tree, flower or insect is allocated a certain number of points that builders will have to compensate for financially to enable the State, in turn, to compensate for the point loss in the biotope in the same ecological area[87].

Any project, plan or activity likely to have a significant impact on protected species or on their breeding or resting areas must be subject to an authorisation specifying, where appropriate, mitigation measures in advance, before moving on to the compensation scheme. These mitigation measures to maintain the continuing functionality of the site at all times for the population of the concerned species shall be carried out in and around the impacted site. If these mitigation measures generate eco-points by creating, restoring or improving protected biotopes or habitats, the eco-points generated will be recorded in the overall balance of the relevant development project.

87 https://www.wort.lu/fr/luxembourg/protection-de-la-nature-la-loi-revolutionnaire-des-verts-5b102335c1097cee25b8a57b

5. DAMAGE QUANTIFICATION METHODS

Apart from the regulatory and case law framework analysed in the previous section, a study of different methods for quantifying environmental damage has been conducted in this report for the drafting of the proposal included in section "7. Proposals" en la página 55.

5.1. THE ENVIRONMENTAL LIABILITY SUPPLY MODEL (MORA)

The Environmental Liability Supply Model (MORA)[1] is a methodology developed by the Technical Commission for the Prevention and Remediation of Environmental Damage,[2]which provides "operators" (this term applies to the subjects of the Environmental Liability Act, see section 4.2.1. *Framework of national legislation*) with a methodology for assessing environmental damage in accordance with this environmental liability legislation, thus facilitating compliance with it. Operators must design the specific remediation to be applied on the basis of the corresponding environmental risk analyses provided for in the Environmental Liability Act Regulation. It is therefore an environmental damage valuation tool that provides the costs of primary, compensatory and complementary remediation, in accordance with the regulations. The model has the following objectives:

- The development of a catalogue of remediation methods.
- The design of a method selection mechanism.
- The design of an economic model for data assessment.

Remediation costs are calculated taking into account the natural resources covered by this regulation, i.e. soil, water, habitat, species, and coastal shores, before damage occurs and applying economic methods based on the supply curve and using a resource-resource[3] approach and, additionally, a service-service[4], value-value or value-cost approach.

In MORA, all wild animal species existing in Spain and listed in the National Biodiversity Inventory (INB) are taken into account, except for invertebrate animals because these are assumed to recover at a reasonable pace and particularly because specific recovery techniques and their costs and restoration times are still unknown.

The National Biodiversity Inventory lists the animal and plant species that are present in Spanish territory, using 10x10 km grids, as well as the threat level that each species faces according to the classification of

1 This section is based in its entirety on the following document: Environmental Liability Supply Model (MORA) - Methodological Document, March 2013. Technical Commission for the Prevention and Remediation of Environmental Damage. https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/responsabilidad-mediambiental/Documento%20metodolog%C3%ADa_tcm30-177400.pdf

2 This Commission was created by Royal Decree 2090/2008, of 22 December, approving the Regulations for partial implementation of Act 26/2007, of 23 October, on Environmental Liability, as a technical cooperation body between the Central Administration and the Autonomous Communities for the exchange of information and counseling on the prevention and remediation of environmental damage.

3 The resource-resource approach is the criterion followed in MORA to assess the costs of restoring all of the resources affected by the damage to their original pre-damage state.

4 The service-service approach uses the exchange rate between the damaged services and the generated services, provided it is known or can be estimated.

the International Union for Conservation of Nature (IUCN).

In addition, given that the recovery of a species entails the recovery, where necessary, of its habitat, all the habitats falling under the Priority Habitat coverage drawn up by the Ministry for Ecological Transition and Demographic Challenge (MITECO) and in the Forest Map of Spain are also contemplated.

Although the MORA procedure is intended as a preventive measure, it has served as a basis for the purposes of this report because of its sound assessment techniques. A summary of each stage of the system used by MORA is set out below (as this will not be included in the description of the proposal in section 7. *Proposals*):

PHASE 1. DETAILED IDENTIFICATION OF THE DAMAGE

- Identification of the damage-causing agent that can potentially result in negative effects on natural resources. This implies a quantitative study of the agent in physical units (volume, mass, etc.) and the medium in which it has been released (water, soil or atmosphere). The following agents are considered to cause damage:
    - Chemical agents, according to the Federal Remediation Technologies Roundtable (FRTR)[5], a US institution created in 1990 in which federal agencies involved in environmental remediation are represented. While air - and the atmosphere - are not natural resources covered by the ELA, environmental damage caused by airborne elements is included in the definition of damage.
    - Physical agents, meaning the excess or lack of substances that do not have an associated level of toxicity, such as water, inert waste, soil, temperature or electromagnetic fields.
    - Biological agents: genetically-modified organisms, invasive alien species, viruses, bacteria, protozoa, fungi and insects.
    - Fires.
- Determination of the resources (soil, water, coastal shores, wild species and protected habitats) that have been affected by the accident, as well as analysis of the potential risks that the damage-causing agent may pose for human health, in which case the damage must always be considered significant.

PHASE 2. DAMAGE QUANTIFICATION

The exposure to the damage-causing agent and the severity of the resulting effects are evaluated here, and the extent of the damage is expressed in biophysical units. This requires information[6] on:

- the extent of the damage (in mass, volume or area units);
- the intensity of the effects in relation to the sensitivity of the environment;
- the duration and reversibility of the damage - time-related factors.

If the damage is not significant, the procedure ends here, but if the damage is significant, the procedure for the next phase in the system will be initiate.

5 www.frtr.gov

6 Under the environmental liability system of the Environmental Liability Act for which MORA was designed, this information has to be provided by the operator. Within the context of offences against animal species, this is not always feasible

PHASE 3. SELECTION OF THE EQUIVALENCE CRITERION TO BE ADOPTED

If it is possible to estimate the rate of exchange through ecological indicators or using tools of economic valuation methods, there are two possible paths:

1. Resources of the same type and quality as those that were damaged must be recovered at a reasonable cost, in which case a resource-resource equivalence criterion will be applied. This criterion will be monitored in MORA in order to assess the costs of restoring all the resources affected by the damage to their original pre-damage state.
2. If the resources recovered under the remediation method cannot be compared with those damaged, also at a reasonable cost, a service-service equivalence should be applied if the rate of exchange between the damaged services and the services generated is known or can be estimated.

When it is not possible to estimate this exchange rate, value-value or value-cost equivalences should be applied. The latter shall only apply in cases where it is not possible to estimate the social value of the natural resources or the resource services that may be generated by the remediation project, or where such valuation cannot be carried out within a reasonable timeframe or at a reasonable cost.

The result provided by MORA is the economic valuation, expressed in monetary units, of the primary, compensatory and, where appropriate, complementary remediation measures. The latter form the core of the MORA model, given that compensatory measures aim to compensate society for temporary resource losses and complementary measures compensate for irrecoverable losses when primary remediation is inapplicable or insufficient.

Primary remediation measures whose objective is to restore or bring damaged natural resources or natural resource services as close as possible to their baseline condition shall be applied when the following conditions are met:

- There are effective methods to remedy the damaged resource or services.
- The cost of the primary measure is reasonable in relation to the expected environmental benefits.
- The required time for primary remediation is reasonable.

Otherwise, complementary remediation measures shall have to be taken.

Compensatory measures shall be applicable whenever primary and/or complementary remediation does not take immediate effect (within less than 1 month).

In the event of irreversible damage, MORA calculates the complementary and compensatory measures jointly. The calculation tool used in MORA for scaling these two measures is the Resource Equivalency Analysis (REA). When the equivalence criterion used is service-service, the applicable tool is called Habitat Equivalency Analysis, whereas it is called Value Equivalency Analysis when the criterion is value-value.

When value-cost criterion is applied, equivalency analyses are not carried out because the costs of a remediation project must be met directly for an amount equal to the value of the damaged resources (REMEDE, 2008). To calculate the remediation project cost, the corresponding budgets must be drawn up taking into consideration concepts such as indirect costs, quality assurance, general expenses, etc. in order to calculate the total value of the damage incurred.

The identification of remediation methods aimed at restoring soil, water, wild species, habitats, and coastal shores after damage caused by chemical, physical and biological agents and fires has been based simultaneously on two main sources of information: specialised bibliography and consultations with experts from the Central and Autonomous Community Administrations. Thus, MORA offers a catalogue outlining the most suitable remediation methods for each type of environmental damage, made up of a series of fact sheets with various characteristics for each method. The following remediation methods are taken into consideration for different types of damage to wild animal species, although they are deemed to have limited effectiveness for endangered species:

TABLE 10. CLASSIFICATION OF REMEDIATION METHODS BY DAMAGE TYPE ACCORDING TO MORA

DAMAGE TYPE	REMEDIATION METHOD
Chemical	Capture, relocation and treatment
	Captive breeding and specimen release
Physical, due to extraction	Captive breeding and release
Physical, due to temperature change	Capture, relocation and treatment
	Captive breeding and release of replacement specimens
Fire	Capture, relocation and treatment
	Captive breeding and release
Biological, due to alien species	Capture of invading specimens and release of captive-bred specimens
Biological, due to genetically modified organisms	Capture of genetically modified organisms and release of captive-bred specimens

The only known practical example of the application of the MORA methodology to wild animals was provided by the Tragsa group in 2017 through a study[7] on the economic impact of the electrocution of birds of prey on power lines in Spain. For this assessment the following were used:

- The annual mortality rates among birds of prey present.
- The valuations made by the different Autonomous Communities in their applicable regulations for the different bird species, CPI-adjusted for the same year.

Using the following formula, the economic impact of a power line (Linx) was calculated in EUR by power pole and year.

Linx (€ / a × a) = (Sp × v)365 / (d × n), where...

- "Sp" is the number of specimens of the species detected in the last sampling
- "v" is the value of the species in EUR in 2014
- "d" is the number of days elapsing between samplings
- "n" is the number of power poles in power line X

The study obtained the environmental impact for each pole based on the determined mortality estimates.

7 Soria, Mª &Guil, Francisco. (2017). First general approach to the impact caused by the electrocution of birds of prey - Incidence on birds and associated economic impact.

Notably, the result of using the currently applicable legal valuations in the valuation of bird species contrasts greatly with the figures obtained from using the values provided by the MORA platform, resulting in totally different values for the annual economic impact, i.e. EUR 22,107,319.03 if determined from the valuations of the Autonomous Communities and EUR 141,299,527.51 if calculated through MORA. Some examples of the species valuations used in this economic impact calculation are shown in Table 11 below:

TABLE 11. COMPARISON OF SPECIES VALUATIONS ACCORDING TO SOME AUTONOMOUS COMMUNITIES

SPECIES	MORA	ANDALUSIA	CASTILLA-LA MANCHA	MADRID
Iberian imperial eagle	139,290.04	31,119.66	66,011.40	9,820.35
Cinereous vulture	92,860.02	10,373.22	19,803.42	4,532.47
Egyptian vulture	46,430	10,373.22	19,803.42	6,798.70
Bonelli's eagle	46,430	3,111.97	66,011.40	2,266.23
Golden eagle	92,860.02	1,037.32	19,803.42	6,043.29
Short-toed snake eagle	847.33	1,037.32	13,202.28	2,266.23
Peregrine falcon	46,430	1,037.32	19,803.42	1,510.82
Red kite	847.33	5,186.61	19,803.42	7,554.11
Eurasian eagle-owl	9,286	1,037.32	19,803.42	1,510.82
Griffon vulture	46,430	1,037.32	13,202.28	7,554.11
Black kite	847.33	1,037.32	1,100.19	2,643.93
Other birds of prey	847.33	1,037.32	6,601.14	4,532.47

As evidenced in this table, the application of this method makes sense only in terms of the objective of the aforementioned study. This study, which was essentially aimed at implementing programmes to adjust power lines, involved extrapolating the mortality rates of birds of prey to Autonomous Communities that had identified or provided information on power poles not meeting the technical specifications required under the relevant legislation (i.e. Royal Decree 1432/2008 of 29 August, whereby measures for the protection of birds of prey against collision and electrocution on high-voltage power lines are established).

The economic impact associated with electrocutions turned out to vary depending on the initial values used, showing the overall assessment trend of the loss of biodiversity caused by these power lines. Therefore, this impact cannot be applied directly or in the same terms to wildlife assessments in the context of this report.

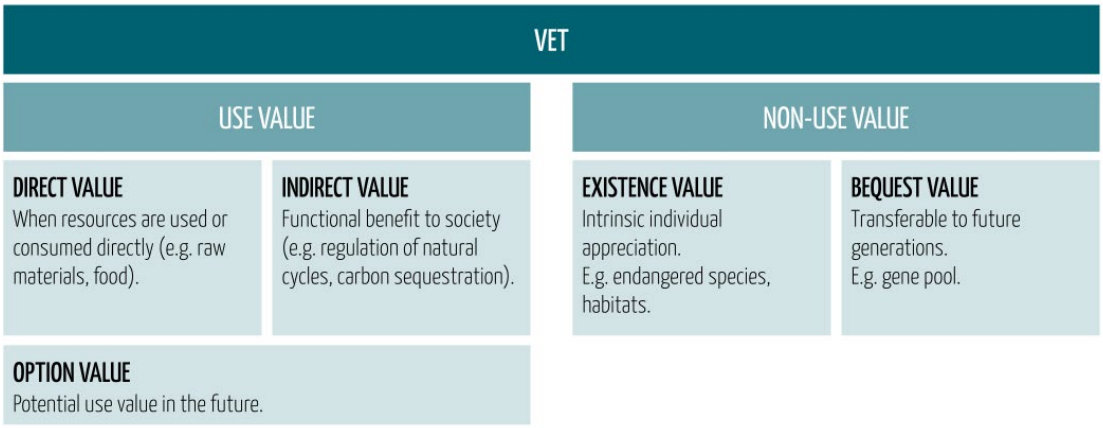
5.2. THE VANE PROJECT

Jointly carried out by the University of Alcalá and the Ministry for the Environment and Rural and Marine Affairs (MARM) in 2008-2010,the project entitled Valuation of Natural Assets in Spain (VANE) is an example of an economic model that is based on the demand curve, i.e. the study is carried out from the perspective of consumers of goods and services, following criteria based on the sustainable use or exploitation of natural assets and using conventional economic analysis tools.

The project resulted in the economic evaluation of a series of services provided by nature, represented by digital raster coverages in which the value of each service to society is shown in EUR per hectare per year.

The project argues that the total economic value (TEV) of a resource is the result of integrating its use value and its non-use value, with the following sub-types (Figure 1).

FIGURE 1. SUB-TYPES OF THE VALUES WHICH INTEGRATE TOTAL ECONOMIC VALUE



In the case of biodiversity resources, these are non-use public assets because they have an intrinsic value, i.e. they produce well-being in their own right without being used. However, they also have an indirect use value (ecosystem sustainability).

People value the existence of particular species or habitats irrespective of the ecosystem services they provide. Biodiversity is an essential part of humanity's natural and spiritual environment. Therefore, when a species disappears there is a sense of irreversible loss that is felt by contemporary generations and affects future generations. Some authors will even go further and argue that biodiversity has an intrinsic value that cannot be analysed from a utilitarian or anthropocentric perspective.

If environmental services are market-regulated, a large part of the use/consumption values of natural assets can be estimated with a direct method. However, in the absence of such a market, indirect methods analysing the preferences revealed by consumers are used. In order to value non-usable assets (natural non-use values), one must analyse consumers' willingness to pay for using certain assets.The best known methods are contingent valuations such as the random utility method, which does not help determine the willingness to pay but rather the preferences for certain goods or services whose valuation is linked to a number of known characteristics.

In any case, once each service value of each natural asset in the pilot areas has been established, the value is transferred to the rest of the territory with the same characteristics. For biodiversity conservation, an estimate of the conservation costs is used based on the economic effort made by Spanish society to maintain its animal and plant species in good condition. For this purpose, the sum of agri-environmental measures and the conservation costs of managing the Natura 2000 network are taken as a reference. The results are used to create a map of a certain number of environmental services in the area of biodiversity conservation, assigning a value to each cell in the map according to the number of species and their threat level. To do this, a higher value is assigned to areas with a higher number of sensitive species (e.g. forests) while those with no listed species receive much lower values.

5.3. THE ECONOMIC ASSESSMENT OF WILD BIRD MORTALITY DUE TO THE USE OF FIREARMS IN EUROPEAN WETLANDS

The Italian National Institute for Environmental Protection and Research (ISPRA, Italian acronym) together with Cambridge University and the British Royal Society for the Protection of Birds (RSPB) jointly published a study in 2017 aimed at obtaining an estimate of the economic value of waterbirds lost annually due to lead shot poisoning, adopting a methodology developed in North America. This was done in order to assess the cost of remediation of ecological damage through restocking/reintroduction programmes to replace the dead birds.

The study found that an estimated one million specimens die annually in Europe and a further three million suffer sub-lethal effects as a result of lead shot ingestion. It was concluded that the annual economic loss associated with this mortality ranges from EUR 100 to 200 million, not including other data that would have raised this figure, such as the deaths of species for which there is insufficient data and delayed deaths indirectly caused by lead poisoning and its effects on reproduction. In this case, it was determined that the benefits of a restriction on the use of lead shot in wetlands could outweigh the cost of adaptation to non-lead ammunition.

Two methods were used for this calculation:

1. **The cost of introducing captive-bred waterbirds to replace the fatally poisoned wild birdswas calculated.** In turn, the number of captive-bred birds that would have to be re-released to compensate for the high mortality rate of captive birds (72.7%) in the months following their release into the wild was also calculated. This is the method that allows financial compensation to be calculated according to the cost of the damage incurred. Following this approach, the resulting annual cost was estimated at EUR 105 million per year in the EU countries and EUR 142 million for the EU as a whole.
2. The opportunity cost of the damage was studied, namely the economic value of the l**oss of hunting opportunities** that was caused by the death of poisoned birds, achieving similar results of EUR 129 million per year in the EU countries and EUR 185 million per year in Europe as a whole.

Thus, to calculate the mortality rate of captive-bred birds in order to assess the number of new birds to be released to make up for the annual loss of wild waterbirds due to lead intake, the following formula is used:

No. of captive-bred birds to be released (N) = Np / (1 – pd), where...

- Np = No. of birds killed by lead
- Pd = Proportion of captive-bred birds expected to die before the start of the hunting season.

The following formula was used to calculate the number and type of bird species poisoned annually by lead shot:

$\sum$di (mortality %) = Pi / hi x t x mi / 100 i=1, where..

- d = Percentage of birds killed by lead poisoning;
- p = Shot prevalence according to the number of pellets found in the carcasses of dead animals:
  - 1 shot = 47.1%
  - 2 shots = 15.7%
  - 3 shots = 5.4%
  - 4 shots = 6.3%
  - 5 shots = 3.5%
  - 6 shots = 2%
  - +6 shots = 19.9%
- h = hunting bias correction factor to compensate for the increased vulnerability to hunting of waterbirds with ingested pellets. The shot prevalence is divided by 1.5, 1.9, 2.0, 2.1, 2.2, 2.3 and 2.4 for birds having ingested 1, 2, 3, 4, 5, 6, +6 pellets, respectively.
- i = Lead contamination class, out of seven classes in total based on the number of ingested lead pellets:
  - 1 = 1 shot
  - 2 = 2 shots
  - 3 = 3 shots
  - 4 = 4 shots
  - 5 = 5 shots
  - 6 = 6 shots
  - 7 = ≥ 6 shots
- t = Population rotation. Lead pellets are retained in the body of the birds for a short time (2-4 weeks) and to avoid bias, a correction factor of 7.25 is used, calculated on the basis of a rotation period of 20 days and an average hunting season of 145 days (145/20 = 7.25).
- m = Mortality rate based on the number of ingested lead pellets, assuming that birds having ingested 1, 2, 3, 4, 5, 6 and +6 pellets have mortality rates of 9, 23, 30, 36, 43, 50 and 75%, respectively.

5.4. DIRECT AND INDIRECT ASSESSMENT METHODS

The study The Economics of Ecosystems and Biodiversity for National and International Policy Makers – Summary: Responding to the Value of Nature 2009(TEEB), sponsored by the United Nations Environment Programme, is a global study launched by the G8 and five major developing economies and funded by the European Commission that focuses on "the global economic benefit of economic biodiversity, the costs of biodiversity loss and the lack of protective measures versus the costs of effective conservation". The TEEB report advocates the integration of the economic values of biodiversity and ecosystem services into decision making.

Regarding the problem of quantification of natural resources that have no market value, such as biodiversity, TEEB points out that quantification cannot be accurate because there are no parameters to calibrate its accuracy. It is possible, however, to construe a market fiction, by assuming a willingness to pay for the use of lost resources. In these cases, quantification will always be "speculative" because it will never be possible to construe the assumption of its correctness[8].

8 TEEB – The Economics of Ecosystems and Biodiversity for National and International Policy Makers – Summary:

Thus, three methods of environmental damage assessment can be used.

DIRECT ASSESSMET METHODS

Direct assessment methods attempt to estimate environmental effects subjectively based on information obtained from individuals.They adopt two approaches: preference methods and contingent valuation methods.

PREFERENCE METHODS

These methods are based on an alternative market where goods and services (other than the environmental goods that have been damaged) are traded, but where the price is directly influenced by goods remaining outside the market (price of real estate, time people want to spend to travel to a wildlife area).

- "Hedonic property prices" identify - based on statistical data - the part of the property value that can be attributed to positive environmental circumstances, and also show how many people are willing to pay for an improvement in environmental quality. In this way, the social value of foreseen investments in environmental improvement can be estimated. It has disadvantages, e.g. when the role of biodiversity is not perceived by consumers in land prices.
- "Cost of travel" is a market-based method which uses information on the costs (time and money) incurred by people visiting an area of high biodiversity for recreational purposes. Based on these data, the willingness to pay for the "facility" services can be extrapolated.[9] It is therefore an effective method for estimating the willingness to pay (hereinafter WTP) for ecotourism.

These methods use a hypothetical market for the trade in the environmental element, for which no market data are actually available; they can be used to estimate the economic use or non-use values of almost any ecosystem or environmental service.

CONTINGENT VALUATION METHODS.

This is the most commonly used direct method for valuing environmental assets that have no market value. It is also used to measure existence values, option values, indirect use values and non-use values.

It is based on people's valuation of a given environmental good or service, which is obtained through the use of surveys, interviews and questionnaires to find out how much the respondents are willing to pay for a certain degree of nature conservation (willingness to pay = WTP), or how much they would like to collect as compensation if a wildlife area is lost (willingness to accept = WTA). A market fiction is thus constructed by assuming a willingness to pay for use of the lost resources[10].

While this method makes it possible to estimate the use and non-use values of biodiversity goods and services, it has certain disadvantages, since willingness to pay does not necessarily translate into actual payments.

However, in recent decades, this method has been used extensively in the United States and Europe. For

Responding to the Value of Nature 2009. http://www.teebweb.org/media/2009/11/National-Executive-Summary_Spanish.pdf

9 Miettinen, V. (5-6 November 2001). Value Confiscation – Monetary Compensation in Crimes against Protected Species. Retrieved from: https://www.traffic.org/site/assets/files/10711/wildlife-trade-controls-eu.pdf.

10 See note 102.

example, as shown below, this method was used in the Exxon Valdez oil spill to assess the full extent of the damage. In Sweden, it was found that each family would pay EUR 12 to repopulate a woodpecker species. The residents of Maine (USA) would save the peregrine falcon by donating EUR 20.

This method can also be used to determine the access rights to a natural site. In 2008 it was used by Baral N, Stern MJ and Bhattarai R. to determine the right of entry to Nepal's largest protected area, Annapurna, by sending a questionnaire to 315 foreign tourists who visited the area in 2006. One of the paragraphs explained to the respondents that the site management authorities intended to increase the entrance fee. This increase in the entrance fee would improve conditions for visiting tourists, preserve biodiversity and even promote local development, but above all, it would compensate for the loss of income linked to the drop in the number of visitors to the site due to geopolitical tensions in the early 2000s. Respondents were asked to indicate whether or not they would agree to pay different amounts to access the site. The quantities offered ranged from USD 30 to USD 120, while during the research the fee charged was USD 27. The study found that an entrance fee of USD 50 was acceptable to more than 60% of the respondents, which would considerably reduce the deficits in the protected area.[11]

In Spain, it was applied for the first time in Galicia[12] in relation to an endangered species, the common guillemot, as this was the most seriously affected species by the Prestige oil tanker accident.Before the oil spill, there were only two breeding colonies of this type of bird in Galicia, with an estimated population of three to five pairs. The Prestige accident affected these local colonies as well as the wintering population of guillemots from northern Europe. A total of 663 people in 12 municipalities were asked how much they would be willing to pay to recover the guillemot population. The result was that each respondent would contribute an average of EUR 24 for a recovery programme for this endangered species. This figure means that for the Galician population as a whole the recovery of the guillemot is worth EUR 21.9 million. If the guillemot could not be recovered, this figure should be paid to Galician society to compensate for the damage to the quality of the environment.[13]

While the reliability of values determined by Contingent Valuation has been the subject of debate (Pearman 2003), there is strong evidence of the existence values that people place on flagship species or habitats flagship species or habitats[14].

INDIRECT ASSESSMENT METHODS

Indirect assessment methods do not seek to estimate the value of the environmental element and there is no need for a reference to a real market.Rather, they assign a value to the effect of damage to environmental elements on other goods, based on an indirect valuation in the (alternative) market. The value is determined by looking at a market linked to that environmental asset, based on the relation between the environmental damage and any effects caused by it (e.g. human health, adverse effects on an aquatic environment, etc.).

Another indirect way to quantify this would be to determine the cost of a programme to restore the damaged resources. The parameter would not be appropriation so much as conservation. The value should be set according to the conservation costs of the affected species and ecosystems over a reasonable period of time. The question would then be: How much would it take to ensure the implementation of

11 Adeline Bas, Pascal Gastineau, Julien Hay et Harold Levrel. Méthodes d'équivalence et compensation du dommage environnemental. Revue d'économie politique 2013/1 (Vol. 123), pag127 à 157.https://www.cairn.info/revue-d-economie-politique-2013-1-page-127.htm#no88

12 Elena Ojea &Maria L. Loureiro. 2005. The economic value of the recovery of the guillemot in Galicia.

13 https://elpais.com/diario/2009/01/26/galicia/1232968690_850215.html

14 See note 102.

a conservation programme over a reasonable number of years? The answer would be a quantity that is reasonable enough to achieve a reasonable objective over a reasonable period of time, i.e. what matters is the reasonableness of the contribution made to humans through conservation of the affected species and ecosystem. This contribution could indeed be quantifiable and, moreover, with the same accuracy as that of property damage. It would be possible to assume its accuracy because it would be possible to determine the future conservation of the species over a reasonable timeframe.

It has been highlighted throughout various studies that the valuation of single or a small number of species generally produces higher values per species than the valuation of several species. For example, Boman and Bosdedt[15] valued the conservation of wolves in Sweden. The results of their estimates show that the average WTP is about EUR 100 per year. Earlier, Johnansson (1989) conducted a contingent valuation (CV) study focusing on the preservation of 300 endangered species in Sweden,and estimated the average WTP at about EUR 190 per year. Although this WTP is higher, it is not proportionally higher, as would be expected. The wolf's WTP alone represents more than 70% of the WTP for 300 endangered species.

Likewise, a study carried out by Jacobsen et al (2008) concluded that by simply naming and somehow "iconising" a few species, the results obtained could be much higher than when using a quantitative description[16].

5.5. THE VALUATION OF ENVIRONMENTAL DAMAGE IN OIL SPILLS

Some of the most dramatic cases of damage to biodiversity have been caused by oil spills with devastating effects on ecosystems and marine animals and plants.

Both at globally and within the EU and Spain, environmental liability regulations are based on the concept of strict liability, i.e. liability exists regardless of whether or not the party causing the damage was negligent. However, this liability is always very limited in practice. It is sufficient that the party causing an accident behaves "diligently" in order for him to avoid paying compensation. Consequently, although the party causing an accident should bear the cost of compensation, in practice this party never accepts unlimited liability for the damage incurred, and the State has to assume subsidiary liability, albeit also in a limited way. Even if the compensation ultimately amounts to millions, it never fully makes up for the real economic and environmental damage caused by the accident, as the disasters of the Prestige tanker and the Deepwater Horizon oil rig have shown[17].

Furthermore, international conventions on marine oil pollution limit the amount of compensation to be paid to such an extent that the amounts, which are not usually sufficient to compensate for damage to property, do not even cover the payment of compensation for damage to biodiversity.

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15 Boman M., Bostedt G. (1999) Valuing the Wolf in Sweden: Are Benefits Contingent on the Supply? In: Boman M., Brännlund R., Kriström B. (eds) Topics in Environmental Economics. Economy &Environment, vol 17. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-3544-5_9

16 Study on the Development and Marketing of Non-Market Forest Products and Services. DG AGRI, Study Contract No: 30-CE-0162979/00-21. Study Report. November 2008. https://ec.europa.eu/agriculture/sites/agriculture/files/analysis/external/forest_products/report_en.pdf

17 Aliança Mar Blava. November 2013. Civil liability and compensation scheme in Spain in the event of oil spills on oil rigs. https://alianzamarblava.org/wp-content/uploads/2013/11/131118_plataformaspetroliferasyresponsabilidadcivil.pdf

Given the recurrence of accidents having a large-scale environmental impact such as oil spills, the need to put a price on environmental damage has gradually emerged.The manifold methods used have been imposed precisely within this context, and in some cases they even have been used simultaneously[18].

In response to the 1989 **Exxon Valdez** oil tanker accident, which caused a 41-million-litre spill of crude oil off the coast of Alaska, the Contingent Valuation Method was used to quantify and assess the damage, with the state of Alaska and the US Federal Government claiming the loss of non-use or passive use values: the kilometres of affected coastline and beaches and the number of birds and mammals killed.The spill damaged approximately 2,000 kilometres of coastline, killing hundreds of thousands of seabirds and marine animals, including otters, porpoises, sea lions and various species of whales.

1,599 households across all the states were asked how much they would be willing to pay to avoid another similar accident, and how much they would be willing to receive in compensation for such a disaster. Surveys considering plausible scenarios were used to make respondents believe that their answers would be equivalent to an actual vote on a tax or some other authentic cost they would have to pay. This involved explaining the damage caused by the spill and a supposedly foolproof plan to prevent another spill, without which, respondents were told, the disaster would inevitably be repeated in 10 years' time.

The lost existence value in the Exxon Valdez oil spill was estimated to be USD 2.75 billion in the United States (Pearman 2003)[19]. In the end, however, the result of the contingent valuation study was around USD 2.8 billion. The trial did not take place, and an out-of-court settlement with Exxon resulted in a USD 1 billion fine for natural resource damages and restitution for injuries.

The **Prestige** case provides an extreme example of the difficulties faced when trying to remedy environmental damage. On 13 November 2002, an oil tanker called the Prestige, carrying 77,000 tonnes of oil, suffered an accident off the Costa da Morte, north-western Spain, and finally sank some 250 km off the coast. Its sinking caused some 63,000 tonnes of fuel oil to spill, and the resulting oil slick was one of the worst environmental disasters in the history of shipping, not only because of the amount of polluting material released, but also because of the magnitude of the area affected, stretching from northern Portugal to southwestern France.

The accident had devastating effects on the biodiversity of the affected area and on specially protected animals and plants, in particular on six species included in Annex II of the Habitat Directive (two plants and four animals), and two species of birds that are endangered in the Iberian Peninsula. The total figure is estimated to range from 150,000 to 600,000 specimens belonging to over 90 affected bird species. It is estimated that somewhere between 720 and 870 specimens of cetaceans, seals, turtles and otters may have been killed, of which sea turtles were the most severely affected species (714 specimens), and some whales may also have been affected.

The economic valuation of the damage for remediation purposes was particularly complex in relation to the affected natural resources. The Provincial Court of Corunna , in execution of the judgement (Order of 15 November 2017), set the exact amount of compensation to be paid by the civilly liable parties at precisely 30 % of the direct property damage, which was valued at EUR 279 million. Spain's Supreme Court passed a final judgement[20] amending certain aspects of the judgement by the Corunna Provincial Court but resulting in a total compensation figure of over EUR 1.5 billion. In any case, it should be borne in mind that the legal proceedings in the Prestige case never went so far as to assess the lost biodiversity or to compensate for it. Only the lost asset values were quantified for civil liability purposes.

Subsequently, another contingent valuation study was carried out in Galicia to find out how much 1,140

18 Prieto, M. & Slim, A. (2009). Évaluation des actifs environnementaux: quels prix pour quelles valeurs? Management &Avenir, 28(8), 18-36. doi:10.3917/mav.028.0018.

19 Pearman 2003

20 Spanish Supreme Court Judgment 668/2018 of 19 December 2018

people would be willing to pay in their next income tax return for an oil spill prevention programme. According to the result, with a 44% response rate, each household was willing to pay EUR 54.55 on average to avoid environmental damage caused by future oil spills.This figure was somewhat higher than the USD 30.30 (EUR 34.35 on that date) that Americans were willing to pay to prevent another Exxon Valdez in 1991.

While the reliability of values determined using Contingent Valuation has been the subject of debate (Pearman 2003), there is strong evidence of the existence values that people place on flagship species or habitats.

6. CONCLUSIONS

ONE

The civil, administrative and criminal regulations protecting fauna require established economic values of fauna species for proper enforcement. The quantity and severity of administrative penalties, and sometimes criminal penalties (as in the case of smuggling) are set according to the value of the damage. Furthermore, in order to comply with the "polluter pays" principle, it is necessary to be able to establish valuations in order to apply them to operations, judgements or rulings relating to compensation or remediation, or even compensatory measures such as those under the environmental impact laws.

TWO

In Spain there are no rules on valuations in the national basic legislation, and those existing in the Autonomous Communities are heterogeneous, inadequate and outdated in most cases, do not fulfil their function and allow for different criminal or administrative penalties for the same acts depending on the Autonomous Community in which they occur.

THREE

There is no EU-wide system of economic wildlife valuation for species protected by the EU acquis. There are some examples in a few Member States, but there is no harmonisation or similarity between them, even though the protected legal right is the same under the Nature Directives.

FOUR

It is therefore essential to economically assess the damage caused to fauna species and to do so, it is necessary to give them a value in themselves. A number of methods have been used internationally, and the best practical outcomes seem to be found in systems where valuation calculations are made on a case-by-case basis, taking into account the circumstances of the specimens in every respect, compared with systems consisting of fixed value tables or scales that are directly applicable.

FIVE

Although it was designed for the application of Environmental Liability legislation, **the Spanish MORA method** referred to in this Report **is considered the best-founded and most objective possible method, allowing for variations that can be adapted to the circumstances of each case**. For this reason, its use in the valuation of wildlife species has been suggested, both at national and EU level.

SIX

The scope of application of the proposal contained in this report for Spain (and perhaps for other EU states) **must necessarily encompass protected wild animals**, i.e. those contained in the lists of Article 56 of the Act on Natural Heritage and Biodiversity. While we are fully aware that game and unlisted wildlife species also need to be assessed, the urgency of the task means that we need a system that can be approved and implemented relatively quickly. And given the constitutional distribution of competences, sticking to "protected" fauna for the time being will ensure that the competence falls to the General State Administration.

SEVEN

The proposals made in this report need to be included in the legal systems of the Member States at the appropriate level. For the EU, it seems clear that the status should be that of a Decision, specifically a Legislative Decision, since this serves to develop or complete a pre-existing EU regulatory instrument. A Decision is a legal rule of Community law which is directly and immediately binding in its entirety on those to whom it is addressed. In Spain, the instrument should be a Royal Decree, both due to the scope and distribution of competences and to the fact that it affects different departments within the General State Administration.These aspects are detailed in the respective introductions in section 7.2. *Proposed Community Decision for the economic valuation of protected animal species*.

EIGHT

The proposal for the valuation of protected fauna put forward here is not only the result of a legal requirement, as stated in section one of these conclusions. It **is also an imperative of fairness and basic justice**. The efforts and funds that have been invested and undertaken for the conservation of species by various public and private institutions, and the growing appreciation that society today attaches to wildlife species as a valuable natural resource that needs to be preserved, deserve recognition and support.

7. PROPOSALS

7.1. TECHNICAL PROPOSAL FOR THE ECONOMIC VALUATION OF PROTECTED ANIMAL SPECIES

7.1.1. PRELIMINARY REMARKS

To correctly implement this proposal, a basic foundation of reliable data must be available, like that in the Biodiversity Inventory (INB in Spanish) used in Spain. The INB lists the plant and animal species present in Spanish territory, using a 10 x10 km grid and stating the threat level to which each species is exposed according to the classification in the International Union for Conservation of Nature's (IUCN) Red List. The soundness and quality of the data contained in the INB or similar tools shall guarantee that the system functions properly. The application of this method, which must be carried out case by case, shall also be entrusted to the agents in charge of enforcing environmental legislation (public administration experts, law enforcement agencies or officers) either directly or by using techniques for the qualification and certification of "appraisers". This, in turn, means allocating human and financial resources.

TECHNICAL PROPOSAL INDEX

7.1.2. METHOD SUMMARY

To calculate an overall valuation for each affected specimen, the following parameters must be taken into account:

- The baseline cost "C", linked to the detection of damage to wild fauna: € 300
- The weighting coefficient for the damage to the fauna (L) in accordance with the legal situation of the species (based on the NHBA in Spain or on the national classifications of other EU Member States, supplemented, nuanced or replaced, depending on the circumstances in each State, by the IUCN categories), which is applied to the baseline cost (See Table 12):
  - Critical situation: 70 times the baseline cost (e.g. €300 x 70).
  - In danger of extinction: 60 times the baseline cost.
  - Vulnerable situation: 40 times the baseline cost.
  - Near threatened: 20 times the baseline cost.
  - Least concern: 6.5 times the baseline cost.
  - Deficient data: 5 times the baseline cost.
- Weighting for endemism (E):
  - x 1 no endemism
  - x 2 endemism
- Weighting for biological determinants of the species (B):
  - x 1.1 for immature specimens or eggs
  - x 1.5 for mature specimens
- Inclusion of the cost of remediation of the damage done to the specimen, in which case the order of magnitude established by MORA (M) shall be used as reference. (see Annex III)
- Maximum weighting for other determinants (where applicable): M x 2.

Therefore, the value of each specimen shall be calculated as follows:

V (Valuation of the specimen) =
(Baseline cost × **Weighting coefficient for damage to the specimen in accordance with the degree of legal protection** × **Weighting for endemism** × **Weighting for biological determinants)** + **Cost of remediation of the damage pursuant to the ELA** (MORA)

β (Valuation of the specimen) = (C × L × E × B) + M

Or:

V (Valuation of the specimen) =
(**B**aseline cost × Weighting coefficient for damage to the specimen in accordance with the degree of protection as per the NHBA × Weighting for endemism × Weighting for biological determinants.) + Cost of remediation of the damage pursuant to the ELA (MORA) × 2

β (Valuation of the specimen) = (C × L × E × B) + (M × 2)

7.1.3. METHOD EXPLANATION

COST APPLICABLE TO DETECTION OF THE INFRINGEMENT (BASELINE COST)

The aim of this parameter is to establish the basic cost (hereinafter, the "baseline cost") to be taken into account when calculating the value of a particular specimen. This cost seeks to enable the Public Administration to recover the expenses incurred in investigating a particular crime or infringement.

It must be noted that investigations of a crime or infringement against fauna and the resulting proceedings entail coordination and cooperation expenses at both the administrative and judicial levels for a range of professionals, which may include veterinarians and other professionals linked to wild fauna, staff at rehabilitation centres, technicians in the environmental department, forestry and environmental agents, estate keepers, national law enforcement agencies, prosecutors and judges, for example.

They also entail the use of numerous techniques, time and resources such as forensic science and investigative police methods for gathering evidence, especially in cases of poaching, poisoning and illegal trapping and fishing of endangered species. Other techniques include visual inspections of the crime scene, laboratory techniques (autopsy, unconventional samples, carcass dating methods, forensic entomology, chemical families and analytical techniques), forensic psychology to analyse the forensic implications of the crime, analysis of the psychological and geographic profile, forensic ballistics, tracking of poaching and the use of specialised canine units.

Therefore, a baseline price of €300 **per affected specimen** is considered, based on the expenses arising from human rescue operations, regulated in diverse regulations on public rates and prices[21]. This is deemed to be a highly conservative estimate by analogy of the minimum expense allocated to the investigative stage of a crime or infringement of this kind, bearing in mind the number of professionals involved in establishing the causes and circumstances of the death of a wild fauna specimen.

COST DERIVING FROM LEGAL PROTECTION OF THE WILD FAUNA SPECIES

The term "protected species" is used to refer to taxa whose rarity and sensitivity require a specific level of legal protection to be taken to safeguard their existence in nature. The degree of protection afforded to a specific species is based on the priority level of conservation of these taxa when they are listed in the national and regional catalogues of endangered species in Spain.

Therefore, according to this parameter, damage done to natural heritage is calculated in line with the legal protection category in which each species is classified. It is precisely this factor which determines the severity of the unlawful conduct, leading a more or less severe penalty to be imposed.

As a matter of jurisdiction, in the case of Spain, this weighting must be in reference to the classifications in the List of Wild Species under the Special Protection Scheme (LWSSPS) and the Spanish Catalogue of Endangered Species.Other EU Member States to which this proposal applies may use their own legal categories or agree to use the categories found in the IUCN Red List, either as the sole criterion or in addition to the categories found in the law. This is precisely what is proposed in Spain's case. The Spanish National Catalogue only sets out three categories (critically endangered, endangered and vulnerable). All

21 Estimates of the costs and rates for this type of action can be found in Art. 175 of Legislative Decree 1/1994, of 29 July, which approves the consolidated text of the legal provisions in force on public rates and prices in the Autonomous Community of the Canary Islands, Art. 156 of Principality of Asturias Act 11/2014, of 29 December, on the General Budget for 2015, and Act 9/1992, of 18 December, on public rates and prices in the Autonomous Community of Cantabria

other species are listed without distinction in the LWSSPS. To further define the differences between the species contained in the list, it is proposed to complement this "legal" parameter (L) with the categories in the IUCN Red List, as shown in the Table below (Table 12).

TABLE 12. BREAKDOWN OF WEIGHTING COEFFICIENTS

IUCN CATEGORY	LEGAL CATEGORY (ROYAL DECREE 139/2011)	COEFFICIENT
Critically endangered (CR)	In critical situation (SC)	70
Endangered (EN)	In danger of extinction (E)	60
Vulnerable (VU)	Vulnerable (V)	40
Near threatened (NT)	Included in the LWSSPS, in the case of Spain	20
Least concern (LC) (o only included in the list, in the case of Spain)		6.5
Deficient data (DD)		

WHEN DEALING WITH A SPECIES IN CRITICAL SITUATION:

The specimen to be assessed is one of the group of taxa or populations facing an extremely high risk of extinction in the wild.

Given the extreme circumstances of these species, a weighting coefficient shall be applied that entails multiplying the baseline cost by 70.

This coefficient is based on an average rate of reduction in the observed or future population of 70% (70 individuals out of 100) over 10 years.

According to Annex IV of the Directorate General of Environmental Assessment and Quality Resolution of 6 March 2017, which issues the Council of Ministers Decision of 24 February 2017, approving guidance criteria for the inclusion of taxa and populations in the Spanish Catalogue of Endangered Species:

1. A reduction of ≥ 90% of the observed or estimated population in the last 10 years or three generations, whichever period is longer. This reduction rate shall be based on an evaluation that is observed (well-documented direct observations), estimated (based on mathematical calculations taken from a sample of the populations or biological variables directly related to the population size), or inferred (based on indirect evidence or variables). The decline may be based on:

a) direct observation.

b) an index of abundance appropriate to the taxon.

c) a decline in area of occupancy, extent of occurrence and/or habitat quality.

d) actual or potential levels of exploitation.

e) effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.

2. A reduction of ≥ 80% of the population projected or suspected to be reached in the next 10 years or three generations, whichever period is longer, in accordance with the biology of the species. This reduction rate shall be based on an evaluation that is projected (using models that serve to extrapolate the evaluation into the future) or future (based on the foreseeable action of a threat that is certain to happen over the next 10 years if steps are not taken to prevent it). The

decline may be based on any of the points a) to e) in paragraph 1 above.

WHEN DEALING WITH A SPECIES IN DANGER OF EXTINCTION...

The specimen to be assessed is one of the group of taxa or populations whose survival is unlikely if the factors that gave rise to their current situation continue to act.

Given the seriousness of the circumstances of these species, as an infringement with strong repercussions on the conservation of the species, a weighting coefficient shall be applied that entails multiplying the baseline cost by 60.

This coefficient is based on an average rate of reduction in the observed or future population of 60% (60 individuals out of 100) over 10 years.

According to Annex IV of the Directorate General of Environmental Assessment and Quality Resolution of 6 March 2017, which issues the Council of Ministers Decision of 24 February 2017, approving guidance criteria for the inclusion of taxa and populations in the Spanish Catalogue of Endangered Species:

1. A reduction of ≥ 70% of the population in the last 10 years or three generations, whichever period is longer. This reduction rate shall be based on an evaluation that is observed (well-documented direct observations or indexes of abundance appropriate to the taxon), estimated (based on mathematical calculations taken from a sample of the populations or biological variables directly related to the population size), or inferred (based on indirect evidence or variables).

2. A reduction of ≥ 50% of the population proven by means of adequate statistical analysis, which will be reached in the next 10 years or three generations, whichever period is longer, in accordance with the biology of the species. This reduction rate shall be based on an evaluation that is projected (using models that serve to extrapolate the evaluation into the future) or future (based on the foreseeable action of a threat that is certain to happen over the next 10 years if steps are not taken to prevent it).

WHEN DEALING WITH A VULNERABLE SPECIES...

The specimen to be assessed is one of the group of taxa or populations that run a high risk of being "in danger of extinction" in the immediate future if the adverse factors acting on them are not corrected.

As an infringement with important repercussions on the conservation of the species, since the risk of being moved into the 'In danger of extinction' category is high, two thirds of the weighting coefficient applicable to species in danger of extinction shall be applied, meaning that **the baseline cost shall be multiplied by 40**.

This coefficient is based on an average rate of reduction in the observed or future population of 40% (40 individuals out of 100) over 10 years.

According to Annex IV of the Directorate General of Environmental Assessment and Quality Resolution of 6 March 2017, which issues the Council of Ministers Decision of 24 February 2017, approving guidance criteria for the inclusion of taxa and populations in the Spanish Catalogue of Endangered Species:

A. Decline in population size. Meeting one of the following sub-criteria:

1. A reduction of ≥ 50% of the observed or estimated population in the last 10 years or three generations, whichever period is longer. This reduction rate shall be based on an evaluation that is observed (well-documented direct observations or indexes of abundance appropriate to the

taxon), estimated (based on mathematical calculations taken from a sample of the populations or biological variables directly related to the population size), or inferred (based on indirect evidence or variables).

2. A reduction of ≥ 30% of the population proven by means of adequate statistical analysis, which will be reached in the next 10 years or three generations, whichever period is longer, in accordance with the biology of the species. This reduction rate shall be based on an evaluation that is projected (using models that serve to extrapolate the evaluation into the future) or future (based on the foreseeable action of a threat that is certain to happen over the next 10 years if steps are not taken to prevent it).

WHEN DEALING WITH A NEAR THREATENED SPECIES...

The specimen to be assessed is one of the group of taxa that are close to meeting the criteria for inclusion in the Critically endangered, Endangered or Vulnerable categories, or are likely to meet them in the near future. In the case of Spain, this refers to species included in the List of Wild Species under the Special Protection Scheme as well as those classified as protected in European directives and the international conventions ratified by Spain.

As species that are close to being classified in the above categories, half of the weighting coefficient for the legal protection category immediately above it shall be applied, i.e., for species in a vulnerable situation. Thus, **the baseline cost would be multiplied by 20**.

WHEN DEALING WITH A LEAST CONCERN SPECIES...

The specimen to be assessed is one of the group of species whose typical habitat is particularly threatened, in serious decline, fragmented or very limited. This refers to species included in the Spanish List of Wild Species under the Special Protection Scheme as well as those classified as protected in European directives and the international conventions ratified by Spain.

In this case, it has been deemed reasonable to apply approximately one third of the weighting coefficient for the threat category immediately above this, i.e. for near threatened species. Thus, **the baseline cost would be multiplied by 6.5**.

WHEN THERE IS DEFICIENT DATA...

The specimen to be assessed is one of the group of species deserving special attention based on their scientific, ecological or cultural value, their uniqueness, rarity or threat level, those included in the Spanish List of Wild Species under the Special Protection Scheme, as well as those classified as protected in European directives and the international conventions ratified by Spain.

In this case,it has been deemed reasonable to apply approximately one fourth of the weighting coefficient for near threatened species. In such cases, a minimum weighting coefficient shall be applied, which would **multiply the baseline cost by 5**.

COST DERIVING FROM THE ENDEMIC NATURE OF THE AFFECTED SPECIES

The term 'endemism' is used when the distribution of a taxon is limited to a small geographic area and it is not found in nature anywhere else in the world. In this case, the penalty must be doubled to account for the uniqueness of the taxon. In such instances (in Spain) the ACs could use a different weighting in accordance with their own catalogues, where applicable.

COSTS DERIVING FROM THE BIOLOGICAL DETERMINANTS OF THE SPECIMEN

This parameter takes into account the reproductive efforts and the energy (time and resources) that a specimen devotes to reproduction under the best possible conditions. This reproductive investment provides benefits (offspring) but can also entail costs if the capacity for growth or survival is reduced. Therefore, similar to the way in which loss of profits arises in the event of financial loss, here not only the loss of the natural resource is assessed but also the loss of potential offspring from this resource, with the consequences that could arise from this in the future in terms of the survival and conservation of the species and the resulting population size of the relevant species.

Thus, the damage differs depending on the type of specimen and the specific stage of this specimen's biological and life cycle, motivated primarily by its capacity to generate offspring.

In such cases, a weighting coefficient shall be applied that takes the baseline cost and the category of legal protection of the species, as described above, multiplying them by:

- For immature specimens or eggs,multiplied by1.1.
- For mature specimens,multiplied by1.5.

TABLE 13. COEFFICIENTS APPLIED TO EACH BIOLOGICAL DETERMINANT

SPECIMEN	COEFFICIENT
Immature specimens or eggs	× 1,1
Mature specimens	× 1,5

COST DERIVING FROM THE VALUE OF REMEDIATION COSTS

This parameter is the only one using fixed values to determine the final valuation of the affected specimen under valuation in the particular case. These are the values from the Spanish MORA procedure for calculating remediation costs based on the ELA, detailed in section 5.1. *The Environmental Liability Supply Model (MORA)* and Annex III of this report. This method analyses the different actions that would need to be implemented in each of the different scenarios depending on the damage and agents causing damage to animal species.

Taking into account that MORA is linked to the Spanish Environmental Liability Act, which transposed into Spanish legislation Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage, this tool is offered to the rest of the European Union Member States for monetising the remediation costs for damage caused to protected species covered by the Directive in an objective and practical way. Otherwise, a similar method for calculating remediation costs should be put in place at EU level, offering results at the same scale, in order to aid in harmonising the basis for compensation for damage caused to wildlife species.

In order to determine the type of remediation measures to be assessed, MORA takes into account the reversibility of the affected natural asset, allowing a distinction to be made between two types of damage depending on the case:

- **Fatal damage (death)**: damage resulting in the death of the specimen. The primary measure that can be applied to this damage is the reintroduction of new specimens.
- **Partial damage (injury)**: damage that does not result in the death of the specimen and is reversible. In this case, the primary measure will be recovery of injured specimens through

health treatment.

Thus, the remediation measures in each case are as follows:

1. REPLACEMENT MEASURES (IN CASE OF FATAL DAMAGE)

This type of economic valuation is designed for specimens that are found dead or have physical and/or behavioural injuries that make them unrecoverable in the wild as a result of human action; it establishes the remediation costs for their replacement in the wild.

The replacement of affected specimens is carried out by captive breeding and release of vaccinated replacement specimens from captive breeding centres, establishing a recovery time of 24 months for mammals and 6 months for other species.

The remediation technique is considered to have limited effectiveness for endangered species due to the recovery difficulties, precisely because of their endangered status. This entails a 40% increase in the total valuation of the measure.

2. RECOVERY MEASURES (IN CASE OF PARTIAL DAMAGE)

This type of economic valuation is designed for specimens that are injured as a result of human action, and specifies the remediation costs for their release after treatment. Therefore, this section takes into account the capture, relocation and treatment of injured specimens at recovery centres, establishing a recovery time of 3 months for all species.

As in the case of fatal damage, the remediation measures are considered to have limited effectiveness for endangered species due to the recovery difficulties, precisely because of their endangered status. This entails a 40% increase in the total valuation of the measure.

WEIGHTING OF OTHER DETERMINANTS

Since the magnitude of the damage is defined by its impact on subsequent remediation efforts, in certain cases we can assume that damage remediation is undermined by certain circumstances.

Therefore, the competent authorities are allowed to reasonably determine that the valuation of replacement or recovery costs based on MORA for the relevant species could reach up to twice that sum (MORA x 2) in the case of, for example:

- Carnivorous mammals, birds of prey and turtles, on the grounds of scarcity criteria, their ecological function and because they are subject to persecution or illegal trade.
- Offences committed during the mating or breeding season.
- An alarmingly low population density in the area where the damage occurred, provided there were less than five pairs.

7.1.4. PRACTICAL APPLICATION

Preliminary note: These examples distinguish between “death” and “injury”. In the event that the injuries sustained or the circumstances in which the specimen was captured mean that the specimen is not recoverable and must be kept in captivity, the same values shall apply as in the case of death.

β (Valuation of the specimen) = (C × L × E × B + MORA)

TABLE 14. APPLICATION EXAMPLES

CANTABRIAN CAPERCAILLIE (*Tetrao urogallus* subsp. *cantabricus*)
Catalogue classification: In danger of extinction (in critical situation)
IUCN classification in Spain: EN (Endangered)
Endemic

Baseline cost	Level of protection (L)	Endemic nature (E)	Biological determinants (B)	MORA remediation cost (M)[22]	Total
MATURE SPECIMEN					
DEATH					
300	× 70	× 2	× 1,5	+ 34,198.85	97,198.85
INJURY					
300	× 70	× 2	× 1,5	+ 1,852.19	64,852.19
IMMATURE/EGGS					
DEATH					
300	× 70	× 2	× 1,1	+ 34,198.85	80,398.85
INJURY					
300	× 70	× 2	×1,1	+ 1,852.19	48,052.19

RED KITE (*Milvus milvus*)
Spanish Catalogue classification: In danger of extinction
IUCN classification in Spain: EN (Endangered)
Not endemic

Baseline cost	Level of protection (L)	Endemic nature (E)	Biological determinants (B)	MORA remediation cost (M)	Total
MATURE SPECIMEN					
DEATH					
300	× 60	× 1	× 1,5	+ 5.270,09	32.270,09
INJURY					
300	× 60	× 1	× 1,5	+ 1.852,19	28.852,19
IMMATURE/EGGS					
DEATH					
300	× 60	× 1	× 1,1	+ 5.270,09	25.070,09
INJURY					
300	× 60	× 1	× 1,1	+ 1.852,19	21.652,19

IBERIAN IMPERIAL EAGLE (*Aquila adalberti*)
Spanish Catalogue classification: In danger of extinction
IUCN classification in Spain: EN (Endangered)
Endemic

MATURE SPECIMEN

22 *Tetrao urogallus cantabricus* is not included in MORA charts. The set value for "other critically endangered birds" has been used.

DEATH					
Baseline cost	Level of protection (L)	Endemic nature (E)	Biological determinants (B)	MORA remediation cost (M)	Total
300	× 60	× 2	× 1,5	159.861,20	213.861,20
LESIÓN					
300	× 60	× 2	× 1,5	1.861,20	55.861,20
IMMATURE/EGGS					
DEATH					
300	× 60	× 2	× 1,1	159.861,20	199.461,20
INJURY					
300	× 60	× 2	× 1,1	1.861,20	41.461,20

EGYPTIAN VULTURE (*Neophron pernopterus* subsp. *pernopterus*)
Spanish Catalogue classification: Vulnerable
IUCN classification in Spain: EN (Endangered)
Not endemic

MATURE SPECIMEN					
DEATH					
Baseline cost	Level of protection (L)	Endemic nature (E)	Biological determinants (B)	MORA remediation cost (M)	Total
300	× 40	×1	× 1,5	+ 53.287	71.287
LESIÓN					
300	× 40	×1	×1,5	+ 1.852,19	19.852,19
IMMATURE/EGGS					
DEATH					
300	× 40	×1	× 1,1	+ 53.287	66.487
INJURY					
300	× 40	×1	× 1,1	+ 1852,19	15.052,19

COMMON BARN OWL (*Tyto alba* subsp. *alba*)
Spanish Catalogue classification: Included in the LWSSPS
IUCN classification in Spain: LC (Least Concern)
Not endemic

MATURE SPECIMEN					
DEATH					
Baseline cost	Level of protection (L)	Endemic nature (E)	Biological determinants (B)	MORA remediation cost (M)	Total
300	× 6,5	× 1	× 1,5	+ 1.185,77	4.110,77
INJURY					
300	× 6,5	× 1	× 1,5	+ 1.185,77	4.110,77
IMMATURE/EGGS					
DEATH					
300	× 6,5	× 1	× 1,1	+ 1.185,77	3.330,77
INJURY					
300	× 6,5	× 1	× 1,1	+ 1.185,77	3.330,77

EUROPEAN TURTLE DOVE (*T Streptopelia turtur*)[23] Not catalogued. The species is hunted in Spain[24] IUCN classification in Spain: Vulnerable (VU) Not endemic					
MATURE SPECIMEN					
DEATH					
Baseline cost	Level of protection (L)	Endemic nature (E)	Biological determinants (B)	MORA remediation cost (M)	Total
300	× 40	× 1	× 1,5	98,81	18.098,81
INJURY					
300	× 40	× 1	× 1,5	98,81	18.098,81
IMMATURE/EGGS					
DEATH					
300	× 40	× 1	× 1,1	98,81	13.298,81
INJURY					
300	× 40	× 1	× 1,1	98,81	13.298,81

23 Although the European turtle dove is currently hunted in Spain, it is included as an example of the application of the valuation method to non-protected species according to the current legislation in Spain.

24 Although we have not included game species in this report, we use the turtle dove here both as an example of the IUCN Vulnerable (VU) category and as a continuing demand for its legal protection, given the condition of its populations in Spain.

7.2. PROPOSED COMMUNITY DECISION FOR THE ECONOMIC VALUATION OF PROTECTED ANIMAL SPECIES

In order to standardise wildlife valuation criteria at EU level,the use of a Decision is proposed. A Decision is a legal rule of EU law which is directly and immediately binding in its entirety on those to whom it is addressed. A Decision may be addressed to institutions, bodies, offices, agencies and officials of the Union, to one or several of its Member States, or to individuals. If addressees are named, the Decision shall only be binding for such addressees.

A Decision is one of the three types of regulation or formal sources of law that exist in the European Union and are binding in nature, the other two being the Regulation and the Directive. Decisions and Regulations have similar effects in that they do not need to be transposed into national law, since they take effect directly. However, a Decision differs from a Regulation in that it does not necessarily have the general scope and abstraction typical of a Regulation.

A Decision takes effect upon publication in the Official Journal of the European Union; if it includes addressees (as is most often the case) it becomes binding upon notification to them.

Among the various types of Decisions, the use of a legislative Decision is deemed to be suited for this particular case. This type of Decision stems from the legislative authority of the European Parliament and the Council (ordinary legislative procedure) or from either of these institutions, which pass it strictly in the exercise of their Community legislative power, acting on a proposal from the Commission. Legal acts adopted this way constitute a legislative act of the Union.

Decision No ...of the European Parliament and of the Council of .... establishing an EU system for the valuation of wild fauna species

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 43(2) thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee,

In accordance with ordinary legislative procedure,

Whereas:

1. Directive 2008/99/EC on the protection of the environment through criminal law, Article 5 lays down that "Member States shall take the necessary measures to ensure that the offences referred to in Articles 3 and 4 are punishable by effective, proportionate and dissuasive criminal penalties".

Furthermore, Article 3 of the same Directive provides that Member States shall ensure that certain conducts constitute a criminal offence when they are unlawful and committed intentionally or at least with serious negligence. Such conducts include f) the killing, destruction, possession or taking of protected wild fauna or flora species, except for cases where the conduct concerns a negligible quantity of such specimens and has a negligible impact on the conservation status of the species; g) trading in specimens of protected wild fauna and flora species or parts or derivatives thereof, except for cases where the conduct concerns a negligible quantity of such specimens and has a negligible impact on the conservation status of the species;

Although the Member States have more or less adequately transposed the Directive, penalising

all the conducts described in the Directive and choosing criminal penalties for these conducts, the objective of meeting the three basic requirements (being effective, proportionate and dissuasive) has not been fully achieved. The margin of discretion allowed to Member States has led to significant differences in the penalties imposed and to an enormous disparity in the valuations of wildlife species that form the basis of these penalties and their remediation tools.

2. In turn, Directive 2009/147/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 November 2009 on the conservation of wild birds, Article 2, requires Member States to take all the requisite measures to maintain or adapt the populations of all species of birds at a level which corresponds in particular to ecological, scientific and cultural requirements, while taking into account economic and recreational requirements.

3. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora establishes the obligation to take measures to promote the conservation of species of fauna as a common responsibility of all Member States.

It is therefore appropriate to provide guidance on the valuation of wild fauna species, in terms of minimum amounts, by adopting a common method for all Member States and, accordingly,

HAVE ADOPTED THIS DECISION:

Article 1

A common methodology for the monetary valuation of fauna species to be used in penalty procedures of any kind relating to damage to such species is set out in the Annex to this Decision.

Article 2

This Decision shall enter into force on the third day following its publication in the Official Journal of the European Union.

It shall apply as from ...

Article 3

This Decision is addressed to the Member States.

Done at Strasbourg on ...

For the European Parliament

For the Council

Methodological ANNEX

(Inclusion of the proposal in point 6. “Technical proposal for the economic valuation of protected animal species” herein above).

ANNEX I. LIST OF REGULATIONS CITED

COMMUNITY LEGISLATION

- Directive 92/43/EC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJEC No 206 of 22 July 1992, pages 7 to 50).
- Council Regulation EC 338/97 on the implementation within the Community countries of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (OJEC No L61 of 03/03/97).
- Directive 2008/99/EC of the European Parliament and of the Council of 19 November 2008 on the protection of the environment through criminal law (OJEU No 328 of 6 December 2008, pages 28 to 37).
- Directive 2009/147/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 30 November 2009 on the conservation of wild birds (OJEU No L 020 of 26/01/2010 p. 0007 - 0025) or the Birds Directive.

STATE LEGISLATION

- Royal Decree of 24 July 1889 publishing the Civil Code ("Gaceta de Madrid" no. 206, 25/07/1889).
- Decree 506/1971, of 25 March, Official State Gazette no. 76, of 30 March - BOE" no. 76, of 30/03/1971.
- Spanish Constitution ("BOE" no. 311, of 29/12/1978).
- Resolution of the National Institute for the Conservation of Nature (hereinafter ICONA) updating the hunting valuation of game ("BOE" No 62, 14 March 1978).
- Ley Orgánica 10/1995, de 23 de noviembre, del Código Penal ("BOE" no. 281, de 24/11/1995).
- Organic Law 12/1995, of 12 December 1995, on the Repression of Smuggling ("BOE" no. 297, f 13/12/1995).
- Organic Law 12/1995, of 12 December 1995, on the Repression of Smuggling ("BOE" no. 297, of 13/12/1995).
- Law 42/2007, of 13 December, on Natural Heritage and Biodiversity ("BOE" no. 299, of 14/12/2007)
- Law 26/2007, of 23 October, on Environmental Responsibility ("BOE" no. 255, of 24/10/2007)
- Royal Decree 2090/2008 of 22 December ("BOE" no. 308, of 23 December 2008, pages 51626 to 51646)
- Royal Decree 139/2011, of 4 February 2011, for the development of the List of Wild Species under Special Protection Regime and the Spanish Catalogue of Threatened Species ("BOE" no. 46, of 23 February 2011).
- Law 21/2013, of 9 December, on environmental assessment ("BOE" no. 296, of 11/12/2013).
- Law 11/2014 of 3 July 2014, amending Law 26/2007 of 23 October 2007 on Environmental Liability ("BOE" no. 162, of 4 July 2014, pages 52139 to 52148).
- Decree 183/2015, of 13 March, amending the Regulations for the partial development of Law 26/2007, of 23 October, on Environmental Liability, approved by Royal Decree 2090/2008, of

22 December ("BOE" no. 83, of 7 April 2015, pages 29407 to 29446).

- Law 33/2015, of 21 September, amending Law 42/2007, of 13 December, on Natural Heritage and Biodiversity ("BOE" no. 227, of 22 September 2015, pages 83588 to 83632).
- Resolution of 6 March 2017, of the Directorate General for Environmental Quality and Assessment and the Natural Environment ("BOE" no. 65, of 17 March 2017, pages 19743 to 19756).
- Ministerial Order TEC/596/2019, of 8 April, amending the annex to Royal Decree 139/2011, of 4 February, for the development of the List of Wild Species under Special Protection Regime and the Spanish Catalogue of Threatened Species ("BOE" no. 134, of 5 June 2019, pages 58611 to 58615).
- Order TEC/596/2019, of 8 April, amending the Annex to Royal Decree 139/2011, of 4 April, amending the Annex to Royal Decree 139/2011, of 4 April.
- Royal Decree 139/2011, of 4 February, for the development of the List of Wild Species under Special Protection Regime and the Spanish Catalogue of Threatened Species (BOE no. 134, of 5 June 2019, pages 58611 to 58615).

AUTONOMOUS COMMUNITY REGULATIONS

- Order of 6 September 1985 of the Consejería de Agricultura, Ganadería y Montes by which the valuations of hunting and protected species in the territory of Castilla y León are updated (BOCL No. 73 / 1985 of 17-09-1985).
- Order of 17 March 1987, of the Department of Agriculture and Fisheries, updating the valuations of protected and non-protected species of fauna in the Valencian Community (DOGV No. 564 of 09.04.1987).
- Order of 14 July 1987, of the Regional Ministry of Agriculture and Livestock, establishing the hunting valuation of game and protected species of wild fauna in the territory of the Community of Madrid (BOCM 25 July 1987).
- Orden Foral 798/1987, of 19 August 1987 (BOLETÍN OFICIAL de Gipuzkoa nº 161, of 26 August 1987).
- Order of 14 September 1988, updating the values of hunting and protected species in the territory of the Autonomous Community of the Canary Islands (BOC No. 122. 26 September 1988 - 2561).
- Order of 4 October 1988, on scales for the valuation of species of wild fauna in the Autonomous Community of the Region of Murcia (BORM no. 246 of 26-10-1988).
- Order of the Regional Ministry of Agriculture and Fisheries of 10 December 1988 providing for the extension of the compensation scale for infringement of the Hunting Law (BOCAIB No. 11, 26-01-1989).
- Asturias Law 2/1989, of 6 June 1989, on hunting (BOPA No 140, of 17 June 1989);
- Decree 32/1990, of 8 March 1990, creating the Regional Catalogue of Endangered Species of the Vertebrate Fauna of the Principality of Asturias (BOPA No 75, 30-03-1990).
- Law 2/1991, of 14 February 1991, for the protection and regulation of wild fauna and flora in the Community of Madrid (BOE No. 102, of 29 April 1991, pages 13535 to 13539).
- Order of 8 October 1991 on the valuation scale for species of native fauna in Catalonia (DOGC No. 2938 - 26.7.1999).
- Law 2/1991 of 14 February 1991 on the Protection and Regulation of Wild Fauna and Flora of the Community of Madrid (BOE No. 102 of 29 April 1991, pages 13535 to 13539).

- Regional Order 107/1993, of 5 May 1993, of the Regional Minister for Regional Planning and the Environment, establishing the scale for the valuation of species of wild fauna (BON No. 34 - 19/03/1993).
- Ley Foral 2/1993, de 5 de marzo, de protección y gestión de la fauna silvestre y sus hábitats (BON núm. 34 de 19 de marzo de 1993).
- Law 16/1994, of 30 June 1994, on Nature Conservation in the Basque Country (BOPV no. 142 of 27 July 1994).
- Regional Order of 16 February 1995, updating and fixing, for the purposes of penalties and compensation, the value of the different species of wild fauna.
- Law 7/1995, 21 April 1995, on wild fauna of the Region of Murcia (BORM no. 102, 4 May 1995).
- Law 9/1998, 2 July 1998, on hunting in La Rioja (BOR No. 80, 4 July 1998).
- Law 7/1998 of 6 July 1998 on hunting in the Canary Islands (BOE No. 182 of 31 July 1998).
- Law 9/1999, of 26 May 1999, on Nature Conservation in Madrid (DOCM No. 40 of 12 June 1999).
- Decree 284/2001 of 11 October 2001, approving the Galician Hunting Regulations (DOG No. 214 of 6 November 2001).
- Law 8/2003, of 28 October, on the flora and wild fauna of Andalusia (BOJA No 218 of 12/11/2003);
- Decree 42/2003 of 7 April 2003 approving the Regulation of Law 7/1998 of 6 July 1998.
- Law 7/1998 of 6 July 1998 (BOIC No. 81 of 29 April 2003).
- Order 9/2003 of 4 February 2003 establishing the Regional Guidelines for the Management and Sustainable Use of Hunting Resources in Cantabria. (BOC No. 33 of 18 February 2003).
- Law 7/2003, of 12 November, on hunting and river fishing in the Region of Murcia (BORM No. 284 of 10 December 2003);
- Ley 13/2004, de 27 de diciembre, de caza de la Comunitat Valenciana (DOGV No. 4913, de 29 de diciembre de 2004).
- Decree 32/2004, of 27 February 2004, of the Consell de la Generalitat, which creates and regulates the Valencian Catalogue of Threatened Fauna Species and establishes categories and rules for their protection (DOGV - No. 4.705 of 4 March 2004).
- Decree 17/2004 of 27 February 2004 approving the Hunting Regulations of La Rioja (BOLR No. 33 of 11 March 2004).
- Order of 1 June 2004, establishing the hunting seasons for the 2004/2005 season and other special regulations for the conservation of wild fauna in the Autonomous Community of Extremadura.
- Ley Foral 17/2005, de 22 de diciembre, de caza y pesca de Navarra (BON No. 155 - 28 December 2005).
- Ley 6/2006 de 12 de abril, de caza y pesca fluvial de Baleares (BOIB No 61, de 27 de abril de 2006).
- Law of Cantabria 12/2006, of 17 July, on hunting (BOC No. 148 of 02 August 2006).
- Law 4/2006 of 25 May 2006 amending Law 4/1996 of 12 July 1996 regulating hunting in the Autonomous Community of Castilla y León (BOCL No. 140 of 22 July 1996);
- Decree 67/2008, of 13 May 2008, establishing the valuation of endangered wildlife species (DOCM No. 101 of 16 May 2008).
- Legislative Decree 2/2008, of 15 April 2008, approving the revised text of the Animal Protection Act (DOGC no. 5113, of 17 April 2008, pages 29665 to 29697).
- Legislative Decree 2/2008, of 15 April 2008, approving the revised text of the Animal Protection Act (DOGC No. 5113, of 17 April 2008, pages 29665 to 29697).
- Law 7/2009, of 22 October 2009, amending Articles 7 and 10 of Law 13/2004, of 27 December

2004, on hunting in the Valencian Community (BOE No. 281, of 21 November 2009, pages 98634 to 98636).

- Law 14/2010, of 9 December, on hunting in Extremadura (BOE No. 239 of 15 December 2010).
- Law 2/2011, of 17 March, on Hunting in the Basque Country (BOPV No. 61, of 29 March 2011).
- Law 2/2011, of 17 March, on hunting ("BOPV" No. 61, of 29 March 2011).
- Order 25/2012, of 19 December, of the Regional Ministry of Infrastructure, Territory and the Environment, for the valuation of species of fauna in the Valencian Community (DOGV no. 6932 of 28.12.2012).
- Decree 23/2012, of 14 February, regulating the conservation and sustainable use of wild flora and fauna and their habitats (BOJA number 60 of 27/03/2012).
- Decree 23/2012 regulating the conservation and sustainable use of wild flora and fauna and their habitats (BOJA number 60 of 27/03/2012).
- Law 3/2013, of 17 July, amending Law 6/2006, of 12 April, on hunting and river fishing in the Balearic Islands, and amended by Law 6/2007, of 27 December, on tax and economic-administrative measures (BOCAIB no. 106 of 30/07/2013).
- Law 13/2013 of 23 December 2013 on hunting in Galicia ("DOG" No 4 of 8 January 2014).
- Galician Law 13/2013, of 23 December, on hunting (DOG No. 4, of 8 January 2014).
- Legislative Decree 1/2014, of 15 April, approving the revised text of the Basque Country Nature Conservation Law ("BOPV" No. 92, of 19 May 2014).
- Order GAN/31/2014, of 12 May, approving the Action Plan for the eradication of the illegal use of poisoned bait in the natural environment of Cantabria (BOC no. 101 of 28 May 2014).
- Law 4/2015, of 24 March, on the Natural Heritage of Castilla y León (BOCL no. 61, of 30/03/2015, "BOE" no. 91, of 16/04/2015).
- Law 1/2015, of 12 March, on Hunting in Aragon (BOA No. 58, of 25/03/2015).
- Law 3/2015, of 5 March, on hunting in Castilla-La Mancha (BOE No. 148, of 22 June 2015, pages 51700 to 51767).
- Decree 34/2016 of 15 March 2016 approving the Regulations governing the exercise of hunting, planning and hunting management (DOE No. 55 of 21 March 2016).
- Decree 126/2017, of 25 July, approving the Regulation of Hunting Management in Andalusia;
- Decree 10/2018 of 26 April, amending Decree 32/2015, of 30 April, regulating the conservation of hunting species in Castilla y León, their sustainable use and the population control of wild fauna. (BOCL No. 82 of 30 April 2018).
- Decree 25/2020, of 10 June, establishing the valuations of wild fauna species not subject to hunting or fish farming in the territory of the Autonomous Community of La Rioja.

REGULATIONS OF OTHER EU MEMBER STATES

- Croatian ordinance on the amount of compensation for damage caused by illegal action on protected animal species (OG 84/1996)
- Finnish Nature Conservation Act (1096/1996) of 20 December 1996.
- Decree 13/2001 of the Hungarian Ministry of Environment on protected and specially protected species of flora and fauna.
- Decree 9/2002 of the Ministry of the Environment of Finland on minimum values for endangered animals and plants.

- Regulation 52/08 of Montenegro on the price list for compensation of damages caused by natural and legal persons in the hunting area by illegal hunting or any other illegal methods.
- Croatian Law on Nature Conservation of June 2013.
- Montenegrin Grand-Ducal Regulation of 1 August 2018 establishing a digital system of evaluation and compensation of ecological points.
- Montenegrin Law of 18 July 2018 on the protection of nature and natural resources.

ANNEX II. LIST OF CASE LAW CITED

- Judgement of the Suprem Court of 23 September 1988 (RJ1988/6853).
- Judgement of the Suprem Court (Criminal Chamber, 1st Section), N. 3.851/1900 of 30 November 1990.
- Judgement of the Suprem Court (Criminal Chamber, 1st Section), N. 1.104/1993 of 1 April 1993.
- Suprem Court Judgement (Civil Division, 1st Section) N. 497/93 of 24 May 1993.
- Judgment of the Swedish Supreme Court (NJA 1995, s. 249).
- Judgment of the Criminal Court N. 6 of Palma de Mallorca N. 244/2011 of 9 June 2011.
- Judgment of the Criminal Court N. 3 of Murcia No 455/2011 of 7 December 2011.
- Judgement of the Criminal Court N. 3 of Vilanova I La Geltrú N. 256/10 of 5 March 2012.
- Judgment of Criminal Court No. 5 of Zaragoza, N. 397/2011 of 24 September 2012.
- Judgement of the Criminal Court N. 5 of Zaragoza 275/2012 of 24 September 2012.
- Judgment of the Provincial Court (Section 1) of Zaragoza N. 93/13 of 22 March 2013.
- Judgement of the Criminal Court 1 of Don Benito N. 141/13 of 17 June 2013.
- Judgment of the Provincial Court (Section 2) of Jaén N. 150/2013 of 6 June 2013.
- Judgment of the Criminal Court 4 of Pamplona N. 206/2013, of 19 July 2013.
- Order of the Criminal Court N. 2 of Valdepeñas (Ciudad Real) P.A.29/13-G of 24 April 2014.
- Judgment of the Provincial Court (3rd Section) of Valencia N. 441/2014 of 27 June 2014.
- Judgment of the Criminal Court No. 3 of Santander, N. 145/2015 of 8 June 2015.
- Judgment of Criminal Court number 1 of Ciudad Real, N. 23/15 of 4 May 2016.
- Judgement of the Criminal Court of Teruel, N. 69/17 of 16 June 2017. 69/17 of 16 June 2017.
- Judgement of the Criminal Court no. 2 of Pamplona/Iruña, N. 126/2019 of 30 April 2019.
- Judgment of Criminal Court no. 26 of Barcelona No 206/2019 of 22 May 2019.
- Judgment of the High Court of Justice of Castilla y León (Administrative Chamber) No 1458/2019 of 12 December 2019.

ANNEX III. METHODOLOGY FOR CALCULATING DAMAGE TO SPECIES OF THE ENVIRONMENTAL LIABILITY OFFERING MODEL[1]

1. SUMMARY OF ORIGINAL INFORMATION

The database used to establish the list of species in MORA2010 was the National Biodiversity Inventory (hereinafter, INB) updated to 2007. From this list, all species were taken into account, except for the groups of flora (as they are not subject to valuation at this point) and invertebrates (as the lack of information on replacement costs makes their inclusion in the valuation unfeasible). In this way, a basic list was obtained consisting of 637 species from the following groups: birds, mammals, reptiles, amphibians and inland fish.

The replacement cost of the animal species is a function of the agent that has caused the environmental damage, as it is proposed to apply different techniques for each combination of agent causing the damage and natural resource affected.

Furthermore, depending on the type of damage caused to the animal, a distinction is made:

- Fatal damage (death): will be that which results in the death or demise of the individual. The primary measure applicable to such damage is the reintroduction of new individuals.
- Partial damage (injury): partial damage is considered to be damage that does not result in the death of the individual and is reversible. In this case, the primary measure is the recovery of the damaged individuals through sanitary treatment.

Specifically, in the area of MORA:

TABLE 1. TECHNIQUES FOR REPAIRING DAMAGE TO ANIMAL SPECIES. SOURCE: OWN ELABORATION.

DAMAGING AGENT		DEATH	INJURY
CHEMICAL		Captive breeding and release of replacement individuals	Collection, transport and treatment in a recovery centre
PHYSICAL	Extraction	Captive breeding and release of replacement individuals	
	Temperature	Captive breeding and release of replacement individuals	Collection, transport and treatment in a recovery centre
FIRE		Captive breeding and release of replacement individuals	Collection, transport and treatment in a recovery centre
BIOLOGICAL	MGO	Capture of GMOs and restocking with captive-bred individuals	
	Alien species	Capture of invasive alien animals by monitoring and population control teams and release of captive-bred individuals.	
	Viruses and bacteria	Captive breeding and release of vaccinated replacement individuals	

1 The content of this annex is extracted from the Report on the identification and analysis of updates to the MORA database, approved by the Technical Commission for the Prevention and Repair of Environmental Damage of the Spanish Ministry for Ecological Transition and Demographic Challenge (2019).

Therefore, the repair techniques applied on wild species are as follows:

A. CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS

The cost of applying this technique was estimated from the following sources:

- Working group for the calculation of the replacement value.
- Order of 29 June 2000, establishing the hunting seasons during the 2000/2001 season and other special regulations for the conservation of wild fauna in the Autonomous Community of Extremadura.
- North Carolina Office of Administrative Hearings (15A NCAC 10B .0117 Replacement costs of wildlife resources).
- North Carolina Office of Administrative Hearings (15A NCAC 10C .0215 Replacement costs of wildlife resources - fish).
- Websites Market prices: Picoaviento, Reptilica, anima lots.
- Replacement costs of birds and mammals. Gardncr Brown, Jr. University of Washington.Seattle, WA 98 195.
- Production on game farms and fish farms for restocking, 2006. MARM.
- Table of unit prices for forestry, 2004.

Based on the different sources, those species for which data was available were assigned the replacement cost reported in the sources. If more than one replacement cost was available for the same species, following a conservative criterion, the highest cost was chosen.

In this way, the specific replacement cost was determined for 87 species of fauna. For the remaining species of fauna included in the GNI - 550 animal species - homogeneous groups were drawn up and given an average cost calculated using the species in this group that did have specific replacement costs for individuals.

B. COLLECTION, TRANSFER AND TREATMENT AT A RECOVERY CENTRE

The cost of applying this technique was estimated on the basis of the following sources:

- Working group for the calculation of the replacement value (data provided by the Junta de Andalucía).
- Order of 29 June 2000, establishing the hunting seasons for the 2000/2001 season and other special regulations for the conservation of wild fauna in the Autonomous Community of Extremadura.
- North Carolina Office of Administrative Hearings (15A NCAC 10B .0117 Replacement costs of wildlife resources).
- North Carolina Office of Administrative Hearings (15A NCAC 10C .0215 Replacement costs of wildlife resources - fish).
- Websites Market prices: Picoaviento, Reptilica, animalots.
- Replacement costs of birds and mammals. Gardncr Brown, Jr. University of Washington.Seattle, WA 98 195.
- Production on game farms and fish farms for restocking, 2006. MARM.
- Table of unit prices for forestry, 2004.

The main source used in MORA2010 was data provided by the Junta de Andalucía, which differentiates between two types of technique costs: one for the treatment of endangered species and one for non-endangered species, as shown in Table 2.

TABLE 2. COSTS OF THE TECHNIQUE "COLLECTION, TRANSFER AND TREATMENT IN A RECOVERY CENTRE". SOURCE: PREPARED BY THE AUTHORS BASED ON DATA FROM THE JUNTA DE ANDALUCÍA.

TYPE SPECIES	BASE COST (€2010)	PEC COST (€2010)	SOURCE
THREATENED	1.260,82	1.630,40	Junta de Andalucía
NOT THREATENED	252,16	326,07	Junta de Andalucía

In the event that the cost of restocking the species by captive breeding and release of replacement individuals was lower than the cost of treatment in a recovery centre, it was decided to apply the cost of restocking the species rather than the cost of recovery.

C. CAPTURE OF GENETICALLY MODIFIED ORGANISMS (GMOS) AND REPLACEMENT WITH CAPTIVE-BRED INDIVIDUALS, AND CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS

With regard to techniques to repair damage to animal species caused by GMOs or invasive alien species, viruses and bacteria, it is worth noting that their costs are based on the costs of captive breeding and release of replacement individuals. However, they have certain particularities.

Damage caused by GMOs would be repaired by the technique "Capture of GMOs and replacement with captive-bred individuals". It can therefore be broken down into two distinct tasks: on the one hand, the capture of the GMOs causing the damage and, on the other hand, the introduction of individuals from captive breeding or from other sources where their extraction and transfer does not represent environmental damage. In the same sense, the damage caused by invasive alien species would be repaired through the technique "Capture of invasive alien animals by means of monitoring and population control equipment and release of captive-bred individuals", which can be divided into the capture of the alien animals and the subsequent release of replacement individuals. Based on this approach, the equation applied to calculate the value of the damage caused to each species is as follows:

$$\text{Cost}(€) = [\text{Bred\_cost}(€/\text{indiv}) \times \text{indiv}] + \text{Capture\_cost}(€)$$

Where:

- Cost (€), is the cost of repairing a certain number of individuals belonging to one of the species differentiated in MORA.
- Bred_cost (€/indiv), is the unit cost of introducing a replacement individual.
- Indiv, is the number of affected individuals of a given species.
- Capture_cost (€), is the estimated cost for the capture of GMOs or alien species that have been released.

The costs of "captive breeding and release of each species" have been analysed in the preceding paragraphs, so the calculation made to determine the capture costs is detailed below.

Firstly, it is worth noting that MORA assumes that the species causing the damage would be similar to the species affected by the damage. In other words, by way of example, damage to a wild fish is considered to be caused by another fish, but of the GMO or invasive alien species type. This is therefore a simplification of the valuation model, which is nevertheless considered acceptable given MORA's objective of estimating the order of magnitude of remediation.

The capture tasks were designed on the basis of the Tragsa 2007 Tariffs. Specifically, they were constructed based on the costs shown in Table 3.

TABLE 3. BASE CATCH COSTS ADOPTED IN MORA2010, EXPRESSED IN 2007 EUROS. SOURCE: PREPARED BY THE AUTHORS BASED ON TRAGSA TARIFFS 2007.

ITEM	UNIT	PRICE (€2007)	DAYS	TOTAL BASE COST (€2007)
MAMMAL CONTROL				
Basic equipment for non-mountain ungulate control	day	281,11	30	8.433,30
Basic equipment for high mountain ungulate control	day	214,45	30	6.433,50
Media	day	247,78	30	7.433,40
Ungulate control animal collection	day	485,88	30	14.576,40
Total basic cost of ungulate control	day	**733,66**	**30**	**22.009,80**
BIRD CONTROL				
Basic equipment for bird population control	day	**467,27**	**30**	**14.018,10**
CONTROL OF OTHER SPECIES				
Basic mobile equipment control, maintenance, daytime observation	day	**304,45**	**30**	**9.133,50**

Table 3 shows that in MORA 3 trapping tasks were designed: one aimed at the trapping of mammals (assimilated to the costs of controlling ungulate populations foreseen in the Tragsa Tariffs), another aimed at the trapping or control of birds and, finally, one aimed at the control of other animal species. Given that in the Tragsa Tariffs the unit costs are expressed in euros per day, it was necessary to establish a duration for the capture campaign (both for GMOs and invasive alien species). In this sense, a value of 30 days was chosen, assuming that if the duration of the capture were to be extended over time, there would be a significant risk that the introduced individuals would disperse in the environment and that the damage could even, in the extreme, be classified as irreversible.

A noteworthy aspect of the calculations made in MORA2010 is that for the control of mammals, the average value of the costs of the teams working in non-high mountain and high mountain areas was adopted, constituting a decision that it would be appropriate to modify in MORA2019 by adopting the maximum value following a conservative criterion.

Table 4 shows the data updated to January 2010 using the coefficient of variation of the CPI published by the INE for the period from June 2007 to January 2010 (1.035).

TABLE 4. BASELINE CATCH COSTS ADOPTED IN MORA2010 EXPRESSED IN 2010 EUROS. SOURCE: PREPARED BY THE AUTHORS BASED ON TRAGSA TARIFFS 2007.

ITEM	UNIT	PRICE (€2010)	DAYS	TOTAL BASE COST (€2010)
MAMMAL CONTROL				
Basic equipment for non-mountain ungulate control	day	291,03	30	8.730,90
Basic equipment for high mountain ungulate control	day	222,02	30	6.660,60
Media	day	256,53	30	7.695,90
Ungulate control animal collection	day	503,03	30	15.090,90
Total basic cost of ungulate control	day	**759,56**	**30**	**22.786,80**
BIRD CONTROL				
Basic equipment for bird population control	day	**483,76**	**30**	**14.512,80**
CONTROL OF OTHER SPECIES				
Basic mobile equipment control, maintenance, daytime observation	day	**315,2**	**30**	**9.456,00**

D. CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS.

The repair of damage caused by viruses and bacteria to animal species would be carried out by the technique "Captive breeding and release of vaccinated replacement individuals". Therefore, the technique can be divided into the application of a vaccine to each individual and its subsequent release into the wild, and its cost can be expressed as follows:

$$\text{Cost}(€) = [\text{Bred\_cost}(€/\text{indiv}) + \text{Vaccine\_cost}\ (€/\text{indiv})] \times \text{indiv}$$

Where:

- Cost (€), is the cost of repairing a certain number of individuals belonging to one of the species differentiated in MORA.
- Breed_cost (€/indiv), is the unit cost of introducing a replacement individual.
- Vaccine_cost (€/indiv), is the estimated cost for the vaccination of each individual.
- Indiv, is the number of affected individuals of a given species.

As indicated above, the costs of "captive breeding and release" for each species are given in the preceding paragraphs. On the other hand, vaccination costs in MORA2010 were taken from VALLADARES, A. Coor. (2004). Specifically, the price of "Vaccine for rabbits" was taken as a reference, estimated at €0.60/individual. This cost was transferred to January 2010 units using the corresponding CPI variation coefficient between June 2004 and January 2010 (1.135), resulting in an updated value expressed at base cost level of €0.68/individual.

2. INFORMATION CURRENTLY IDENTIFIED

A. DETERMINATION OF THE LIST OF ANIMAL SPECIES

The first step in updating the data on animal species was to establish the list of species to be considered in MORA2019. As indicated in the previous section, in MORA2010 the source of data on species richness in the territory was the INB (2007), which has now been replaced by the Spanish Inventory of Terrestrial Species (hereinafter, IEET) of 2013. In order to establish the definitive list, both registers have been compared, eliminating flora species (both vascular and non-vascular) -since they are not the object of valuation at this point-, invasive alien species and invertebrates, which due to their high number (734 species) and lack of information on replacement costs, make their inclusion in the valuation unmanageable.

This results in a list of 614 species, distributed as follows:

- 35 species of amphibians.
- 319 species of birds.
- 100 species of mammals.
- 65 species of inland fish.
- 95 species of reptiles.

B. UPDATE ON THE COSTS OF ANIMAL RECOVERY TECHNIQUES

In order to update the costs of animal species recovery techniques, the different techniques listed in Table 5 have been analysed.

TABLE 5. TECHNIQUES FOR REPAIRING DAMAGE TO ANIMAL SPECIES.

DAMAGING AGENT			DEATH	INJURY
	CHEMICAL		Captive breeding and release of replacement individuals	Collection, transport and treatment in a recovery centre
	PHYSICAL	Extraction	Captive breeding and release of replacement individuals	
		Temperature	Captive breeding and release of replacement individuals	Collection, transport and treatment in a recovery centre
	FIRE		Captive breeding and release of replacement individuals	Collection, transport and treatment in a recovery centre
		MGO	Capture of GMOs and restocking with captive-bred individuals	
	BIOLOGICAL	Alien species	Capture of invasive alien animals by monitoring and population control teams and release of captive-bred individuals.	
		Viruses and bacteria	Captive breeding and release of vaccinated replacement individuals	

Specifically, the first phase has been the search for new information to update and improve the costs of the techniques of "Captive breeding and release of replacement individuals" for lethal damage to the different species, since the sources of information used in MORA2010 were mostly from foreign articles or market prices of specific shops as stated in section 1. In addition to this, the specific cost of the recovery technique was only available for 87 species out of the more than 600 identified in the GNI, with the rest of the species

being considered within large groups and the associated costs calculated using averages.

Through this search for new sources of information, a Draft Decree of the Autonomous Community of the Basque Country has been found, establishing estimated values for specimens of wild fauna, the purpose of which is to provide an estimated value for specimens of wild fauna to serve as a reference in the calculation of the replacement value in hunting and fishing sanctioning procedures. Annexes I (hunting species) and II (non-game species) set out the value attributed to the species for the purposes of establishing the relevant replacement value. These annexes provide values for a total of 427 species of fauna. However, it is important to point out that the aforementioned project is a text which, at the date of this report, has not been included in any regulation, and that it is up to the provincial councils of the Basque Country to give it regulatory status.

Thanks to the existence of this document, the sources of information to be used to assign costs to the technique of captive breeding and release of replacement individuals for the different species have been refined, and the following have finally been maintained:

- Working group for the calculation of the replacement value.
- Order of 29 June 2000, establishing the hunting seasons during the 2000/2001 season and other special regulations for the conservation of wild fauna in the Autonomous Community of Extremadura.
- Draft Decree .../...., of ... of ... of ... of 2017, establishing estimated values for specimens of wild fauna.

The process of assigning replacement costs to each species has been carried out by comparing the existence of replacement costs for each of the species included in the SRES -614 species- in the different sources of information. In the event of the replacement cost being included in more than one source for the same species, the highest of the values was chosen following a conservative criterion. Thus, the cost of captive breeding and release of replacement individuals has been specifically budgeted for a total of 376 of the 614 species included in the IEET, distributed as follows:

- 16 species of amphibians.
- 240 species of birds.
- 77 species of mammals.
- 16 species of inland fish.
- 27 species of reptiles.

In order to assign a cost of the recovery technique to the rest of the species, average replacement costs have been calculated for certain homogeneous groups according to the type of species and their category of threat, resulting in the following techniques:

- Captive breeding and release of other critically endangered amphibians.
- Captive-breeding and release of other endangered amphibians.
- Captive breeding and release of other vulnerable amphibians.
- Captive breeding and release of other non-endangered amphibians.
- Captive breeding and release of other critically endangered birds.
- Captive breeding and release of other endangered birds.
- Captive breeding and release of other vulnerable birds.
- Captive-breeding and release of other non-threatened birds.
- Captive breeding and release of other critically endangered mammals.
- Captive-breeding and release of other endangered mammals.

- Captive breeding and release of other vulnerable mammals.
- Captive breeding and release of other non-threatened mammals.
- Captive breeding and release of other critically endangered inland fishes.
- Captive breeding and release of other endangered inland fishes.
- Captive breeding and release of other vulnerable inland fishes.
- Captive breeding and release of other non-endangered inland fishes.
- Captive breeding and release of other critically endangered reptiles.
- Captive breeding and release of other endangered reptiles.
- Captive breeding and release of other vulnerable reptiles.
- Captive breeding and release of other non-endangered reptiles.

The cost assigned to each of the techniques, as previously mentioned, is based on the average cost calculated for each of the differentiated homogeneous groups. In addition to this, the following decisions have been made:

1. In the case of not having costs for any of the groups, the average cost of the most similar group has been assigned.
2. In case the average cost obtained for a lower threat category is higher than that of the higher threat category, this cost has been assigned to both categories. That is, if the average replacement cost of vulnerable birds is higher than that of endangered birds, the replacement cost of vulnerable birds has been assigned to both categories: vulnerable and endangered.

With regard to the technique "Collection, transfer and treatment in a recovery centre", for those damages that cause injuries to fauna, no new sources of information on costs of treatment of animal species in a recovery centre have been located, so the source used in MORA2010 has been maintained - data provided by the Andalusian Regional Government - which differentiates between two types of costs of the technique: one for the treatment of endangered species and another for non-endangered species. These costs have been updated using the CPI from January 2010 to January 2019. In the event that the cost of replacing the species -breeding in captivity and release of replacement individuals- is lower than the cost of treatment in a recovery centre, the cost of replacing the species is applied instead of the cost of its recovery. These costs are shown in Table 6.

TABLE 6. COST UPDATE OF THE TECHNIQUE "COLLECTION, TRANSFER AND TREATMENT IN A RECOVERY CENTRE". SOURCE: OWN ELABORATION BASED ON DATA FROM THE JUNTA DE ANDALUCÍA.

TYPE SPECIES	BASE COST (€2010)	PEC COST (€2010)	BASE COST (€2019)	PEC COST (€2019)	SOURCE
THREATENED	1.260,82	1.630,40	1.405,81	1.852,19	Junta de Andalucía
NOT THREATENED	252,16	326,07	281,16	370,43	Junta de Andalucía

With regard to techniques for the capture of GMOs or invasive alien species, the Tragsa 2018 Tariffs have now been published, so it is appropriate to update the prices based on this new source of information. Specifically, Table 7 shows the costs for each of the items considered in MORA expressed at base cost level and in 2018 euros.

TABLE 7. BASE CATCH COSTS ADOPTED IN MORA, INCLUDED IN TRAGSA TARIFFS 2018, EXPRESSED IN EUROS FOR THE YEAR 2018. SOURCE: PREPARED BY THE AUTHORS BASED ON TRAGSA TARIFFS 2018.

ITEM	UNIT	PRICE (€2018)	DAYS	TOTAL BASE COST (€2018)
MAMMAL CONTROL				
Basic equipment for ungulate control in a light vehicle T.T. not in the mountains	day	171,60	30	5.148,00
Basic equipment for high mountain ungulate control	day	128,96	30	3.868,80
Media	day	171,60		
Animal collection in vehicle T.T ungulates control	day	424,56	30	12.736,80
Total basic cost of ungulate control	day	**596,16**	**30**	**17.884,80**
BIRD CONTROL				
Basic equipment in vehicle T.T bird population control	day	**171,60**	**30**	**5.148,00**
CONTROL OF OTHER SPECIES				
Mobile basic equipment in vehicle T.T control, maintenance, daytime observation	day	**188,38**	**30**	**5.651,40**

On the other hand, Table 8 shows the costs updated to January 2019 using the CPI update coefficient provided by the INE for the period June 2018 to January 2019, which is equal to 0.987.

TABLE 8. BASE CATCH COSTS ADOPTED IN MORA, INCLUDED IN TRAGSA TARIFFS 2018, EXPRESSED IN 2019 EUROS. SOURCE: PREPARED BY THE AUTHORS BASED ON TRAGSA TARIFFS 2018.

ITEM	UNIT	PRICE (€2019)	DAYS	TOTAL BASE COST (€2019)
MAMMAL CONTROL				
Basic equipment for ungulate control in a light vehicle T.T. not in the mountains	day	169,37	30	5.081,08
Basic equipment for high mountain ungulate control	day	127,28	30	3.818,51
Media	day	169,37	30	5.081,08
Animal collection in vehicle T.T ungulates control	day	419,04	30	12.571,22
Total basic cost of ungulate control	day	**588,41**	**30**	**17.652,30**
BIRD CONTROL				
Basic equipment in vehicle T.T bird population control	day	**169,37**	**30**	**5.081,08**
CONTROL OF OTHER SPECIES				
Mobile basic equipment in vehicle T.T control, maintenance, daytime observation	day	**185,93**	**30**	**5.577,93**

Finally, Table 9 provides the data to be entered in MORA expressed at the PEC level using the MORA2019 conversion factor (1.31752278).

TABLE 9. CATCH COSTS OF ANIMAL SPECIES AT SGP LEVEL PROPOSED FOR MORA2019. SOURCE: PREPARED BY THE AUTHORS BASED ON TRAGSA TARIFFS 2018.

ITEM	BASIC COST (€2019)	PEC (€2019)
CAPTURE OF MAMMALS	17.652,30	**23.257**
TRAPPING OF BIRDS	5.081,08	**6.694**
CATCH OF OTHER SPECIES	5.577,93	**7.349**

On the other hand, no animal species vaccination costs have been located in more current reference databases than those used in MORA, so it is proposed to keep the one used in MORA2010 updated to January 2019 and expressed at the level of PEC. These operations are summarised in Table 10.

TABLE 10. COST OF VACCINATION OF ANIMAL SPECIES AT PEC LEVEL PROPOSED FOR MORA2019. SOURCE: OWN ELABORATION BASED ON VALLADARES, A. COOR. (2004).

ITEM	BASIC COST (€2010/UD)	BASIC COST (€2019/UD)	PEC (€2019/UD)
VACCINE	0,68	**0,76**	**1,00**
COEFFICIENT IPC (JAN2010-JAN2019)			**1,115**
CONVERSION RATIO TO PEC			**1,318**

C. ASSESSMENT OF THE VARIATION BETWEEN ORIGINAL AND CURRENT INFORMATION

In the case of the technique "Captive breeding and release of replacement individuals" for lethal damage to the different species, as most of the sources of information used to set the cost of the technique have changed, the data used in MORA2010 and those proposed for MORA2019 differ greatly.

3. DATA TABLES FOR DAMAGE TO ANIMAL SPECIES

This annex compiles the data tables to be included in MORA2019 with regard to damage caused to animal species.

The tables are organised according to the different combinations of agent causing damage - type of damage caused (death or injury) as shown in Table A.I-1. Furthermore, the generic designation of each group of techniques is given in Table A.I-2.

TABLE A.I-1. CODING OF THE AGENT CAUSING DAMAGE - TYPE OF DAMAGE COMBINATIONS FOLLOWED IN ANNEX I. SOURCE: OWN ELABORATION.

DAMAGING AGENT		DEATH	INJURY
CHEMICAL		1A.1	2
PHYSICAL	Extraction	1A.2	
	Temperature	1A.1	2
FIRE		1A.1	2
	MGO	1B	
BIOLOGICAL	Alien species	1C	
	Viruses and bacteria	1D	

TABLE A.I-2. GENERIC DESIGNATION OF THE TECHNIQUES CORRESPONDING TO EACH AGENT CAUSING DAMAGE - TYPE OF DAMAGE COMBINATION FOLLOWED IN ANNEX I. SOURCE: OWN ELABORATION.

DAMAGING AGENT		DEATH	INJURY
CHEMICAL		Breeding in captivity and release of replacement individuals.	Collection, transfer and treatment at a recovery centre
PHYSICAL	Extraction	Breeding in captivity and release of replacement individuals.	
	Temperature	Breeding in captivity and release of replacement individuals.	Collection, transfer and treatment at a recovery centre
FIRE		Breeding in captivity and release of replacement individuals.	Collection, transfer and treatment at a recovery centre
	MGO	Capture of GMOs and restocking with captive-bred individuals	
BIOLOGICAL	Alien species	Capture of invasive alien animals by monitoring and population control teams and release of captive-bred individuals.	
	Viruses and bacteria	Captive breeding and release of vaccinated replacement individuals	

A. DAMAGE TO ANIMAL SPECIES: COMBINATION 1A.1 (DAMAGE OF DEATH BY CHEMICAL AGENTS, TEMPERATURE OR FIRE).

TABLE A.I-3. TECHNIQUES FOR REPAIRING DEATH DAMAGE BY CHEMICAL AGENTS, TEMPERATURE OR FIRE TO ANIMAL SPECIES (COMBINATION 1A.1). SOURCE: OWN ELABORATION.

COMBINATION	1A.1		
REPAIR TECHNIQUE	CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Accipiter gentilis	Birds	3.952,57	6
Accipiter nisus	Birds	1.976,28	6
Acrocephalus arundinaceus	Birds	2.635,05	6
Acrocephalus paludicola	Birds	197,63	6
Acrocephalus schoenobaenus	Birds	5.270,09	6

COMBINATION REPAIR TECHNIQUE	1A.1 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Acrocephalus scirpaceus	Birds	2.635,05	6
Actitis hypoleucos	Birds	2.635,05	6
Aegithalos caudatus	Birds	197,63	6
Aegypius monachus	Birds	106.574,13	6
Alauda arvensis	Birds	197,63	6
Alcedo atthis	Birds	592,89	6
Alectoris barbara	Birds	54,09	6
Alectoris rufa	Birds	98,81	6
Alosa alosa	Inland fish	395,26	6
Alytes obstetricans	Amphibians	65,88	6
Anas acuta	Birds	131,75	6
Anas clypeata	Birds	131,75	6
Anas crecca	Birds	98,81	6
Anas platyrhynchos	Birds	98,81	6
Anas querquedula	Birds	263,50	6
Anas strepera	Birds	131,75	6
Anguilla anguilla	Inland fish	26,35	6
Anguis fragilis	Reptiles	65,88	6
Anser anser	Birds	395,26	6
Anthus campestris	Birds	197,63	6
Anthus pratensis	Birds	197,63	6
Anthus spinoletta	Birds	197,63	6
Anthus trivialis	Birds	197,63	6
Apodemus flavicollis	Mammals	32,94	24
Apodemus sylvaticus	Mammals	32,94	24
Apus apus	Birds	592,89	6
Apus melba	Birds	592,89	6
Aquila adalberti	Birds	159.861,20	6
Aquila chrysaetos	Birds	106.574,13	6
Ardea cinerea	Birds	5.328,70	6
Ardea purpurea	Birds	5.330,17	6
Ardeola ralloides	Birds	6.587,61	6
Arvicola sapidus	Mammals	131,75	24
Arvicola terrestris	Mammals	131,75	24
Asio flammeus	Birds	2.635,05	6
Asio otus	Birds	1.185,77	6
Athene noctua	Birds	1.185,77	6
Aythya ferina	Birds	131,75	6
Aythya fuligula	Birds	197,63	6
Barbastella barbastellus	Mammals	5.270,09	24
Barbus haasi	Inland fish	131,75	6
Botaurus stellaris	Birds	6.587,61	6
Bubo bubo	Birds	10.657,41	6

COMBINATION REPAIR TECHNIQUE	1A.1 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Bufo calamita	Amphibians	395,26	6
Burhinus oedicnemus	Birds	592,89	6
Buteo buteo	Birds	1.976,28	6
Calandrella brachydactyla	Birds	197,63	6
Calandrella rufescens	Birds	197,63	6
Callipepla californica	Birds	21,32	6
Calonectris diomedea	Birds	1.185,77	6
Calotriton asper	Amphibians	658,76	6
Canis lupus	Mammals	21.314,83	24
Capra pyrenaica	Mammals	21.314,83	24
Capreolus capreolus	Mammals	2.664,35	24
Caprimulgus europaeus	Birds	592,89	6
Carassius auratus	Inland fish	6,59	6
Carduelis cannabina	Birds	39,53	6
Carduelis carduelis	Birds	39,53	6
Carduelis chloris	Birds	39,53	6
Carduelis spinus	Birds	65,88	6
Caretta caretta	Reptiles	395,26	6
Certhia brachydactyla	Birds	197,63	6
Certhia familiaris	Birds	2.635,05	6
Cervus elaphus	Mammals	2.664,35	24
Cettia cetti	Birds	197,63	6
Chalcides minutus	Reptiles	395,26	6
Chalcides striatus	Reptiles	131,75	6
Charadrius alexandrinus	Birds	2.635,05	6
Charadrius dubius	Birds	3.952,57	6
Charadrius morinellus	Birds	592,89	6
Chelon labrosus	Inland fish	13,18	6
Chelonia mydas	Reptiles	658,76	6
Chionomys nivalis	Mammals	263,50	24
Chlamydotis undulata	Birds	21.314,83	6
Chlidonias hybrida	Birds	592,89	6
Chlidonias niger	Birds	5.270,09	6
Ciconia ciconia	Birds	10.657,41	6
Ciconia nigra	Birds	159.861,20	6
Cinclus cinclus	Birds	592,89	6
Circaetus gallicus	Birds	3.952,57	6
Circus aeruginosus	Birds	3.952,57	6
Circus cyaneus	Birds	1.976,28	6
Circus pygargus	Birds	3.952,57	6
Cisticola juncidis	Birds	197,63	6
Cobitis calderoni	Inland fish	395,26	6
Coccothraustes coccothraustes	Birds	1.185,77	6

COMBINATION REPAIR TECHNIQUE	1A.1 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Columba bollii	Birds	21,32	6
Columba domestica	Birds	21,32	6
Columba guinea	Birds	21,32	6
Columba junoniae	Birds	21,32	6
Columba livia/domestica	Birds	52,70	6
Columba oenas	Birds	52,70	6
Columba palumbus	Birds	52,70	6
Coracias garrulus	Birds	592,89	6
Coronella austriaca	Reptiles	197,63	6
Coronella girondica	Reptiles	131,75	6
Corvus corax	Birds	263,50	6
Corvus corone	Birds	6,59	6
Corvus monedula	Birds	263,50	6
Coturnix coturnix	Birds	98,81	6
Crocidura russula	Mammals	32,94	24
Crocidura suaveolens	Mammals	32,94	24
Cuculus canorus	Birds	592,89	6
Cyanopica cyana	Birds	197,63	6
Cygnus olor	Birds	2.635,05	6
Dama dama	Mammals	2.664,35	24
Delichon urbicum	Birds	197,63	6
Dendrocopos leucotos	Birds	592,89	6
Dendrocopos major	Birds	592,89	6
Dendrocopos medius	Birds	3.952,57	6
Dendrocopos minor	Birds	592,89	6
Dermochelys coriacea	Reptiles	658,76	6
Discoglossus galganoi	Amphibians	131,75	6
Dryocopus martius	Birds	2.635,05	6
Egretta garzetta	Birds	1.976,28	6
Eliomys quercinus	Mammals	197,63	24
Emberiza calandra	Birds	65,88	6
Emberiza cia	Birds	197,63	6
Emberiza cirlus	Birds	197,63	6
Emberiza citrinella	Birds	197,63	6
Emberiza hortulana	Birds	197,63	6
Emberiza schoeniclus	Birds	2.635,05	6
Emys orbicularis	Reptiles	395,26	6
Eptesicus serotinus	Mammals	131,75	24
Eretmochelys imbricata	Reptiles	658,76	6
Erinaceus europaeus	Mammals	197,63	24
Erithacus rubecula	Birds	197,63	6
Falco columbarius	Birds	3.952,57	6
Falco eleonorae	Birds	53.287,06	6

COMBINATION REPAIR TECHNIQUE	1A.1 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Falco naumanni	Birds	1.976,28	6
Falco pelegrinoides	Birds	53.287,06	6
Falco peregrinus	Birds	53.287,06	6
Falco subbuteo	Birds	3.952,57	6
Falco tinnunculus	Birds	1.976,28	6
Felis silvestris	Mammals	3.952,57	24
Ficedula hypoleuca	Birds	2.635,05	6
Fringilla coelebs	Birds	197,63	6
Fulica atra	Birds	65,88	6
Galemys pyrenaicus	Mammals	5.270,09	24
Galerida cristata	Birds	197,63	6
Galerida theklae	Birds	197,63	6
Gallinago gallinago	Birds	98,81	6
Gallinula chloropus	Birds	65,88	6
Gallotia gomerana	Reptiles	35.515,17	6
Garrulus glandarius	Birds	79,05	6
Gasterosteus aculeatus	Inland fish	131,75	6
Genetta genetta	Mammals	197,63	24
Glis glis	Mammals	658,76	24
Gypaetus barbatus	Birds	159.861,20	6
Gyps fulvus	Birds	53.287,06	6
Haematopus ostralegus	Birds	592,89	6
Hieraaetus fasciatus	Birds	53.287,06	6
Hieraaetus pennatus	Birds	3.952,57	6
Hierophis viridiflavus	Reptiles	395,26	6
Himantopus himantopus	Birds	592,89	6
Hippolais polyglotta	Birds	197,63	6
Hirundo rustica	Birds	197,63	6
Hydrobates pelagicus	Birds	2.635,05	6
Hyla arborea	Amphibians	263,50	6
Hyla meridionalis	Amphibians	658,76	6
Hypsugo savii	Mammals	131,75	24
Ixobrychus minutus	Birds	3.952,57	6
Jynx torquilla	Birds	592,89	6
Lacerta bilineata	Reptiles	197,63	6
Lacerta schreiberi	Reptiles	197,63	6
Lamprotornis caudatus	Birds	5,32	6
Lamprotornis chalybaeus	Birds	6,79	6
Lanius collurio	Birds	197,63	6
Lanius excubitor	Birds	197,63	6
Lanius senator	Birds	3.952,57	6
Larus argentatus	Birds	26,35	6
Larus audouinii	Birds	1.976,28	6

COMBINATION REPAIR TECHNIQUE	1A.1 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Larus fuscus	Birds	592,89	6
Larus genei	Birds	592,89	6
Larus melanocephalus	Birds	592,89	6
Larus michahellis	Birds	26,35	6
Larus ridibundus	Birds	26,35	6
Lepus castroviejoi	Mammals	395,26	24
Lepus europaeus	Mammals	395,26	24
Lepus granatensis	Mammals	395,26	24
Lepus schlumbergeri	Mammals	395,26	24
Limosa limosa	Birds	592,89	6
Lissotriton helveticus	Amphibians	131,75	6
Locustella luscinioides	Birds	5.270,09	6
Locustella naevia	Birds	197,63	6
Loxia curvirostra	Birds	1.185,77	6
Lullula arborea	Birds	197,63	6
Luscinia megarhynchos	Birds	197,63	6
Luscinia svecica	Birds	197,63	6
Lutra lutra	Mammals	10.657,41	24
Lynx pardinus	Mammals	159.861,20	24
Malpolon monspessulanus	Reptiles	197,63	6
Martes foina	Mammals	197,63	24
Martes martes	Mammals	527,01	24
Mauremys leprosa	Reptiles	395,26	6
Melanocorypha calandra	Birds	197,63	6
Meles meles	Mammals	197,63	24
Merops apiaster	Birds	592,89	6
Mesotriton alpestris	Amphibians	395,26	6
Micromys minutus	Mammals	32,94	24
Microtus agrestis	Mammals	32,94	24
Microtus arvalis	Mammals	32,94	24
Microtus duodecimcostatus	Mammals	32,94	24
Microtus gerbei	Mammals	32,94	24
Microtus lusitanicus	Mammals	32,94	24
Milvus migrans	Birds	1.976,28	6
Milvus milvus	Birds	5.270,09	6
Miniopterus schreibersii	Mammals	527,01	24
Monticola saxatilis	Birds	592,89	6
Monticola solitarius	Birds	592,89	6
Montifringilla nivalis	Birds	197,63	6
Motacilla alba	Birds	197,63	6
Motacilla cinerea	Birds	197,63	6
Motacilla flava	Birds	197,63	6
Mus musculus	Mammals	32,94	24

COMBINATION REPAIR TECHNIQUE	1A.1 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Mus spretus	Mammals	32,94	24
Muscicapa striata	Birds	197,63	6
Mustela erminea	Mammals	5.270,09	24
Mustela lutreola	Mammals	5.270,09	24
Mustela nivalis	Mammals	131,75	24
Mustela putorius	Mammals	527,01	24
Myodes glareolus	Mammals	32,94	24
Myotis alcathoe	Mammals	658,76	24
Myotis bechsteinii	Mammals	658,76	24
Myotis blythii	Mammals	527,01	24
Myotis daubentonii	Mammals	131,75	24
Myotis emarginatus	Mammals	527,01	24
Myotis myotis	Mammals	658,76	24
Myotis mystacinus	Mammals	658,76	24
Myotis nattereri	Mammals	131,75	24
Natrix maura	Reptiles	131,75	6
Natrix natrix	Reptiles	131,75	6
Neomys anomalus	Mammals	32,94	24
Neomys fodiens	Mammals	32,94	24
Neophron percnopterus	Birds	53.287,06	6
Netta rufina	Birds	197,63	6
Numenius arquata	Birds	592,89	6
Nyctalus lasiopterus	Mammals	527,01	24
Nyctalus leisleri	Mammals	131,75	24
Nyctalus noctula	Mammals	527,01	24
Nycticorax nycticorax	Birds	3.952,57	6
Oenanthe hispanica	Birds	197,63	6
Oenanthe leucura	Birds	197,63	6
Oenanthe oenanthe	Birds	197,63	6
Oriolus oriolus	Birds	592,89	6
Oryctolagus cuniculus	Mammals	65,88	24
Otis tarda	Birds	21.314,83	6
Otus scops	Birds	1.185,77	6
Ovis aries	Mammals	2.664,35	24
Pandion haliaetus	Birds	106.574,13	6
Panurus biarmicus	Birds	197,63	6
Parachondrostoma miegii	Inland fish	19,76	6
Parus ater	Birds	197,63	6
Parus cristatus	Birds	197,63	6
Parus major	Birds	197,63	6
Parus palustris	Birds	197,63	6
Passer domesticus	Birds	32,94	6
Passer montanus	Birds	197,63	6

COMBINATION REPAIR TECHNIQUE	1A.1 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Pelobates cultripes	Amphibians	197,63	6
Pelodytes punctatus	Amphibians	65,88	6
Pelophylax perezi	Amphibians	39,53	6
Perdix perdix	Birds	54,09	6
Pernis apivorus	Birds	2.635,05	6
Petromyzon marinus	Inland fish	395,26	6
Petronia petronia	Birds	197,63	6
Phalacrocorax aristotelis	Birds	3.952,57	6
Phalacrocorax carbo	Birds	1.185,77	6
Phasianus colchicus	Birds	98,81	6
Phoenicopterus roseus	Birds	5.270,09	6
Phoenicurus ochruros	Birds	197,63	6
Phoenicurus phoenicurus	Birds	3.952,57	6
Phoxinus bigerri	Inland fish	19,76	6
Phylloscopus bonelli	Birds	197,63	6
Phylloscopus sibilatrix	Birds	197,63	6
Phylloscopus trochilus	Birds	2.635,05	6
Pica pica	Birds	6,59	6
Picus viridis	Birds	592,89	6
Pipistrellus kuhlii	Mammals	131,75	24
Pipistrellus nathusii	Mammals	131,75	24
Pipistrellus pipistrellus	Mammals	131,75	24
Pipistrellus pygmaeus	Mammals	131,75	24
Platalea leucorodia	Birds	5.270,09	6
Platichthys flesus	Inland fish	19,76	6
Plecotus auritus	Mammals	131,75	24
Plecotus austriacus	Mammals	131,75	24
Podarcis hispanica	Reptiles	65,88	6
Podarcis muralis	Reptiles	65,88	6
Podiceps cristatus	Birds	592,89	6
Podiceps nigricollis	Birds	592,89	6
Porzana parva	Birds	197,63	6
Porzana porzana	Birds	197,63	6
Porzana pusilla	Birds	197,63	6
Prunella collaris	Birds	197,63	6
Prunella modularis	Birds	197,63	6
Psammodromus algirus	Reptiles	197,63	6
Ptyonoprogne rupestris	Birds	197,63	6
Puffinus puffinus	Birds	1.185,77	6
Pyrrhocorax graculus	Birds	592,89	6
Pyrrhocorax pyrrhocorax	Birds	592,89	6
Pyrrhula pyrrhula	Birds	197,63	6
Rallus aquaticus	Birds	2.635,05	6

COMBINATION REPAIR TECHNIQUE	1A.1 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Rana dalmatina	Amphibians	395,26	6
Rana iberica	Amphibians	263,50	6
Rana temporaria	Amphibians	65,88	6
Recurvirostra avosetta	Birds	592,89	6
Regulus ignicapilla	Birds	197,63	6
Regulus regulus	Birds	197,63	6
Remiz pendulinus	Birds	197,63	6
Rhinechis scalaris	Reptiles	263,50	6
Rhinolophus euryale	Mammals	658,76	24
Rhinolophus ferrumequinum	Mammals	527,01	24
Rhinolophus hipposideros	Mammals	131,75	24
Riparia riparia	Birds	3.952,57	6
Rissa tridactyla	Birds	592,89	6
Salamandra salamandra	Amphibians	65,88	6
Salaria fluviatilis	Inland fish	395,26	6
Salmo salar	Inland fish	105,40	6
Salmo trutta	Inland fish	105,40	6
Saxicola rubetra	Birds	197,63	6
Sciurus vulgaris	Mammals	197,63	24
Scolopax rusticola	Birds	131,75	6
Serinus citrinella	Birds	197,63	6
Serinus serinus	Birds	39,53	6
Sitta europaea	Birds	197,63	6
Sorex coronatus	Mammals	32,94	24
Sorex minutus	Mammals	32,94	24
Squalius pyrenaicus	Inland fish	395,26	6
Sterna albifrons	Birds	592,89	6
Sterna hirundo	Birds	592,89	6
Sterna nilotica	Birds	2.635,05	6
Streptopelia decaocto	Birds	26,35	6
Streptopelia turtur	Birds	98,81	6
Strix aluco	Birds	1.185,77	6
Sturnus unicolor	Birds	26,35	6
Sturnus vulgaris	Birds	32,94	6
Suncus etruscus	Mammals	32,94	24
Sus scrofa	Mammals	532,86	24
Sylvia atricapilla	Birds	197,63	6
Sylvia borin	Birds	197,63	6
Sylvia cantillans	Birds	197,63	6
Sylvia communis	Birds	197,63	6
Sylvia conspicillata	Birds	197,63	6
Sylvia hortensis	Birds	197,63	6
Sylvia undata	Birds	197,63	6

COMBINATION REPAIR TECHNIQUE	1A.1 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Tachybaptus ruficollis	Birds	2.635,05	6
Tadarida teniotis	Mammals	131,75	24
Tadorna ferruginea	Birds	3.952,57	6
Tadorna tadorna	Birds	3.952,57	6
Talpa europaea	Mammals	32,94	24
Talpa occidentalis	Mammals	32,94	24
Tetrax tetrax	Birds	3.952,57	6
Thalasseus sandvicensis	Birds	592,89	6
Tichodroma muraria	Birds	1.976,28	6
Timon lepidus	Reptiles	197,63	6
Tinca tinca	Inland fish	19,76	6
Tringa ochropus	Birds	592,89	6
Triturus marmoratus	Amphibians	65,88	6
Troglodytes troglodytes	Birds	197,63	6
Turdus merula	Birds	26,35	6
Turdus philomelos	Birds	32,94	6
Turdus torquatus	Birds	592,89	6
Turdus viscivorus	Birds	32,94	6
Tyto alba	Birds	1.185,77	6
Upupa epops	Birds	3.952,57	6
Uria aalge	Birds	592,89	6
Vanellus vanellus	Birds	65,88	6
Vipera aspis	Reptiles	65,88	6
Vipera seoanei	Reptiles	65,88	6
Vulpes vulpes	Mammals	26,35	24
Zamenis longissimus	Reptiles	197,63	6
Zootoca vivipara	Reptiles	65,88	6
Other Critically Endangered Amphibians	Amphibians	395,26	6
Other Endangered Amphibians	Amphibians	395,26	6
Other Vulnerable Amphibians	Amphibians	241,55	6
Other non-threatened Amphibians	Amphibians	228,37	6
Other Critically Endangered Birds	Birds	34.198,85	6
Other endangered Birds	Birds	24.973,21	6
Other Vulnerable Birds	Birds	11.575,07	6
Other non-threatened Birds	Birds	2.184,66	6
Other Critically Endangered Mammals	Mammals	159.861,20	24
Other endangered mammals	Mammals	5.270,09	24
Other Vulnerable Mammals	Mammals	1.394,03	24
Other non-threatened mammals	Mammals	1.394,03	24
Other critically endangered Inland fish	Inland fish	251,06	6
Other Inland fish endangered	Inland fish	251,06	6

COMBINATION REPAIR TECHNIQUE	1A.1 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Other vulnerable Inland fish	Inland fish	251,06	6
Other Inland fish not threatened	Inland fish	15,81	6
Other critically endangered reptiles	Reptiles	9.241,11	6
Other endangered reptiles	Reptiles	9.241,11	6
Other vulnerable reptiles	Reptiles	395,26	6
Other non-threatened reptiles	Reptiles	191,35	6

B. DAMAGE TO ANIMAL SPECIES: COMBINATION 2 (DAMAGE FROM CHEMICAL, TEMPERATURE OR FIRE INJURY)

TABLE A.I-4. TECHNIQUES FOR THE REPAIR OF CHEMICAL, TEMPERATURE OR FIRE INJURY DAMAGE TO ANIMAL SPECIES (COMBINATION 2). SOURCE: OWN ELABORATION.

COMBINATION REPAIR TECHNIQUE	2 COLLECTION, TRANSFER AND TREATMENT AT A RECOVERY CENTRE		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Accipiter gentilis	Birds	370,43	3
Accipiter nisus	Birds	1.852,19	3
Acrocephalus arundinaceus	Birds	370,43	3
Acrocephalus paludicola	Birds	197,63	3
Acrocephalus schoenobaenus	Birds	370,43	3
Acrocephalus scirpaceus	Birds	370,43	3
Actitis hypoleucos	Birds	370,43	3
Aegithalos caudatus	Birds	197,63	3
Aegypius monachus	Birds	1.852,19	3
Alauda arvensis	Birds	197,63	3
Alcedo atthis	Birds	370,43	3
Alectoris barbara	Birds	54,09	3
Alectoris rufa	Birds	98,81	3
Alosa alosa	Inland fish	395,26	3
Alytes obstetricans	Amphibians	65,88	3
Anas acuta	Birds	131,75	3
Anas clypeata	Birds	131,75	3
Anas crecca	Birds	98,81	3
Anas platyrhynchos	Birds	98,81	3
Anas querquedula	Birds	263,50	3
Anas strepera	Birds	131,75	3
Anguilla anguilla	Inland fish	26,35	3
Anguis fragilis	Reptiles	65,88	3
Anser anser	Birds	370,43	3
Anthus campestris	Birds	197,63	3

COMBINATION REPAIR TECHNIQUE	2 COLLECTION, TRANSFER AND TREATMENT AT A RECOVERY CENTRE		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Anthus pratensis	Birds	197,63	3
Anthus spinoletta	Birds	197,63	3
Anthus trivialis	Birds	197,63	3
Apodemus flavicollis	Mammals	32,94	3
Apodemus sylvaticus	Mammals	32,94	3
Apus apus	Birds	370,43	3
Apus melba	Birds	370,43	3
Aquila adalberti	Birds	1.852,19	3
Aquila chrysaetos	Birds	370,43	3
Ardea cinerea	Birds	370,43	3
Ardea purpurea	Birds	370,43	3
Ardeola ralloides	Birds	370,43	3
Arvicola sapidus	Mammals	131,75	3
Arvicola terrestris	Mammals	131,75	3
Asio flammeus	Birds	370,43	3
Asio otus	Birds	370,43	3
Athene noctua	Birds	370,43	3
Aythya ferina	Birds	131,75	3
Aythya fuligula	Birds	197,63	3
Barbastella barbastellus	Mammals	370,43	3
Barbus haasi	Inland fish	131,75	3
Botaurus stellaris	Birds	1.852,19	3
Bubo bubo	Birds	370,43	3
Bufo calamita	Amphibians	370,43	3
Burhinus oedicnemus	Birds	592,89	3
Buteo buteo	Birds	370,43	3
Calandrella brachydactyla	Birds	197,63	3
Calandrella rufescens	Birds	197,63	3
Callipepla californica	Birds	21,32	3
Calonectris diomedea	Birds	1.185,77	3
Calotriton asper	Amphibians	370,43	3
Canis lupus	Mammals	370,43	3
Capra pyrenaica	Mammals	370,43	3
Capreolus capreolus	Mammals	370,43	3
Caprimulgus europaeus	Birds	370,43	3
Carassius auratus	Inland fish	6,59	3
Carduelis cannabina	Birds	39,53	3
Carduelis carduelis	Birds	39,53	3
Carduelis chloris	Birds	39,53	3
Carduelis spinus	Birds	65,88	3
Caretta caretta	Reptiles	395,26	3
Certhia brachydactyla	Birds	197,63	3
Certhia familiaris	Birds	370,43	3

COMBINATION REPAIR TECHNIQUE	2 COLLECTION, TRANSFER AND TREATMENT AT A RECOVERY CENTRE		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Cervus elaphus	Mammals	370,43	3
Cettia cetti	Birds	197,63	3
Chalcides minutus	Reptiles	370,43	3
Chalcides striatus	Reptiles	131,75	3
Charadrius alexandrinus	Birds	1.852,19	3
Charadrius dubius	Birds	370,43	3
Charadrius morinellus	Birds	592,89	3
Chelon labrosus	Inland fish	13,18	3
Chelonia mydas	Reptiles	658,76	3
Chionomys nivalis	Mammals	263,50	3
Chlamydotis undulata	Birds	1.852,19	3
Chlidonias hybrida	Birds	592,89	3
Chlidonias niger	Birds	1.852,19	3
Ciconia ciconia	Birds	370,43	3
Ciconia nigra	Birds	1.852,19	3
Cinclus cinclus	Birds	370,43	3
Circaetus gallicus	Birds	370,43	3
Circus aeruginosus	Birds	370,43	3
Circus cyaneus	Birds	370,43	3
Circus pygargus	Birds	1.852,19	3
Cisticola juncidis	Birds	197,63	3
Cobitis calderoni	Inland fish	395,26	3
Coccothraustes coccothraustes	Birds	370,43	3
Columba bollii	Birds	21,32	3
Columba domestica	Birds	21,32	3
Columba guinea	Birds	21,32	3
Columba junoniae	Birds	21,32	3
Columba livia/domestica	Birds	52,70	3
Columba oenas	Birds	52,70	3
Columba palumbus	Birds	52,70	3
Coracias garrulus	Birds	592,89	3
Coronella austriaca	Reptiles	197,63	3
Coronella girondica	Reptiles	131,75	3
Corvus corax	Birds	263,50	3
Corvus corone	Birds	6,59	3
Corvus monedula	Birds	263,50	3
Coturnix coturnix	Birds	98,81	3
Crocidura russula	Mammals	32,94	3
Crocidura suaveolens	Mammals	32,94	3
Cuculus canorus	Birds	370,43	3
Cyanopica cyana	Birds	197,63	3
Cygnus olor	Birds	370,43	3
Dama dama	Mammals	370,43	3

COMBINATION REPAIR TECHNIQUE	2 COLLECTION, TRANSFER AND TREATMENT AT A RECOVERY CENTRE		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Delichon urbicum	Birds	197,63	3
Dendrocopos leucotos	Birds	592,89	3
Dendrocopos major	Birds	592,89	3
Dendrocopos medius	Birds	370,43	3
Dendrocopos minor	Birds	370,43	3
Dermochelys coriacea	Reptiles	658,76	3
Discoglossus galganoi	Amphibians	131,75	3
Dryocopus martius	Birds	370,43	3
Egretta garzetta	Birds	370,43	3
Eliomys quercinus	Mammals	197,63	3
Emberiza calandra	Birds	65,88	3
Emberiza cia	Birds	197,63	3
Emberiza cirlus	Birds	197,63	3
Emberiza citrinella	Birds	197,63	3
Emberiza hortulana	Birds	197,63	3
Emberiza schoeniclus	Birds	1.852,19	3
Emys orbicularis	Reptiles	395,26	3
Eptesicus serotinus	Mammals	131,75	3
Eretmochelys imbricata	Reptiles	370,43	3
Erinaceus europaeus	Mammals	197,63	3
Erithacus rubecula	Birds	197,63	3
Falco columbarius	Birds	370,43	3
Falco eleonorae	Birds	370,43	3
Falco naumanni	Birds	1.852,19	3
Falco pelegrinoides	Birds	1.852,19	3
Falco peregrinus	Birds	1.852,19	3
Falco subbuteo	Birds	370,43	3
Falco tinnunculus	Birds	370,43	3
Felis silvestris	Mammals	370,43	3
Ficedula hypoleuca	Birds	370,43	3
Fringilla coelebs	Birds	197,63	3
Fulica atra	Birds	65,88	3
Galemys pyrenaicus	Mammals	1.852,19	3
Galerida cristata	Birds	197,63	3
Galerida theklae	Birds	197,63	3
Gallinago gallinago	Birds	98,81	3
Gallinula chloropus	Birds	65,88	3
Gallotia gomerana	Reptiles	1.852,19	3
Garrulus glandarius	Birds	79,05	3
Gasterosteus aculeatus	Inland fish	131,75	3
Genetta genetta	Mammals	197,63	3
Glis glis	Mammals	370,43	3
Gypaetus barbatus	Birds	1.852,19	3

COMBINATION REPAIR TECHNIQUE	2 COLLECTION, TRANSFER AND TREATMENT AT A RECOVERY CENTRE		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Gyps fulvus	Birds	370,43	3
Haematopus ostralegus	Birds	370,43	3
Hieraaetus fasciatus	Birds	1.852,19	3
Hieraaetus pennatus	Birds	370,43	3
Hierophis viridiflavus	Reptiles	370,43	3
Himantopus himantopus	Birds	370,43	3
Hippolais polyglotta	Birds	197,63	3
Hirundo rustica	Birds	197,63	3
Hydrobates pelagicus	Birds	1.852,19	3
Hyla arborea	Amphibians	263,50	3
Hyla meridionalis	Amphibians	370,43	3
Hypsugo savii	Mammals	131,75	3
Ixobrychus minutus	Birds	370,43	3
Jynx torquilla	Birds	370,43	3
Lacerta bilineata	Reptiles	197,63	3
Lacerta schreiberi	Reptiles	197,63	3
Lamprotornis caudatus	Birds	5,32	3
Lamprotornis chalybaeus	Birds	6,79	3
Lanius collurio	Birds	197,63	3
Lanius excubitor	Birds	197,63	3
Lanius senator	Birds	370,43	3
Larus argentatus	Birds	26,35	3
Larus audouinii	Birds	1.852,19	3
Larus fuscus	Birds	370,43	3
Larus genei	Birds	592,89	3
Larus melanocephalus	Birds	370,43	3
Larus michahellis	Birds	26,35	3
Larus ridibundus	Birds	26,35	3
Lepus castroviejoi	Mammals	395,26	3
Lepus europaeus	Mammals	370,43	3
Lepus granatensis	Mammals	370,43	3
Lepus schlumbergeri	Mammals	370,43	3
Limosa limosa	Birds	592,89	3
Lissotriton helveticus	Amphibians	131,75	3
Locustella luscinioides	Birds	370,43	3
Locustella naevia	Birds	197,63	3
Loxia curvirostra	Birds	370,43	3
Lullula arborea	Birds	197,63	3
Luscinia megarhynchos	Birds	197,63	3
Luscinia svecica	Birds	197,63	3
Lutra lutra	Mammals	370,43	3
Lynx pardinus	Mammals	1.852,19	3
Malpolon monspessulanus	Reptiles	197,63	3

COMBINATION REPAIR TECHNIQUE	2 COLLECTION, TRANSFER AND TREATMENT AT A RECOVERY CENTRE		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Martes foina	Mammals	197,63	3
Martes martes	Mammals	370,43	3
Mauremys leprosa	Reptiles	395,26	3
Melanocorypha calandra	Birds	197,63	3
Meles meles	Mammals	197,63	3
Merops apiaster	Birds	370,43	3
Mesotriton alpestris	Amphibians	395,26	3
Micromys minutus	Mammals	32,94	3
Microtus agrestis	Mammals	32,94	3
Microtus arvalis	Mammals	32,94	3
Microtus duodecimcostatus	Mammals	32,94	3
Microtus gerbei	Mammals	32,94	3
Microtus lusitanicus	Mammals	32,94	3
Milvus migrans	Birds	370,43	3
Milvus milvus	Birds	1.852,19	3
Miniopterus schreibersii	Mammals	527,01	3
Monticola saxatilis	Birds	370,43	3
Monticola solitarius	Birds	370,43	3
Montifringilla nivalis	Birds	197,63	3
Motacilla alba	Birds	197,63	3
Motacilla cinerea	Birds	197,63	3
Motacilla flava	Birds	197,63	3
Mus musculus	Mammals	32,94	3
Mus spretus	Mammals	32,94	3
Muscicapa striata	Birds	197,63	3
Mustela erminea	Mammals	370,43	3
Mustela lutreola	Mammals	1.852,19	3
Mustela nivalis	Mammals	131,75	3
Mustela putorius	Mammals	370,43	3
Myodes glareolus	Mammals	32,94	3
Myotis alcathoe	Mammals	370,43	3
Myotis bechsteinii	Mammals	658,76	3
Myotis blythii	Mammals	527,01	3
Myotis daubentonii	Mammals	131,75	3
Myotis emarginatus	Mammals	527,01	3
Myotis myotis	Mammals	658,76	3
Myotis mystacinus	Mammals	370,43	3
Myotis nattereri	Mammals	131,75	3
Natrix maura	Reptiles	131,75	3
Natrix natrix	Reptiles	131,75	3
Neomys anomalus	Mammals	32,94	3
Neomys fodiens	Mammals	32,94	3
Neophron percnopterus	Birds	1.852,19	3

COMBINATION REPAIR TECHNIQUE	2 COLLECTION, TRANSFER AND TREATMENT AT A RECOVERY CENTRE		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Netta rufina	Birds	197,63	3
Numenius arquata	Birds	592,89	3
Nyctalus lasiopterus	Mammals	527,01	3
Nyctalus leisleri	Mammals	131,75	3
Nyctalus noctula	Mammals	527,01	3
Nycticorax nycticorax	Birds	370,43	3
Oenanthe hispanica	Birds	197,63	3
Oenanthe leucura	Birds	197,63	3
Oenanthe oenanthe	Birds	197,63	3
Oriolus oriolus	Birds	370,43	3
Oryctolagus cuniculus	Mammals	65,88	3
Otis tarda	Birds	1.852,19	3
Otus scops	Birds	370,43	3
Ovis aries	Mammals	370,43	3
Pandion haliaetus	Birds	1.852,19	3
Panurus biarmicus	Birds	197,63	3
Parachondrostoma miegii	Inland fish	19,76	3
Parus ater	Birds	197,63	3
Parus cristatus	Birds	197,63	3
Parus major	Birds	197,63	3
Parus palustris	Birds	197,63	3
Passer domesticus	Birds	32,94	3
Passer montanus	Birds	197,63	3
Pelobates cultripes	Amphibians	197,63	3
Pelodytes punctatus	Amphibians	65,88	3
Pelophylax perezi	Amphibians	39,53	3
Perdix perdix	Birds	54,09	3
Pernis apivorus	Birds	370,43	3
Petromyzon marinus	Inland fish	395,26	3
Petronia petronia	Birds	197,63	3
Phalacrocorax aristotelis	Birds	1.852,19	3
Phalacrocorax carbo	Birds	370,43	3
Phasianus colchicus	Birds	98,81	3
Phoenicopterus roseus	Birds	370,43	3
Phoenicurus ochruros	Birds	197,63	3
Phoenicurus phoenicurus	Birds	1.852,19	3
Phoxinus bigerri	Inland fish	19,76	3
Phylloscopus bonelli	Birds	197,63	3
Phylloscopus sibilatrix	Birds	197,63	3
Phylloscopus trochilus	Birds	370,43	3
Pica pica	Birds	6,59	3
Picus viridis	Birds	370,43	3
Pipistrellus kuhlii	Mammals	131,75	3

COMBINATION REPAIR TECHNIQUE	2 COLLECTION, TRANSFER AND TREATMENT AT A RECOVERY CENTRE		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Pipistrellus nathusii	Mammals	131,75	3
Pipistrellus pipistrellus	Mammals	131,75	3
Pipistrellus pygmaeus	Mammals	131,75	3
Platalea leucorodia	Birds	1.852,19	3
Platichthys flesus	Inland fish	19,76	3
Plecotus auritus	Mammals	131,75	3
Plecotus austriacus	Mammals	131,75	3
Podarcis hispanica	Reptiles	65,88	3
Podarcis muralis	Reptiles	65,88	3
Podiceps cristatus	Birds	370,43	3
Podiceps nigricollis	Birds	370,43	3
Porzana parva	Birds	197,63	3
Porzana porzana	Birds	197,63	3
Porzana pusilla	Birds	197,63	3
Prunella collaris	Birds	197,63	3
Prunella modularis	Birds	197,63	3
Psammodromus algirus	Reptiles	197,63	3
Ptyonoprogne rupestris	Birds	197,63	3
Puffinus puffinus	Birds	1.185,77	3
Pyrrhocorax graculus	Birds	370,43	3
Pyrrhocorax pyrrhocorax	Birds	592,89	3
Pyrrhula pyrrhula	Birds	197,63	3
Rallus aquaticus	Birds	370,43	3
Rana dalmatina	Amphibians	395,26	3
Rana iberica	Amphibians	263,50	3
Rana temporaria	Amphibians	65,88	3
Recurvirostra avosetta	Birds	370,43	3
Regulus ignicapilla	Birds	197,63	3
Regulus regulus	Birds	197,63	3
Remiz pendulinus	Birds	197,63	3
Rhinechis scalaris	Reptiles	263,50	3
Rhinolophus euryale	Mammals	658,76	3
Rhinolophus ferrumequinum	Mammals	370,43	3
Rhinolophus hipposideros	Mammals	131,75	3
Riparia riparia	Birds	370,43	3
Rissa tridactyla	Birds	592,89	3
Salamandra salamandra	Amphibians	65,88	3
Salaria fluviatilis	Inland fish	395,26	3
Salmo salar	Inland fish	105,40	3
Salmo trutta	Inland fish	105,40	3
Saxicola rubetra	Birds	197,63	3
Sciurus vulgaris	Mammals	197,63	3
Scolopax rusticola	Birds	131,75	3

COMBINATION REPAIR TECHNIQUE	2 COLLECTION, TRANSFER AND TREATMENT AT A RECOVERY CENTRE		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Serinus citrinella	Birds	197,63	3
Serinus serinus	Birds	39,53	3
Sitta europaea	Birds	197,63	3
Sorex coronatus	Mammals	32,94	3
Sorex minutus	Mammals	32,94	3
Squalius pyrenaicus	Inland fish	395,26	3
Sterna albifrons	Birds	370,43	3
Sterna hirundo	Birds	370,43	3
Sterna nilotica	Birds	1.852,19	3
Streptopelia decaocto	Birds	26,35	3
Streptopelia turtur	Birds	98,81	3
Strix aluco	Birds	370,43	3
Sturnus unicolor	Birds	26,35	3
Sturnus vulgaris	Birds	32,94	3
Suncus etruscus	Mammals	32,94	3
Sus scrofa	Mammals	370,43	3
Sylvia atricapilla	Birds	197,63	3
Sylvia borin	Birds	197,63	3
Sylvia cantillans	Birds	197,63	3
Sylvia communis	Birds	197,63	3
Sylvia conspicillata	Birds	197,63	3
Sylvia hortensis	Birds	197,63	3
Sylvia undata	Birds	197,63	3
Tachybaptus ruficollis	Birds	370,43	3
Tadarida teniotis	Mammals	131,75	3
Tadorna ferruginea	Birds	1.852,19	3
Tadorna tadorna	Birds	370,43	3
Talpa europaea	Mammals	32,94	3
Talpa occidentalis	Mammals	32,94	3
Tetrax tetrax	Birds	1.852,19	3
Thalasseus sandvicensis	Birds	370,43	3
Tichodroma muraria	Birds	370,43	3
Timon lepidus	Reptiles	197,63	3
Tinca tinca	Inland fish	19,76	3
Tringa ochropus	Birds	370,43	3
Triturus marmoratus	Amphibians	65,88	3
Troglodytes troglodytes	Birds	197,63	3
Turdus merula	Birds	26,35	3
Turdus philomelos	Birds	32,94	3
Turdus torquatus	Birds	370,43	3
Turdus viscivorus	Birds	32,94	3
Tyto alba	Birds	1.185,77	3
Upupa epops	Birds	370,43	3

COMBINATION REPAIR TECHNIQUE	2 COLLECTION, TRANSFER AND TREATMENT AT A RECOVERY CENTRE		
SPECIES	TYPE SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Uria aalge	Birds	592,89	3
Vanellus vanellus	Birds	65,88	3
Vipera aspis	Reptiles	65,88	3
Vipera seoanei	Reptiles	65,88	3
Vulpes vulpes	Mammals	26,35	3
Zamenis longissimus	Reptiles	197,63	3
Zootoca vivipara	Reptiles	65,88	3
Other Critically Endangered Amphibians	Amphibians	395,26	3
Other Endangered Amphibians	Amphibians	395,26	3
Other Vulnerable Amphibians	Amphibians	241,55	3
Other non-threatened Amphibians	Amphibians	228,37	3
Other Critically Endangered Birds	Birds	1.852,19	3
Other endangered Birds	Birds	1.852,19	3
Other Vulnerable Birds	Birds	1.852,19	3
Other non-threatened Birds	Birds	370,43	3
Other Critically Endangered Mammals	Mammals	1.852,19	3
Other endangered mammals	Mammals	1.852,19	3
Other Vulnerable Mammals	Mammals	1.394,03	3
Other non-threatened mammals	Mammals	370,43	3
Other critically endangered Inland fish	Inland fish	251,06	3
Other Inland fish endangered	Inland fish	251,06	3
Other vulnerable Inland fish	Inland fish	251,06	3
Other non-endangered Inland fish	Inland fish	15,81	3
Other critically endangered reptiles	Reptiles	1.852,19	3
Other endangered reptiles	Reptiles	1.852,19	3
Other vulnerable reptiles	Reptiles	395,26	3
Other non-threatened reptiles	Reptiles	191,35	3

C. DAMAGE TO ANIMAL SPECIES: COMBINATION 1A.2 (DEATH BY REMOVAL DAMAGE)

TABLE A.I-5. TECHNIQUES FOR REPAIRING DEATH BY REMOVAL DAMAGE TO ANIMAL SPECIES (COMBINATION 1A.2). SOURCE: OWN ELABORATION.

COMBINATION REPAIR TECHNIQUE	1A.2 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE OF SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Accipiter gentilis	Birds	3.952,57	6
Accipiter nisus	Birds	1.976,28	6

COMBINATION REPAIR TECHNIQUE	1A.2 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE OF SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Acrocephalus arundinaceus	Birds	2.635,05	6
Acrocephalus paludicola	Birds	197,63	6
Acrocephalus schoenobaenus	Birds	5.270,09	6
Acrocephalus scirpaceus	Birds	2.635,05	6
Actitis hypoleucos	Birds	2.635,05	6
Aegithalos caudatus	Birds	197,63	6
Aegypius monachus	Birds	106.574,13	6
Alauda arvensis	Birds	197,63	6
Alcedo atthis	Birds	592,89	6
Alectoris barbara	Birds	54,09	6
Alectoris rufa	Birds	98,81	6
Alosa alosa	Inland fish	395,26	6
Alytes obstetricans	Amphibians	65,88	6
Anas acuta	Birds	131,75	6
Anas clypeata	Birds	131,75	6
Anas crecca	Birds	98,81	6
Anas platyrhynchos	Birds	98,81	6
Anas querquedula	Birds	263,50	6
Anas strepera	Birds	131,75	6
Anguilla anguilla	Inland fish	26,35	6
Anguis fragilis	Reptiles	65,88	6
Anser anser	Birds	395,26	6
Anthus campestris	Birds	197,63	6
Anthus pratensis	Birds	197,63	6
Anthus spinoletta	Birds	197,63	6
Anthus trivialis	Birds	197,63	6
Apodemus flavicollis	Mammals	32,94	24
Apodemus sylvaticus	Mammals	32,94	24
Apus apus	Birds	592,89	6
Apus melba	Birds	592,89	6
Aquila adalberti	Birds	159.861,20	6
Aquila chrysaetos	Birds	106.574,13	6
Ardea cinerea	Birds	5.328,70	6
Ardea purpurea	Birds	5.330,17	6
Ardeola ralloides	Birds	6.587,61	6
Arvicola sapidus	Mammals	131,75	24
Arvicola terrestris	Mammals	131,75	24
Asio flammeus	Birds	2.635,05	6
Asio otus	Birds	1.185,77	6
Athene noctua	Birds	1.185,77	6
Aythya ferina	Birds	131,75	6
Aythya fuligula	Birds	197,63	6
Barbastella barbastellus	Mammals	5.270,09	24

COMBINATION REPAIR TECHNIQUE	1A.2 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE OF SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Barbus haasi	Inland fish	131,75	6
Botaurus stellaris	Birds	6.587,61	6
Bubo bubo	Birds	10.657,41	6
Bufo calamita	Amphibians	395,26	6
Burhinus oedicnemus	Birds	592,89	6
Buteo buteo	Birds	1.976,28	6
Calandrella brachydactyla	Birds	197,63	6
Calandrella rufescens	Birds	197,63	6
Callipepla californica	Birds	21,32	6
Calonectris diomedea	Birds	1.185,77	6
Calotriton asper	Amphibians	658,76	6
Canis lupus	Mammals	21.314,83	24
Capra pyrenaica	Mammals	21.314,83	24
Capreolus capreolus	Mammals	2.664,35	24
Caprimulgus europaeus	Birds	592,89	6
Carassius auratus	Inland fish	6,59	6
Carduelis cannabina	Birds	39,53	6
Carduelis carduelis	Birds	39,53	6
Carduelis chloris	Birds	39,53	6
Carduelis spinus	Birds	65,88	6
Caretta caretta	Reptiles	395,26	6
Certhia brachydactyla	Birds	197,63	6
Certhia familiaris	Birds	2.635,05	6
Cervus elaphus	Mammals	2.664,35	24
Cettia cetti	Birds	197,63	6
Chalcides minutus	Reptiles	395,26	6
Chalcides striatus	Reptiles	131,75	6
Charadrius alexandrinus	Birds	2.635,05	6
Charadrius dubius	Birds	3.952,57	6
Charadrius morinellus	Birds	592,89	6
Chelon labrosus	Inland fish	13,18	6
Chelonia mydas	Reptiles	658,76	6
Chionomys nivalis	Mammals	263,50	24
Chlamydotis undulata	Birds	21.314,83	6
Chlidonias hybrida	Birds	592,89	6
Chlidonias niger	Birds	5.270,09	6
Ciconia ciconia	Birds	10.657,41	6
Ciconia nigra	Birds	159.861,20	6
Cinclus cinclus	Birds	592,89	6
Circaetus gallicus	Birds	3.952,57	6
Circus aeruginosus	Birds	3.952,57	6
Circus cyaneus	Birds	1.976,28	6
Circus pygargus	Birds	3.952,57	6

COMBINATION REPAIR TECHNIQUE	1A.2 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE OF SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Cisticola juncidis	Birds	197,63	6
Cobitis calderoni	Inland fish	395,26	6
Coccothraustes coccothraustes	Birds	1.185,77	6
Columba bollii	Birds	21,32	6
Columba domestica	Birds	21,32	6
Columba guinea	Birds	21,32	6
Columba junoniae	Birds	21,32	6
Columba livia/domestica	Birds	52,70	6
Columba oenas	Birds	52,70	6
Columba palumbus	Birds	52,70	6
Coracias garrulus	Birds	592,89	6
Coronella austriaca	Reptiles	197,63	6
Coronella girondica	Reptiles	131,75	6
Corvus corax	Birds	263,50	6
Corvus corone	Birds	6,59	6
Corvus monedula	Birds	263,50	6
Coturnix coturnix	Birds	98,81	6
Crocidura russula	Mammals	32,94	24
Crocidura suaveolens	Mammals	32,94	24
Cuculus canorus	Birds	592,89	6
Cyanopica cyana	Birds	197,63	6
Cygnus olor	Birds	2.635,05	6
Dama dama	Mammals	2.664,35	24
Delichon urbicum	Birds	197,63	6
Dendrocopos leucotos	Birds	592,89	6
Dendrocopos major	Birds	592,89	6
Dendrocopos medius	Birds	3.952,57	6
Dendrocopos minor	Birds	592,89	6
Dermochelys coriacea	Reptiles	658,76	6
Discoglossus galganoi	Amphibians	131,75	6
Dryocopus martius	Birds	2.635,05	6
Egretta garzetta	Birds	1.976,28	6
Eliomys quercinus	Mammals	197,63	24
Emberiza calandra	Birds	65,88	6
Emberiza cia	Birds	197,63	6
Emberiza cirlus	Birds	197,63	6
Emberiza citrinella	Birds	197,63	6
Emberiza hortulana	Birds	197,63	6
Emberiza schoeniclus	Birds	2.635,05	6
Emys orbicularis	Reptiles	395,26	6
Eptesicus serotinus	Mammals	131,75	24
Eretmochelys imbricata	Reptiles	658,76	6
Erinaceus europaeus	Mammals	197,63	24

COMBINATION REPAIR TECHNIQUE	1A.2 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE OF SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Erithacus rubecula	Birds	197,63	6
Falco columbarius	Birds	3.952,57	6
Falco eleonorae	Birds	53.287,06	6
Falco naumanni	Birds	1.976,28	6
Falco pelegrinoides	Birds	53.287,06	6
Falco peregrinus	Birds	53.287,06	6
Falco subbuteo	Birds	3.952,57	6
Falco tinnunculus	Birds	1.976,28	6
Felis silvestris	Mammals	3.952,57	24
Ficedula hypoleuca	Birds	2.635,05	6
Fringilla coelebs	Birds	197,63	6
Fulica atra	Birds	65,88	6
Galemys pyrenaicus	Mammals	5.270,09	24
Galerida cristata	Birds	197,63	6
Galerida theklae	Birds	197,63	6
Gallinago gallinago	Birds	98,81	6
Gallinula chloropus	Birds	65,88	6
Gallotia gomerana	Reptiles	35.515,17	6
Garrulus glandarius	Birds	79,05	6
Gasterosteus aculeatus	Inland fish	131,75	6
Genetta genetta	Mammals	197,63	24
Glis glis	Mammals	658,76	24
Gypaetus barbatus	Birds	159.861,20	6
Gyps fulvus	Birds	53.287,06	6
Haematopus ostralegus	Birds	592,89	6
Hieraaetus fasciatus	Birds	53.287,06	6
Hieraaetus pennatus	Birds	3.952,57	6
Hierophis viridiflavus	Reptiles	395,26	6
Himantopus himantopus	Birds	592,89	6
Hippolais polyglotta	Birds	197,63	6
Hirundo rustica	Birds	197,63	6
Hydrobates pelagicus	Birds	2.635,05	6
Hyla arborea	Amphibians	263,50	6
Hyla meridionalis	Amphibians	658,76	6
Hypsugo savii	Mammals	131,75	24
Ixobrychus minutus	Birds	3.952,57	6
Jynx torquilla	Birds	592,89	6
Lacerta bilineata	Reptiles	197,63	6
Lacerta schreiberi	Reptiles	197,63	6
Lamprotornis caudatus	Birds	5,32	6
Lamprotornis chalybaeus	Birds	6,79	6
Lanius collurio	Birds	197,63	6
Lanius excubitor	Birds	197,63	6

COMBINATION REPAIR TECHNIQUE	1A.2 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE OF SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Lanius senator	Birds	3.952,57	6
Larus argentatus	Birds	26,35	6
Larus audouinii	Birds	1.976,28	6
Larus fuscus	Birds	592,89	6
Larus genei	Birds	592,89	6
Larus melanocephalus	Birds	592,89	6
Larus michahellis	Birds	26,35	6
Larus ridibundus	Birds	26,35	6
Lepus castroviejoi	Mammals	395,26	24
Lepus europaeus	Mammals	395,26	24
Lepus granatensis	Mammals	395,26	24
Lepus schlumbergeri	Mammals	395,26	24
Limosa limosa	Birds	592,89	6
Lissotriton helveticus	Amphibians	131,75	6
Locustella luscinioides	Birds	5.270,09	6
Locustella naevia	Birds	197,63	6
Loxia curvirostra	Birds	1.185,77	6
Lullula arborea	Birds	197,63	6
Luscinia megarhynchos	Birds	197,63	6
Luscinia svecica	Birds	197,63	6
Lutra lutra	Mammals	10.657,41	24
Lynx pardinus	Mammals	159.861,20	24
Malpolon monspessulanus	Reptiles	197,63	6
Martes foina	Mammals	197,63	24
Martes martes	Mammals	527,01	24
Mauremys leprosa	Reptiles	395,26	6
Melanocorypha calandra	Birds	197,63	6
Meles meles	Mammals	197,63	24
Merops apiaster	Birds	592,89	6
Mesotriton alpestris	Amphibians	395,26	6
Micromys minutus	Mammals	32,94	24
Microtus agrestis	Mammals	32,94	24
Microtus arvalis	Mammals	32,94	24
Microtus duodecimcostatus	Mammals	32,94	24
Microtus gerbei	Mammals	32,94	24
Microtus lusitanicus	Mammals	32,94	24
Milvus migrans	Birds	1.976,28	6
Milvus milvus	Birds	5.270,09	6
Miniopterus schreibersii	Mammals	527,01	24
Monticola saxatilis	Birds	592,89	6
Monticola solitarius	Birds	592,89	6
Montifringilla nivalis	Birds	197,63	6
Motacilla alba	Birds	197,63	6

COMBINATION REPAIR TECHNIQUE	1A.2 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE OF SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Motacilla cinerea	Birds	197,63	6
Motacilla flava	Birds	197,63	6
Mus musculus	Mammals	32,94	24
Mus spretus	Mammals	32,94	24
Muscicapa striata	Birds	197,63	6
Mustela erminea	Mammals	5.270,09	24
Mustela lutreola	Mammals	5.270,09	24
Mustela nivalis	Mammals	131,75	24
Mustela putorius	Mammals	527,01	24
Myodes glareolus	Mammals	32,94	24
Myotis alcathoe	Mammals	658,76	24
Myotis bechsteinii	Mammals	658,76	24
Myotis blythii	Mammals	527,01	24
Myotis daubentonii	Mammals	131,75	24
Myotis emarginatus	Mammals	527,01	24
Myotis myotis	Mammals	658,76	24
Myotis mystacinus	Mammals	658,76	24
Myotis nattereri	Mammals	131,75	24
Natrix maura	Reptiles	131,75	6
Natrix natrix	Reptiles	131,75	6
Neomys anomalus	Mammals	32,94	24
Neomys fodiens	Mammals	32,94	24
Neophron percnopterus	Birds	53.287,06	6
Netta rufina	Birds	197,63	6
Numenius arquata	Birds	592,89	6
Nyctalus lasiopterus	Mammals	527,01	24
Nyctalus leisleri	Mammals	131,75	24
Nyctalus noctula	Mammals	527,01	24
Nycticorax nycticorax	Birds	3.952,57	6
Oenanthe hispanica	Birds	197,63	6
Oenanthe leucura	Birds	197,63	6
Oenanthe oenanthe	Birds	197,63	6
Oriolus oriolus	Birds	592,89	6
Oryctolagus cuniculus	Mammals	65,88	24
Otis tarda	Birds	21.314,83	6
Otus scops	Birds	1.185,77	6
Ovis aries	Mammals	2.664,35	24
Pandion haliaetus	Birds	106.574,13	6
Panurus biarmicus	Birds	197,63	6
Parachondrostoma miegii	Inland fish	19,76	6
Parus ater	Birds	197,63	6
Parus cristatus	Birds	197,63	6
Parus major	Birds	197,63	6

COMBINATION REPAIR TECHNIQUE	1A.2 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE OF SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Parus palustris	Birds	197,63	6
Passer domesticus	Birds	32,94	6
Passer montanus	Birds	197,63	6
Pelobates cultripes	Amphibians	197,63	6
Pelodytes punctatus	Amphibians	65,88	6
Pelophylax perezi	Amphibians	39,53	6
Perdix perdix	Birds	54,09	6
Pernis apivorus	Birds	2.635,05	6
Petromyzon marinus	Inland fish	395,26	6
Petronia petronia	Birds	197,63	6
Phalacrocorax aristotelis	Birds	3.952,57	6
Phalacrocorax carbo	Birds	1.185,77	6
Phasianus colchicus	Birds	98,81	6
Phoenicopterus roseus	Birds	5.270,09	6
Phoenicurus ochruros	Birds	197,63	6
Phoenicurus phoenicurus	Birds	3.952,57	6
Phoxinus bigerri	Inland fish	19,76	6
Phylloscopus bonelli	Birds	197,63	6
Phylloscopus sibilatrix	Birds	197,63	6
Phylloscopus trochilus	Birds	2.635,05	6
Pica pica	Birds	6,59	6
Picus viridis	Birds	592,89	6
Pipistrellus kuhlii	Mammals	131,75	24
Pipistrellus nathusii	Mammals	131,75	24
Pipistrellus pipistrellus	Mammals	131,75	24
Pipistrellus pygmaeus	Mammals	131,75	24
Platalea leucorodia	Birds	5.270,09	6
Platichthys flesus	Inland fish	19,76	6
Plecotus auritus	Mammals	131,75	24
Plecotus austriacus	Mammals	131,75	24
Podarcis hispanica	Reptiles	65,88	6
Podarcis muralis	Reptiles	65,88	6
Podiceps cristatus	Birds	592,89	6
Podiceps nigricollis	Birds	592,89	6
Porzana parva	Birds	197,63	6
Porzana porzana	Birds	197,63	6
Porzana pusilla	Birds	197,63	6
Prunella collaris	Birds	197,63	6
Prunella modularis	Birds	197,63	6
Psammodromus algirus	Reptiles	197,63	6
Ptyonoprogne rupestris	Birds	197,63	6
Puffinus puffinus	Birds	1.185,77	6
Pyrrhocorax graculus	Birds	592,89	6

COMBINATION REPAIR TECHNIQUE	1A.2 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE OF SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Pyrrhocorax pyrrhocorax	Birds	592,89	6
Pyrrhula pyrrhula	Birds	197,63	6
Rallus aquaticus	Birds	2.635,05	6
Rana dalmatina	Amphibians	395,26	6
Rana iberica	Amphibians	263,50	6
Rana temporaria	Amphibians	65,88	6
Recurvirostra avosetta	Birds	592,89	6
Regulus ignicapilla	Birds	197,63	6
Regulus regulus	Birds	197,63	6
Remiz pendulinus	Birds	197,63	6
Rhinechis scalaris	Reptiles	263,50	6
Rhinolophus euryale	Mammals	658,76	24
Rhinolophus ferrumequinum	Mammals	527,01	24
Rhinolophus hipposideros	Mammals	131,75	24
Riparia riparia	Birds	3.952,57	6
Rissa tridactyla	Birds	592,89	6
Salamandra salamandra	Amphibians	65,88	6
Salaria fluviatilis	Inland fish	395,26	6
Salmo salar	Inland fish	105,40	6
Salmo trutta	Inland fish	105,40	6
Saxicola rubetra	Birds	197,63	6
Sciurus vulgaris	Mammals	197,63	24
Scolopax rusticola	Birds	131,75	6
Serinus citrinella	Birds	197,63	6
Serinus serinus	Birds	39,53	6
Sitta europaea	Birds	197,63	6
Sorex coronatus	Mammals	32,94	24
Sorex minutus	Mammals	32,94	24
Squalius pyrenaicus	Inland fish	395,26	6
Sterna albifrons	Birds	592,89	6
Sterna hirundo	Birds	592,89	6
Sterna nilotica	Birds	2.635,05	6
Streptopelia decaocto	Birds	26,35	6
Streptopelia turtur	Birds	98,81	6
Strix aluco	Birds	1.185,77	6
Sturnus unicolor	Birds	26,35	6
Sturnus vulgaris	Birds	32,94	6
Suncus etruscus	Mammals	32,94	24
Sus scrofa	Mammals	532,86	24
Sylvia atricapilla	Birds	197,63	6
Sylvia borin	Birds	197,63	6
Sylvia cantillans	Birds	197,63	6
Sylvia communis	Birds	197,63	6

COMBINATION REPAIR TECHNIQUE	1A.2 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE OF SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Sylvia conspicillata	Birds	197,63	6
Sylvia hortensis	Birds	197,63	6
Sylvia undata	Birds	197,63	6
Tachybaptus ruficollis	Birds	2.635,05	6
Tadarida teniotis	Mammals	131,75	24
Tadorna ferruginea	Birds	3.952,57	6
Tadorna tadorna	Birds	3.952,57	6
Talpa europaea	Mammals	32,94	24
Talpa occidentalis	Mammals	32,94	24
Tetrax tetrax	Birds	3.952,57	6
Thalasseus sandvicensis	Birds	592,89	6
Tichodroma muraria	Birds	1.976,28	6
Timon lepidus	Reptiles	197,63	6
Tinca tinca	Inland fish	19,76	6
Tringa ochropus	Birds	592,89	6
Triturus marmoratus	Amphibians	65,88	6
Troglodytes troglodytes	Birds	197,63	6
Turdus merula	Birds	26,35	6
Turdus philomelos	Birds	32,94	6
Turdus torquatus	Birds	592,89	6
Turdus viscivorus	Birds	32,94	6
Tyto alba	Birds	1.185,77	6
Upupa epops	Birds	3.952,57	6
Uria aalge	Birds	592,89	6
Vanellus vanellus	Birds	65,88	6
Vipera aspis	Reptiles	65,88	6
Vipera seoanei	Reptiles	65,88	6
Vulpes vulpes	Mammals	26,35	24
Zamenis longissimus	Reptiles	197,63	6
Zootoca vivipara	Reptiles	65,88	6
Other Critically Endangered Amphibians	Amphibians	395,26	6
Other Endangered Amphibians	Amphibians	395,26	6
Other Vulnerable Amphibians	Amphibians	241,55	6
Other non-threatened Amphibians	Amphibians	228,37	6
Other Critically Endangered Birds	Birds	34.198,85	6
Other endangered Birds	Birds	24.973,21	6
Other Vulnerable Birds	Birds	11.575,07	6
Other non-threatened Birds	Birds	2.184,66	6
Other Critically Endangered Mammals	Mammals	159.861,20	24
Other endangered mammals	Mammals	5.270,09	24
Other Vulnerable Mammals	Mammals	1.394,03	24

COMBINATION REPAIR TECHNIQUE	1A.2 CAPTIVE BREEDING AND RELEASE OF REPLACEMENT INDIVIDUALS		
SPECIES	TYPE OF SPECIES	PEC (€2019/UD; UNIT COST)	RECOVERY TIME (MONTHS)
Other non-threatened mammals	Mammals	1.394,03	24
Other critically endangered Inland fish	Inland fish	251,06	6
Other Inland fish at risk	Inland fish	251,06	6
Other vulnerable Inland fish	Inland fish	251,06	6
Other non-endangered Inland fish	Inland fish	15,81	6
Other critically endangered reptiles	Reptiles	9.241,11	6
Other endangered reptiles	Reptiles	9.241,11	6
Other vulnerable reptiles	Reptiles	395,26	6
Other non-threatened reptiles	Reptiles	191,35	6

D. DAMAGE TO ANIMAL SPECIES: COMBINATION 1B (GMO FATALITY DAMAGE)

TABLE A.I-6. REMEDIATION TECHNIQUES FOR GMO DEATH DAMAGE TO ANIMAL SPECIES (COMBINATION 1B). SOURCE: OWN ELABORATION.

COMBINATION REPAIR TECHNIQUE	1B CAPTURE OF GMOS AND RESTOCKING WITH CAPTIVE-BRED INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Accipiter gentilis	Birds	3.952,57	6.694,43	6
Accipiter nisus	Birds	1.976,28	6.694,43	6
Acrocephalus arundinaceus	Birds	2.635,05	6.694,43	6
Acrocephalus paludicola	Birds	197,63	6.694,43	6
Acrocephalus schoenobaenus	Birds	5.270,09	6.694,43	6
Acrocephalus scirpaceus	Birds	2.635,05	6.694,43	6
Actitis hypoleucos	Birds	2.635,05	6.694,43	6
Aegithalos caudatus	Birds	197,63	6.694,43	6
Aegypius monachus	Birds	106.574,13	6.694,43	6
Alauda arvensis	Birds	197,63	6.694,43	6
Alcedo atthis	Birds	592,89	6.694,43	6
Alectoris barbara	Birds	54,09	6.694,43	6
Alectoris rufa	Birds	98,81	6.694,43	6
Alosa alosa	Inland fish	395,26	7.349,05	6
Alytes obstetricans	Amphibians	65,88	7.349,05	6
Anas acuta	Birds	131,75	6.694,43	6
Anas clypeata	Birds	131,75	6.694,43	6
Anas crecca	Birds	98,81	6.694,43	6
Anas platyrhynchos	Birds	98,81	6.694,43	6
Anas querquedula	Birds	263,50	6.694,43	6
Anas strepera	Birds	131,75	6.694,43	6

COMBINATION REPAIR TECHNIQUE	1B CAPTURE OF GMOS AND RESTOCKING WITH CAPTIVE-BRED INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Anguilla anguilla	Inland fish	26,35	7.349,05	6
Anguis fragilis	Reptiles	65,88	7.349,05	6
Anser anser	Birds	395,26	6.694,43	6
Anthus campestris	Birds	197,63	6.694,43	6
Anthus pratensis	Birds	197,63	6.694,43	6
Anthus spinoletta	Birds	197,63	6.694,43	6
Anthus trivialis	Birds	197,63	6.694,43	6
Apodemus flavicollis	Mammals	32,94	23.257,30	24
Apodemus sylvaticus	Mammals	32,94	23.257,30	24
Apus apus	Birds	592,89	6.694,43	6
Apus melba	Birds	592,89	6.694,43	6
Aquila adalberti	Birds	159.861,20	6.694,43	6
Aquila chrysaetos	Birds	106.574,13	6.694,43	6
Ardea cinerea	Birds	5.328,70	6.694,43	6
Ardea purpurea	Birds	5.330,17	6.694,43	6
Ardeola ralloides	Birds	6.587,61	6.694,43	6
Arvicola sapidus	Mammals	131,75	23.257,30	24
Arvicola terrestris	Mammals	131,75	23.257,30	24
Asio flammeus	Birds	2.635,05	6.694,43	6
Asio otus	Birds	1.185,77	6.694,43	6
Athene noctua	Birds	1.185,77	6.694,43	6
Aythya ferina	Birds	131,75	6.694,43	6
Aythya fuligula	Birds	197,63	6.694,43	6
Barbastella barbastellus	Mammals	5.270,09	23.257,30	24
Barbus haasi	Inland fish	131,75	7.349,05	6
Botaurus stellaris	Birds	6.587,61	6.694,43	6
Bubo bubo	Birds	10.657,41	6.694,43	6
Bufo calamita	Amphibians	395,26	7.349,05	6
Burhinus oedicnemus	Birds	592,89	6.694,43	6
Buteo buteo	Birds	1.976,28	6.694,43	6
Calandrella brachydactyla	Birds	197,63	6.694,43	6
Calandrella rufescens	Birds	197,63	6.694,43	6
Callipepla californica	Birds	21,32	6.694,43	6
Calonectris diomedea	Birds	1.185,77	6.694,43	6
Calotriton asper	Amphibians	658,76	7.349,05	6
Canis lupus	Mammals	21.314,83	23.257,30	24
Capra pyrenaica	Mammals	21.314,83	23.257,30	24
Capreolus capreolus	Mammals	2.664,35	23.257,30	24
Caprimulgus europaeus	Birds	592,89	6.694,43	6
Carassius auratus	Inland fish	6,59	7.349,05	6
Carduelis cannabina	Birds	39,53	6.694,43	6
Carduelis carduelis	Birds	39,53	6.694,43	6

COMBINATION REPAIR TECHNIQUE	1B CAPTURE OF GMOS AND RESTOCKING WITH CAPTIVE-BRED INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Carduelis chloris	Birds	39,53	6.694,43	6
Carduelis spinus	Birds	65,88	6.694,43	6
Caretta caretta	Reptiles	395,26	7.349,05	6
Certhia brachydactyla	Birds	197,63	6.694,43	6
Certhia familiaris	Birds	2.635,05	6.694,43	6
Cervus elaphus	Mammals	2.664,35	23.257,30	24
Cettia cetti	Birds	197,63	6.694,43	6
Chalcides minutus	Reptiles	395,26	7.349,05	6
Chalcides striatus	Reptiles	131,75	7.349,05	6
Charadrius alexandrinus	Birds	2.635,05	6.694,43	6
Charadrius dubius	Birds	3.952,57	6.694,43	6
Charadrius morinellus	Birds	592,89	6.694,43	6
Chelon labrosus	Inland fish	13,18	7.349,05	6
Chelonia mydas	Reptiles	658,76	7.349,05	6
Chionomys nivalis	Mammals	263,50	23.257,30	24
Chlamydotis undulata	Birds	21.314,83	6.694,43	6
Chlidonias hybrida	Birds	592,89	6.694,43	6
Chlidonias niger	Birds	5.270,09	6.694,43	6
Ciconia ciconia	Birds	10.657,41	6.694,43	6
Ciconia nigra	Birds	159.861,20	6.694,43	6
Cinclus cinclus	Birds	592,89	6.694,43	6
Circaetus gallicus	Birds	3.952,57	6.694,43	6
Circus aeruginosus	Birds	3.952,57	6.694,43	6
Circus cyaneus	Birds	1.976,28	6.694,43	6
Circus pygargus	Birds	3.952,57	6.694,43	6
Cisticola juncidis	Birds	197,63	6.694,43	6
Cobitis calderoni	Inland fish	395,26	7.349,05	6
Coccothraustes coccothraustes	Birds	1.185,77	6.694,43	6
Columba bollii	Birds	21,32	6.694,43	6
Columba domestica	Birds	21,32	6.694,43	6
Columba guinea	Birds	21,32	6.694,43	6
Columba junoniae	Birds	21,32	6.694,43	6
Columba livia/domestica	Birds	52,70	6.694,43	6
Columba oenas	Birds	52,70	6.694,43	6
Columba palumbus	Birds	52,70	6.694,43	6
Coracias garrulus	Birds	592,89	6.694,43	6
Coronella austriaca	Reptiles	197,63	7.349,05	6
Coronella girondica	Reptiles	131,75	7.349,05	6
Corvus corax	Birds	263,50	6.694,43	6
Corvus corone	Birds	6,59	6.694,43	6
Corvus monedula	Birds	263,50	6.694,43	6
Coturnix coturnix	Birds	98,81	6.694,43	6

COMBINATION REPAIR TECHNIQUE	1B CAPTURE OF GMOS AND RESTOCKING WITH CAPTIVE-BRED INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Crocidura russula	Mammals	32,94	23.257,30	24
Crocidura suaveolens	Mammals	32,94	23.257,30	24
Cuculus canorus	Birds	592,89	6.694,43	6
Cyanopica cyana	Birds	197,63	6.694,43	6
Cygnus olor	Birds	2.635,05	6.694,43	6
Dama dama	Mammals	2.664,35	23.257,30	24
Delichon urbicum	Birds	197,63	6.694,43	6
Dendrocopos leucotos	Birds	592,89	6.694,43	6
Dendrocopos major	Birds	592,89	6.694,43	6
Dendrocopos medius	Birds	3.952,57	6.694,43	6
Dendrocopos minor	Birds	592,89	6.694,43	6
Dermochelys coriacea	Reptiles	658,76	7.349,05	6
Discoglossus galganoi	Amphibians	131,75	7.349,05	6
Dryocopus martius	Birds	2.635,05	6.694,43	6
Egretta garzetta	Birds	1.976,28	6.694,43	6
Eliomys quercinus	Mammals	197,63	23.257,30	24
Emberiza calandra	Birds	65,88	6.694,43	6
Emberiza cia	Birds	197,63	6.694,43	6
Emberiza cirlus	Birds	197,63	6.694,43	6
Emberiza citrinella	Birds	197,63	6.694,43	6
Emberiza hortulana	Birds	197,63	6.694,43	6
Emberiza schoeniclus	Birds	2.635,05	6.694,43	6
Emys orbicularis	Reptiles	395,26	7.349,05	6
Eptesicus serotinus	Mammals	131,75	23.257,30	24
Eretmochelys imbricata	Reptiles	658,76	7.349,05	6
Erinaceus europaeus	Mammals	197,63	23.257,30	24
Erithacus rubecula	Birds	197,63	6.694,43	6
Falco columbarius	Birds	3.952,57	6.694,43	6
Falco eleonorae	Birds	53.287,06	6.694,43	6
Falco naumanni	Birds	1.976,28	6.694,43	6
Falco pelegrinoides	Birds	53.287,06	6.694,43	6
Falco peregrinus	Birds	53.287,06	6.694,43	6
Falco subbuteo	Birds	3.952,57	6.694,43	6
Falco tinnunculus	Birds	1.976,28	6.694,43	6
Felis silvestris	Mammals	3.952,57	23.257,30	24
Ficedula hypoleuca	Birds	2.635,05	6.694,43	6
Fringilla coelebs	Birds	197,63	6.694,43	6
Fulica atra	Birds	65,88	6.694,43	6
Galemys pyrenaicus	Mammals	5.270,09	23.257,30	24
Galerida cristata	Birds	197,63	6.694,43	6
Galerida theklae	Birds	197,63	6.694,43	6
Gallinago gallinago	Birds	98,81	6.694,43	6

COMBINATION REPAIR TECHNIQUE	1B CAPTURE OF GMOS AND RESTOCKING WITH CAPTIVE-BRED INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Gallinula chloropus	Birds	65,88	6.694,43	6
Gallotia gomerana	Reptiles	35.515,17	7.349,05	6
Garrulus glandarius	Birds	79,05	6.694,43	6
Gasterosteus aculeatus	Inland fish	131,75	7.349,05	6
Genetta genetta	Mammals	197,63	23.257,30	24
Glis glis	Mammals	658,76	23.257,30	24
Gypaetus barbatus	Birds	159.861,20	6.694,43	6
Gyps fulvus	Birds	53.287,06	6.694,43	6
Haematopus ostralegus	Birds	592,89	6.694,43	6
Hieraaetus fasciatus	Birds	53.287,06	6.694,43	6
Hieraaetus pennatus	Birds	3.952,57	6.694,43	6
Hierophis viridiflavus	Reptiles	395,26	7.349,05	6
Himantopus himantopus	Birds	592,89	6.694,43	6
Hippolais polyglotta	Birds	197,63	6.694,43	6
Hirundo rustica	Birds	197,63	6.694,43	6
Hydrobates pelagicus	Birds	2.635,05	6.694,43	6
Hyla arborea	Amphibians	263,50	7.349,05	6
Hyla meridionalis	Amphibians	658,76	7.349,05	6
Hypsugo savii	Mammals	131,75	23.257,30	24
Ixobrychus minutus	Birds	3.952,57	6.694,43	6
Jynx torquilla	Birds	592,89	6.694,43	6
Lacerta bilineata	Reptiles	197,63	7.349,05	6
Lacerta schreiberi	Reptiles	197,63	7.349,05	6
Lamprotornis caudatus	Birds	5,32	6.694,43	6
Lamprotornis chalybaeus	Birds	6,79	6.694,43	6
Lanius collurio	Birds	197,63	6.694,43	6
Lanius excubitor	Birds	197,63	6.694,43	6
Lanius senator	Birds	3.952,57	6.694,43	6
Larus argentatus	Birds	26,35	6.694,43	6
Larus audouinii	Birds	1.976,28	6.694,43	6
Larus fuscus	Birds	592,89	6.694,43	6
Larus genei	Birds	592,89	6.694,43	6
Larus melanocephalus	Birds	592,89	6.694,43	6
Larus michahellis	Birds	26,35	6.694,43	6
Larus ridibundus	Birds	26,35	6.694,43	6
Lepus castroviejoi	Mammals	395,26	23.257,30	24
Lepus europaeus	Mammals	395,26	23.257,30	24
Lepus granatensis	Mammals	395,26	23.257,30	24
Lepus schlumbergeri	Mammals	395,26	23.257,30	24
Limosa limosa	Birds	592,89	6.694,43	6
Lissotriton helveticus	Amphibians	131,75	7.349,05	6
Locustella luscinioides	Birds	5.270,09	6.694,43	6

COMBINATION REPAIR TECHNIQUE	1B CAPTURE OF GMOS AND RESTOCKING WITH CAPTIVE-BRED INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Locustella naevia	Birds	197,63	6.694,43	6
Loxia curvirostra	Birds	1.185,77	6.694,43	6
Lullula arborea	Birds	197,63	6.694,43	6
Luscinia megarhynchos	Birds	197,63	6.694,43	6
Luscinia svecica	Birds	197,63	6.694,43	6
Lutra lutra	Mammals	10.657,41	23.257,30	24
Lynx pardinus	Mammals	159.861,20	23.257,30	24
Malpolon monspessulanus	Reptiles	197,63	7.349,05	6
Martes foina	Mammals	197,63	23.257,30	24
Martes martes	Mammals	527,01	23.257,30	24
Mauremys leprosa	Reptiles	395,26	7.349,05	6
Melanocorypha calandra	Birds	197,63	6.694,43	6
Meles meles	Mammals	197,63	23.257,30	24
Merops apiaster	Birds	592,89	6.694,43	6
Mesotriton alpestris	Amphibians	395,26	7.349,05	6
Micromys minutus	Mammals	32,94	23.257,30	24
Microtus agrestis	Mammals	32,94	23.257,30	24
Microtus arvalis	Mammals	32,94	23.257,30	24
Microtus duodecimcostatus	Mammals	32,94	23.257,30	24
Microtus gerbei	Mammals	32,94	23.257,30	24
Microtus lusitanicus	Mammals	32,94	23.257,30	24
Milvus migrans	Birds	1.976,28	6.694,43	6
Milvus milvus	Birds	5.270,09	6.694,43	6
Miniopterus schreibersii	Mammals	527,01	23.257,30	24
Monticola saxatilis	Birds	592,89	6.694,43	6
Monticola solitarius	Birds	592,89	6.694,43	6
Montifringilla nivalis	Birds	197,63	6.694,43	6
Motacilla alba	Birds	197,63	6.694,43	6
Motacilla cinerea	Birds	197,63	6.694,43	6
Motacilla flava	Birds	197,63	6.694,43	6
Mus musculus	Mammals	32,94	23.257,30	24
Mus spretus	Mammals	32,94	23.257,30	24
Muscicapa striata	Birds	197,63	6.694,43	6
Mustela erminea	Mammals	5.270,09	23.257,30	24
Mustela lutreola	Mammals	5.270,09	23.257,30	24
Mustela nivalis	Mammals	131,75	23.257,30	24
Mustela putorius	Mammals	527,01	23.257,30	24
Myodes glareolus	Mammals	32,94	23.257,30	24
Myotis alcathoe	Mammals	658,76	23.257,30	24
Myotis bechsteinii	Mammals	658,76	23.257,30	24
Myotis blythii	Mammals	527,01	23.257,30	24
Myotis daubentonii	Mammals	131,75	23.257,30	24

COMBINATION REPAIR TECHNIQUE	1B CAPTURE OF GMOS AND RESTOCKING WITH CAPTIVE-BRED INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Myotis emarginatus	Mammals	527,01	23.257,30	24
Myotis myotis	Mammals	658,76	23.257,30	24
Myotis mystacinus	Mammals	658,76	23.257,30	24
Myotis nattereri	Mammals	131,75	23.257,30	24
Natrix maura	Reptiles	131,75	7.349,05	6
Natrix natrix	Reptiles	131,75	7.349,05	6
Neomys anomalus	Mammals	32,94	23.257,30	24
Neomys fodiens	Mammals	32,94	23.257,30	24
Neophron percnopterus	Birds	53.287,06	6.694,43	6
Netta rufina	Birds	197,63	6.694,43	6
Numenius arquata	Birds	592,89	6.694,43	6
Nyctalus lasiopterus	Mammals	527,01	23.257,30	24
Nyctalus leisleri	Mammals	131,75	23.257,30	24
Nyctalus noctula	Mammals	527,01	23.257,30	24
Nycticorax nycticorax	Birds	3.952,57	6.694,43	6
Oenanthe hispanica	Birds	197,63	6.694,43	6
Oenanthe leucura	Birds	197,63	6.694,43	6
Oenanthe oenanthe	Birds	197,63	6.694,43	6
Oriolus oriolus	Birds	592,89	6.694,43	6
Oryctolagus cuniculus	Mammals	65,88	23.257,30	24
Otis tarda	Birds	21.314,83	6.694,43	6
Otus scops	Birds	1.185,77	6.694,43	6
Ovis aries	Mammals	2.664,35	23.257,30	24
Pandion haliaetus	Birds	106.574,13	6.694,43	6
Panurus biarmicus	Birds	197,63	6.694,43	6
Parachondrostoma miegii	Inland fish	19,76	7.349,05	6
Parus ater	Birds	197,63	6.694,43	6
Parus cristatus	Birds	197,63	6.694,43	6
Parus major	Birds	197,63	6.694,43	6
Parus palustris	Birds	197,63	6.694,43	6
Passer domesticus	Birds	32,94	6.694,43	6
Passer montanus	Birds	197,63	6.694,43	6
Pelobates cultripes	Amphibians	197,63	7.349,05	6
Pelodytes punctatus	Amphibians	65,88	7.349,05	6
Pelophylax perezi	Amphibians	39,53	7.349,05	6
Perdix perdix	Birds	54,09	6.694,43	6
Pernis apivorus	Birds	2.635,05	6.694,43	6
Petromyzon marinus	Inland fish	395,26	7.349,05	6
Petronia petronia	Birds	197,63	6.694,43	6
Phalacrocorax aristotelis	Birds	3.952,57	6.694,43	6
Phalacrocorax carbo	Birds	1.185,77	6.694,43	6
Phasianus colchicus	Birds	98,81	6.694,43	6

COMBINATION REPAIR TECHNIQUE	1B CAPTURE OF GMOS AND RESTOCKING WITH CAPTIVE-BRED INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Phoenicopterus roseus	Birds	5.270,09	6.694,43	6
Phoenicurus ochruros	Birds	197,63	6.694,43	6
Phoenicurus phoenicurus	Birds	3.952,57	6.694,43	6
Phoxinus bigerri	Inland fish	19,76	7.349,05	6
Phylloscopus bonelli	Birds	197,63	6.694,43	6
Phylloscopus sibilatrix	Birds	197,63	6.694,43	6
Phylloscopus trochilus	Birds	2.635,05	6.694,43	6
Pica pica	Birds	6,59	6.694,43	6
Picus viridis	Birds	592,89	6.694,43	6
Pipistrellus kuhlii	Mammals	131,75	23.257,30	24
Pipistrellus nathusii	Mammals	131,75	23.257,30	24
Pipistrellus pipistrellus	Mammals	131,75	23.257,30	24
Pipistrellus pygmaeus	Mammals	131,75	23.257,30	24
Platalea leucorodia	Birds	5.270,09	6.694,43	6
Platichthys flesus	Inland fish	19,76	7.349,05	6
Plecotus auritus	Mammals	131,75	23.257,30	24
Plecotus austriacus	Mammals	131,75	23.257,30	24
Podarcis hispanica	Reptiles	65,88	7.349,05	6
Podarcis muralis	Reptiles	65,88	7.349,05	6
Podiceps cristatus	Birds	592,89	6.694,43	6
Podiceps nigricollis	Birds	592,89	6.694,43	6
Porzana parva	Birds	197,63	6.694,43	6
Porzana porzana	Birds	197,63	6.694,43	6
Porzana pusilla	Birds	197,63	6.694,43	6
Prunella collaris	Birds	197,63	6.694,43	6
Prunella modularis	Birds	197,63	6.694,43	6
Psammodromus algirus	Reptiles	197,63	7.349,05	6
Ptyonoprogne rupestris	Birds	197,63	6.694,43	6
Puffinus puffinus	Birds	1.185,77	6.694,43	6
Pyrrhocorax graculus	Birds	592,89	6.694,43	6
Pyrrhocorax pyrrhocorax	Birds	592,89	6.694,43	6
Pyrrhula pyrrhula	Birds	197,63	6.694,43	6
Rallus aquaticus	Birds	2.635,05	6.694,43	6
Rana dalmatina	Amphibians	395,26	7.349,05	6
Rana iberica	Amphibians	263,50	7.349,05	6
Rana temporaria	Amphibians	65,88	7.349,05	6
Recurvirostra avosetta	Birds	592,89	6.694,43	6
Regulus ignicapilla	Birds	197,63	6.694,43	6
Regulus regulus	Birds	197,63	6.694,43	6
Remiz pendulinus	Birds	197,63	6.694,43	6
Rhinechis scalaris	Reptiles	263,50	7.349,05	6
Rhinolophus euryale	Mammals	658,76	23.257,30	24

COMBINATION REPAIR TECHNIQUE	1B CAPTURE OF GMOS AND RESTOCKING WITH CAPTIVE-BRED INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Rhinolophus ferrumequinum	Mammals	527,01	23.257,30	24
Rhinolophus hipposideros	Mammals	131,75	23.257,30	24
Riparia riparia	Birds	3.952,57	6.694,43	6
Rissa tridactyla	Birds	592,89	6.694,43	6
Salamandra salamandra	Amphibians	65,88	7.349,05	6
Salaria fluviatilis	Inland fish	395,26	7.349,05	6
Salmo salar	Inland fish	105,40	7.349,05	6
Salmo trutta	Inland fish	105,40	7.349,05	6
Saxicola rubetra	Birds	197,63	6.694,43	6
Sciurus vulgaris	Mammals	197,63	23.257,30	24
Scolopax rusticola	Birds	131,75	6.694,43	6
Serinus citrinella	Birds	197,63	6.694,43	6
Serinus serinus	Birds	39,53	6.694,43	6
Sitta europaea	Birds	197,63	6.694,43	6
Sorex coronatus	Mammals	32,94	23.257,30	24
Sorex minutus	Mammals	32,94	23.257,30	24
Squalius pyrenaicus	Inland fish	395,26	7.349,05	6
Sterna albifrons	Birds	592,89	6.694,43	6
Sterna hirundo	Birds	592,89	6.694,43	6
Sterna nilotica	Birds	2.635,05	6.694,43	6
Streptopelia decaocto	Birds	26,35	6.694,43	6
Streptopelia turtur	Birds	98,81	6.694,43	6
Strix aluco	Birds	1.185,77	6.694,43	6
Sturnus unicolor	Birds	26,35	6.694,43	6
Sturnus vulgaris	Birds	32,94	6.694,43	6
Suncus etruscus	Mammals	32,94	23.257,30	24
Sus scrofa	Mammals	532,86	23.257,30	24
Sylvia atricapilla	Birds	197,63	6.694,43	6
Sylvia borin	Birds	197,63	6.694,43	6
Sylvia cantillans	Birds	197,63	6.694,43	6
Sylvia communis	Birds	197,63	6.694,43	6
Sylvia conspicillata	Birds	197,63	6.694,43	6
Sylvia hortensis	Birds	197,63	6.694,43	6
Sylvia undata	Birds	197,63	6.694,43	6
Tachybaptus ruficollis	Birds	2.635,05	6.694,43	6
Tadarida teniotis	Mammals	131,75	23.257,30	24
Tadorna ferruginea	Birds	3.952,57	6.694,43	6
Tadorna tadorna	Birds	3.952,57	6.694,43	6
Talpa europaea	Mammals	32,94	23.257,30	24
Talpa occidentalis	Mammals	32,94	23.257,30	24
Tetrax tetrax	Birds	3.952,57	6.694,43	6

COMBINATION REPAIR TECHNIQUE	1B CAPTURE OF GMOS AND RESTOCKING WITH CAPTIVE-BRED INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Thalasseus sandvicensis	Birds	592,89	6.694,43	6
Tichodroma muraria	Birds	1.976,28	6.694,43	6
Timon lepidus	Reptiles	197,63	7.349,05	6
Tinca tinca	Inland fish	19,76	7.349,05	6
Tringa ochropus	Birds	592,89	6.694,43	6
Triturus marmoratus	Amphibians	65,88	7.349,05	6
Troglodytes troglodytes	Birds	197,63	6.694,43	6
Turdus merula	Birds	26,35	6.694,43	6
Turdus philomelos	Birds	32,94	6.694,43	6
Turdus torquatus	Birds	592,89	6.694,43	6
Turdus viscivorus	Birds	32,94	6.694,43	6
Tyto alba	Birds	1.185,77	6.694,43	6
Upupa epops	Birds	3.952,57	6.694,43	6
Uria aalge	Birds	592,89	6.694,43	6
Vanellus vanellus	Birds	65,88	6.694,43	6
Vipera aspis	Reptiles	65,88	7.349,05	6
Vipera seoanei	Reptiles	65,88	7.349,05	6
Vulpes vulpes	Mammals	26,35	23.257,30	24
Zamenis longissimus	Reptiles	197,63	7.349,05	6
Zootoca vivipara	Reptiles	65,88	7.349,05	6
Other Critically Endangered Amphibians	Amphibians	395,26	7.349,05	6
Other endangered Amphibians	Amphibians	395,26	7.349,05	6
Other Vulnerable Amphibians	Amphibians	241,55	7.349,05	6
Other non-endangered Amphibians	Amphibians	228,37	7.349,05	6
Other Critically Endangered Birds	Birds	34.198,85	6.694,43	6
Other Birds at risk	Birds	24.973,21	6.694,43	6
Other Vulnerable Birds	Birds	11.575,07	6.694,43	6
Other non-threatened Birds	Birds	2.184,66	6.694,43	6
Other Critically Endangered Mammals	Mammals	159.861,20	23.257,30	24
Other endangered mammals	Mammals	5.270,09	23.257,30	24
Other Vulnerable Mammals	Mammals	1.394,03	23.257,30	24
Other non-threatened mammals	Mammals	1.394,03	23.257,30	24
Other critically endangered Inland fish	Inland fish	251,06	7.349,05	6
Other Inland fish endangered	Inland fish	251,06	7.349,05	6
Other vulnerable Inland fish	Inland fish	251,06	7.349,05	6
Other Inland fish not threatened	Inland fish	15,81	7.349,05	6
Other critically endangered reptiles	Reptiles	9.241,11	7.349,05	6
Other endangered reptiles	Reptiles	9.241,11	7.349,05	6
Other vulnerable reptiles	Reptiles	395,26	7.349,05	6

COMBINATION REPAIR TECHNIQUE	1B CAPTURE OF GMOS AND RESTOCKING WITH CAPTIVE-BRED INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Other non-threatened reptiles	Reptiles	191,35	7.349,05	6

E. DAMAGE TO ANIMAL SPECIES: COMBINATION 1C (DAMAGE BY DEATH BY INVASIVE ALIEN SPECIES

TABLE A.I-7. REMEDIATION TECHNIQUES FOR INVASIVE ALIEN INVASIVE SPECIES DEATH DAMAGE TO ANIMAL SPECIES (COMBINATION 1C). SOURCE: OWN ELABORATION.

COMBINATION REPAIR TECHNIQUE	1C CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS.			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Accipiter gentilis	Birds	3.952,57	6.694,43	6
Accipiter nisus	Birds	1.976,28	6.694,43	6
Acrocephalus arundinaceus	Birds	2.635,05	6.694,43	6
Acrocephalus paludicola	Birds	197,63	6.694,43	6
Acrocephalus schoenobaenus	Birds	5.270,09	6.694,43	6
Acrocephalus scirpaceus	Birds	2.635,05	6.694,43	6
Actitis hypoleucos	Birds	2.635,05	6.694,43	6
Aegithalos caudatus	Birds	197,63	6.694,43	6
Aegypius monachus	Birds	106.574,13	6.694,43	6
Alauda arvensis	Birds	197,63	6.694,43	6
Alcedo atthis	Birds	592,89	6.694,43	6
Alectoris barbara	Birds	54,09	6.694,43	6
Alectoris rufa	Birds	98,81	6.694,43	6
Alosa alosa	Inland fish	395,26	7.349,05	6
Alytes obstetricans	Amphibians	65,88	7.349,05	6
Anas acuta	Birds	131,75	6.694,43	6
Anas clypeata	Birds	131,75	6.694,43	6
Anas crecca	Birds	98,81	6.694,43	6
Anas platyrhynchos	Birds	98,81	6.694,43	6
Anas querquedula	Birds	263,50	6.694,43	6
Anas strepera	Birds	131,75	6.694,43	6
Anguilla anguilla	Inland fish	26,35	7.349,05	6
Anguis fragilis	Reptiles	65,88	7.349,05	6
Anser anser	Birds	395,26	6.694,43	6
Anthus campestris	Birds	197,63	6.694,43	6
Anthus pratensis	Birds	197,63	6.694,43	6
Anthus spinoletta	Birds	197,63	6.694,43	6

COMBINATION	1C			
REPAIR TECHNIQUE	CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS.			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Anthus trivialis	Birds	197,63	6.694,43	6
Apodemus flavicollis	Mammals	32,94	23.257,30	24
Apodemus sylvaticus	Mammals	32,94	23.257,30	24
Apus apus	Birds	592,89	6.694,43	6
Apus melba	Birds	592,89	6.694,43	6
Aquila adalberti	Birds	159.861,20	6.694,43	6
Aquila chrysaetos	Birds	106.574,13	6.694,43	6
Ardea cinerea	Birds	5.328,70	6.694,43	6
Ardea purpurea	Birds	5.330,17	6.694,43	6
Ardeola ralloides	Birds	6.587,61	6.694,43	6
Arvicola sapidus	Mammals	131,75	23.257,30	24
Arvicola terrestris	Mammals	131,75	23.257,30	24
Asio flammeus	Birds	2.635,05	6.694,43	6
Asio otus	Birds	1.185,77	6.694,43	6
Athene noctua	Birds	1.185,77	6.694,43	6
Aythya ferina	Birds	131,75	6.694,43	6
Aythya fuligula	Birds	197,63	6.694,43	6
Barbastella barbastellus	Mammals	5.270,09	23.257,30	24
Barbus haasi	Inland fish	131,75	7.349,05	6
Botaurus stellaris	Birds	6.587,61	6.694,43	6
Bubo bubo	Birds	10.657,41	6.694,43	6
Bufo calamita	Amphibians	395,26	7.349,05	6
Burhinus oedicnemus	Birds	592,89	6.694,43	6
Buteo buteo	Birds	1.976,28	6.694,43	6
Calandrella brachydactyla	Birds	197,63	6.694,43	6
Calandrella rufescens	Birds	197,63	6.694,43	6
Callipepla californica	Birds	21,32	6.694,43	6
Calonectris diomedea	Birds	1.185,77	6.694,43	6
Calotriton asper	Amphibians	658,76	7.349,05	6
Canis lupus	Mammals	21.314,83	23.257,30	24
Capra pyrenaica	Mammals	21.314,83	23.257,30	24
Capreolus capreolus	Mammals	2.664,35	23.257,30	24
Caprimulgus europaeus	Birds	592,89	6.694,43	6
Carassius auratus	Inland fish	6,59	7.349,05	6
Carduelis cannabina	Birds	39,53	6.694,43	6
Carduelis carduelis	Birds	39,53	6.694,43	6
Carduelis chloris	Birds	39,53	6.694,43	6
Carduelis spinus	Birds	65,88	6.694,43	6
Caretta caretta	Reptiles	395,26	7.349,05	6
Certhia brachydactyla	Birds	197,63	6.694,43	6
Certhia familiaris	Birds	2.635,05	6.694,43	6

COMBINATION REPAIR TECHNIQUE	1C CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS.			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Cervus elaphus	Mammals	2.664,35	23.257,30	24
Cettia cetti	Birds	197,63	6.694,43	6
Chalcides minutus	Reptiles	395,26	7.349,05	6
Chalcides striatus	Reptiles	131,75	7.349,05	6
Charadrius alexandrinus	Birds	2.635,05	6.694,43	6
Charadrius dubius	Birds	3.952,57	6.694,43	6
Charadrius morinellus	Birds	592,89	6.694,43	6
Chelon labrosus	Inland fish	13,18	7.349,05	6
Chelonia mydas	Reptiles	658,76	7.349,05	6
Chionomys nivalis	Mammals	263,50	23.257,30	24
Chlamydotis undulata	Birds	21.314,83	6.694,43	6
Chlidonias hybrida	Birds	592,89	6.694,43	6
Chlidonias niger	Birds	5.270,09	6.694,43	6
Ciconia ciconia	Birds	10.657,41	6.694,43	6
Ciconia nigra	Birds	159.861,20	6.694,43	6
Cinclus cinclus	Birds	592,89	6.694,43	6
Circaetus gallicus	Birds	3.952,57	6.694,43	6
Circus aeruginosus	Birds	3.952,57	6.694,43	6
Circus cyaneus	Birds	1.976,28	6.694,43	6
Circus pygargus	Birds	3.952,57	6.694,43	6
Cisticola juncidis	Birds	197,63	6.694,43	6
Cobitis calderoni	Inland fish	395,26	7.349,05	6
Coccothraustes coccothraustes	Birds	1.185,77	6.694,43	6
Columba bollii	Birds	21,32	6.694,43	6
Columba domestica	Birds	21,32	6.694,43	6
Columba guinea	Birds	21,32	6.694,43	6
Columba junoniae	Birds	21,32	6.694,43	6
Columba livia/domestica	Birds	52,70	6.694,43	6
Columba oenas	Birds	52,70	6.694,43	6
Columba palumbus	Birds	52,70	6.694,43	6
Coracias garrulus	Birds	592,89	6.694,43	6
Coronella austriaca	Reptiles	197,63	7.349,05	6
Coronella girondica	Reptiles	131,75	7.349,05	6
Corvus corax	Birds	263,50	6.694,43	6
Corvus corone	Birds	6,59	6.694,43	6
Corvus monedula	Birds	263,50	6.694,43	6
Coturnix coturnix	Birds	98,81	6.694,43	6
Crocidura russula	Mammals	32,94	23.257,30	24
Crocidura suaveolens	Mammals	32,94	23.257,30	24
Cuculus canorus	Birds	592,89	6.694,43	6
Cyanopica cyana	Birds	197,63	6.694,43	6

COMBINATION	1C			
REPAIR TECHNIQUE	CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS.			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Cygnus olor	Birds	2.635,05	6.694,43	6
Dama dama	Mammals	2.664,35	23.257,30	24
Delichon urbicum	Birds	197,63	6.694,43	6
Dendrocopos leucotos	Birds	592,89	6.694,43	6
Dendrocopos major	Birds	592,89	6.694,43	6
Dendrocopos medius	Birds	3.952,57	6.694,43	6
Dendrocopos minor	Birds	592,89	6.694,43	6
Dermochelys coriacea	Reptiles	658,76	7.349,05	6
Discoglossus galganoi	Amphibians	131,75	7.349,05	6
Dryocopus martius	Birds	2.635,05	6.694,43	6
Egretta garzetta	Birds	1.976,28	6.694,43	6
Eliomys quercinus	Mammals	197,63	23.257,30	24
Emberiza calandra	Birds	65,88	6.694,43	6
Emberiza cia	Birds	197,63	6.694,43	6
Emberiza cirlus	Birds	197,63	6.694,43	6
Emberiza citrinella	Birds	197,63	6.694,43	6
Emberiza hortulana	Birds	197,63	6.694,43	6
Emberiza schoeniclus	Birds	2.635,05	6.694,43	6
Emys orbicularis	Reptiles	395,26	7.349,05	6
Eptesicus serotinus	Mammals	131,75	23.257,30	24
Eretmochelys imbricata	Reptiles	658,76	7.349,05	6
Erinaceus europaeus	Mammals	197,63	23.257,30	24
Erithacus rubecula	Birds	197,63	6.694,43	6
Falco columbarius	Birds	3.952,57	6.694,43	6
Falco eleonorae	Birds	53.287,06	6.694,43	6
Falco naumanni	Birds	1.976,28	6.694,43	6
Falco pelegrinoides	Birds	53.287,06	6.694,43	6
Falco peregrinus	Birds	53.287,06	6.694,43	6
Falco subbuteo	Birds	3.952,57	6.694,43	6
Falco tinnunculus	Birds	1.976,28	6.694,43	6
Felis silvestris	Mammals	3.952,57	23.257,30	24
Ficedula hypoleuca	Birds	2.635,05	6.694,43	6
Fringilla coelebs	Birds	197,63	6.694,43	6
Fulica atra	Birds	65,88	6.694,43	6
Galemys pyrenaicus	Mammals	5.270,09	23.257,30	24
Galerida cristata	Birds	197,63	6.694,43	6
Galerida theklae	Birds	197,63	6.694,43	6
Gallinago gallinago	Birds	98,81	6.694,43	6
Gallinula chloropus	Birds	65,88	6.694,43	6
Gallotia gomerana	Reptiles	35.515,17	7.349,05	6
Garrulus glandarius	Birds	79,05	6.694,43	6

COMBINATION REPAIR TECHNIQUE	1C CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS.			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Gasterosteus aculeatus	Inland fish	131,75	7.349,05	6
Genetta genetta	Mammals	197,63	23.257,30	24
Glis glis	Mammals	658,76	23.257,30	24
Gypaetus barbatus	Birds	159.861,20	6.694,43	6
Gyps fulvus	Birds	53.287,06	6.694,43	6
Haematopus ostralegus	Birds	592,89	6.694,43	6
Hieraaetus fasciatus	Birds	53.287,06	6.694,43	6
Hieraaetus pennatus	Birds	3.952,57	6.694,43	6
Hierophis viridiflavus	Reptiles	395,26	7.349,05	6
Himantopus himantopus	Birds	592,89	6.694,43	6
Hippolais polyglotta	Birds	197,63	6.694,43	6
Hirundo rustica	Birds	197,63	6.694,43	6
Hydrobates pelagicus	Birds	2.635,05	6.694,43	6
Hyla arborea	Amphibians	263,50	7.349,05	6
Hyla meridionalis	Amphibians	658,76	7.349,05	6
Hypsugo savii	Mammals	131,75	23.257,30	24
Ixobrychus minutus	Birds	3.952,57	6.694,43	6
Jynx torquilla	Birds	592,89	6.694,43	6
Lacerta bilineata	Reptiles	197,63	7.349,05	6
Lacerta schreiberi	Reptiles	197,63	7.349,05	6
Lamprotornis caudatus	Birds	5,32	6.694,43	6
Lamprotornis chalybaeus	Birds	6,79	6.694,43	6
Lanius collurio	Birds	197,63	6.694,43	6
Lanius excubitor	Birds	197,63	6.694,43	6
Lanius senator	Birds	3.952,57	6.694,43	6
Larus argentatus	Birds	26,35	6.694,43	6
Larus audouinii	Birds	1.976,28	6.694,43	6
Larus fuscus	Birds	592,89	6.694,43	6
Larus genei	Birds	592,89	6.694,43	6
Larus melanocephalus	Birds	592,89	6.694,43	6
Larus michahellis	Birds	26,35	6.694,43	6
Larus ridibundus	Birds	26,35	6.694,43	6
Lepus castroviejoi	Mammals	395,26	23.257,30	24
Lepus europaeus	Mammals	395,26	23.257,30	24
Lepus granatensis	Mammals	395,26	23.257,30	24
Lepus schlumbergeri	Mammals	395,26	23.257,30	24
Limosa limosa	Birds	592,89	6.694,43	6
Lissotriton helveticus	Amphibians	131,75	7.349,05	6
Locustella luscinioides	Birds	5.270,09	6.694,43	6
Locustella naevia	Birds	197,63	6.694,43	6
Loxia curvirostra	Birds	1.185,77	6.694,43	6

COMBINATION REPAIR TECHNIQUE	1C CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS.			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Lullula arborea	Birds	197,63	6.694,43	6
Luscinia megarhynchos	Birds	197,63	6.694,43	6
Luscinia svecica	Birds	197,63	6.694,43	6
Lutra lutra	Mammals	10.657,41	23.257,30	24
Lynx pardinus	Mammals	159.861,20	23.257,30	24
Malpolon monspessulanus	Reptiles	197,63	7.349,05	6
Martes foina	Mammals	197,63	23.257,30	24
Martes martes	Mammals	527,01	23.257,30	24
Mauremys leprosa	Reptiles	395,26	7.349,05	6
Melanocorypha calandra	Birds	197,63	6.694,43	6
Meles meles	Mammals	197,63	23.257,30	24
Merops apiaster	Birds	592,89	6.694,43	6
Mesotriton alpestris	Amphibians	395,26	7.349,05	6
Micromys minutus	Mammals	32,94	23.257,30	24
Microtus agrestis	Mammals	32,94	23.257,30	24
Microtus arvalis	Mammals	32,94	23.257,30	24
Microtus duodecimcostatus	Mammals	32,94	23.257,30	24
Microtus gerbei	Mammals	32,94	23.257,30	24
Microtus lusitanicus	Mammals	32,94	23.257,30	24
Milvus migrans	Birds	1.976,28	6.694,43	6
Milvus milvus	Birds	5.270,09	6.694,43	6
Miniopterus schreibersii	Mammals	527,01	23.257,30	24
Monticola saxatilis	Birds	592,89	6.694,43	6
Monticola solitarius	Birds	592,89	6.694,43	6
Montifringilla nivalis	Birds	197,63	6.694,43	6
Motacilla alba	Birds	197,63	6.694,43	6
Motacilla cinerea	Birds	197,63	6.694,43	6
Motacilla flava	Birds	197,63	6.694,43	6
Mus musculus	Mammals	32,94	23.257,30	24
Mus spretus	Mammals	32,94	23.257,30	24
Muscicapa striata	Birds	197,63	6.694,43	6
Mustela erminea	Mammals	5.270,09	23.257,30	24
Mustela lutreola	Mammals	5.270,09	23.257,30	24
Mustela nivalis	Mammals	131,75	23.257,30	24
Mustela putorius	Mammals	527,01	23.257,30	24
Myodes glareolus	Mammals	32,94	23.257,30	24
Myotis alcathoe	Mammals	658,76	23.257,30	24
Myotis bechsteinii	Mammals	658,76	23.257,30	24
Myotis blythii	Mammals	527,01	23.257,30	24
Myotis daubentonii	Mammals	131,75	23.257,30	24
Myotis emarginatus	Mammals	527,01	23.257,30	24

COMBINATION	1C			
REPAIR TECHNIQUE	CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS.			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Myotis myotis	Mammals	658,76	23.257,30	24
Myotis mystacinus	Mammals	658,76	23.257,30	24
Myotis nattereri	Mammals	131,75	23.257,30	24
Natrix maura	Reptiles	131,75	7.349,05	6
Natrix natrix	Reptiles	131,75	7.349,05	6
Neomys anomalus	Mammals	32,94	23.257,30	24
Neomys fodiens	Mammals	32,94	23.257,30	24
Neophron percnopterus	Birds	53.287,06	6.694,43	6
Netta rufina	Birds	197,63	6.694,43	6
Numenius arquata	Birds	592,89	6.694,43	6
Nyctalus lasiopterus	Mammals	527,01	23.257,30	24
Nyctalus leisleri	Mammals	131,75	23.257,30	24
Nyctalus noctula	Mammals	527,01	23.257,30	24
Nycticorax nycticorax	Birds	3.952,57	6.694,43	6
Oenanthe hispanica	Birds	197,63	6.694,43	6
Oenanthe leucura	Birds	197,63	6.694,43	6
Oenanthe oenanthe	Birds	197,63	6.694,43	6
Oriolus oriolus	Birds	592,89	6.694,43	6
Oryctolagus cuniculus	Mammals	65,88	23.257,30	24
Otis tarda	Birds	21.314,83	6.694,43	6
Otus scops	Birds	1.185,77	6.694,43	6
Ovis aries	Mammals	2.664,35	23.257,30	24
Pandion haliaetus	Birds	106.574,13	6.694,43	6
Panurus biarmicus	Birds	197,63	6.694,43	6
Parachondrostoma miegii	Inland fish	19,76	7.349,05	6
Parus ater	Birds	197,63	6.694,43	6
Parus cristatus	Birds	197,63	6.694,43	6
Parus major	Birds	197,63	6.694,43	6
Parus palustris	Birds	197,63	6.694,43	6
Passer domesticus	Birds	32,94	6.694,43	6
Passer montanus	Birds	197,63	6.694,43	6
Pelobates cultripes	Amphibians	197,63	7.349,05	6
Pelodytes punctatus	Amphibians	65,88	7.349,05	6
Pelophylax perezi	Amphibians	39,53	7.349,05	6
Perdix perdix	Birds	54,09	6.694,43	6
Pernis apivorus	Birds	2.635,05	6.694,43	6
Petromyzon marinus	Inland fish	395,26	7.349,05	6
Petronia petronia	Birds	197,63	6.694,43	6
Phalacrocorax aristotelis	Birds	3.952,57	6.694,43	6
Phalacrocorax carbo	Birds	1.185,77	6.694,43	6
Phasianus colchicus	Birds	98,81	6.694,43	6

COMBINATION	1C			
REPAIR TECHNIQUE	CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS.			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Phoenicopterus roseus	Birds	5.270,09	6.694,43	6
Phoenicurus ochruros	Birds	197,63	6.694,43	6
Phoenicurus phoenicurus	Birds	3.952,57	6.694,43	6
Phoxinus bigerri	Inland fish	19,76	7.349,05	6
Phylloscopus bonelli	Birds	197,63	6.694,43	6
Phylloscopus sibilatrix	Birds	197,63	6.694,43	6
Phylloscopus trochilus	Birds	2.635,05	6.694,43	6
Pica pica	Birds	6,59	6.694,43	6
Picus viridis	Birds	592,89	6.694,43	6
Pipistrellus kuhlii	Mammals	131,75	23.257,30	24
Pipistrellus nathusii	Mammals	131,75	23.257,30	24
Pipistrellus pipistrellus	Mammals	131,75	23.257,30	24
Pipistrellus pygmaeus	Mammals	131,75	23.257,30	24
Platalea leucorodia	Birds	5.270,09	6.694,43	6
Platichthys flesus	Inland fish	19,76	7.349,05	6
Plecotus auritus	Mammals	131,75	23.257,30	24
Plecotus austriacus	Mammals	131,75	23.257,30	24
Podarcis hispanica	Reptiles	65,88	7.349,05	6
Podarcis muralis	Reptiles	65,88	7.349,05	6
Podiceps cristatus	Birds	592,89	6.694,43	6
Podiceps nigricollis	Birds	592,89	6.694,43	6
Porzana parva	Birds	197,63	6.694,43	6
Porzana porzana	Birds	197,63	6.694,43	6
Porzana pusilla	Birds	197,63	6.694,43	6
Prunella collaris	Birds	197,63	6.694,43	6
Prunella modularis	Birds	197,63	6.694,43	6
Psammodromus algirus	Reptiles	197,63	7.349,05	6
Ptyonoprogne rupestris	Birds	197,63	6.694,43	6
Puffinus puffinus	Birds	1.185,77	6.694,43	6
Pyrrhocorax graculus	Birds	592,89	6.694,43	6
Pyrrhocorax pyrrhocorax	Birds	592,89	6.694,43	6
Pyrrhula pyrrhula	Birds	197,63	6.694,43	6
Rallus aquaticus	Birds	2.635,05	6.694,43	6
Rana dalmatina	Amphibians	395,26	7.349,05	6
Rana iberica	Amphibians	263,50	7.349,05	6
Rana temporaria	Amphibians	65,88	7.349,05	6
Recurvirostra avosetta	Birds	592,89	6.694,43	6
Regulus ignicapilla	Birds	197,63	6.694,43	6
Regulus regulus	Birds	197,63	6.694,43	6
Remiz pendulinus	Birds	197,63	6.694,43	6
Rhinechis scalaris	Reptiles	263,50	7.349,05	6

COMBINATION REPAIR TECHNIQUE	1C CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS.			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Rhinolophus euryale	Mammals	658,76	23.257,30	24
Rhinolophus ferrumequinum	Mammals	527,01	23.257,30	24
Rhinolophus hipposideros	Mammals	131,75	23.257,30	24
Riparia riparia	Birds	3.952,57	6.694,43	6
Rissa tridactyla	Birds	592,89	6.694,43	6
Salamandra salamandra	Amphibians	65,88	7.349,05	6
Salaria fluviatilis	Inland fish	395,26	7.349,05	6
Salmo salar	Inland fish	105,40	7.349,05	6
Salmo trutta	Inland fish	105,40	7.349,05	6
Saxicola rubetra	Birds	197,63	6.694,43	6
Sciurus vulgaris	Mammals	197,63	23.257,30	24
Scolopax rusticola	Birds	131,75	6.694,43	6
Serinus citrinella	Birds	197,63	6.694,43	6
Serinus serinus	Birds	39,53	6.694,43	6
Sitta europaea	Birds	197,63	6.694,43	6
Sorex coronatus	Mammals	32,94	23.257,30	24
Sorex minutus	Mammals	32,94	23.257,30	24
Squalius pyrenaicus	Inland fish	395,26	7.349,05	6
Sterna albifrons	Birds	592,89	6.694,43	6
Sterna hirundo	Birds	592,89	6.694,43	6
Sterna nilotica	Birds	2.635,05	6.694,43	6
Streptopelia decaocto	Birds	26,35	6.694,43	6
Streptopelia turtur	Birds	98,81	6.694,43	6
Strix aluco	Birds	1.185,77	6.694,43	6
Sturnus unicolor	Birds	26,35	6.694,43	6
Sturnus vulgaris	Birds	32,94	6.694,43	6
Suncus etruscus	Mammals	32,94	23.257,30	24
Sus scrofa	Mammals	532,86	23.257,30	24
Sylvia atricapilla	Birds	197,63	6.694,43	6
Sylvia borin	Birds	197,63	6.694,43	6
Sylvia cantillans	Birds	197,63	6.694,43	6
Sylvia communis	Birds	197,63	6.694,43	6
Sylvia conspicillata	Birds	197,63	6.694,43	6
Sylvia hortensis	Birds	197,63	6.694,43	6
Sylvia undata	Birds	197,63	6.694,43	6
Tachybaptus ruficollis	Birds	2.635,05	6.694,43	6
Tadarida teniotis	Mammals	131,75	23.257,30	24
Tadorna ferruginea	Birds	3.952,57	6.694,43	6
Tadorna tadorna	Birds	3.952,57	6.694,43	6
Talpa europaea	Mammals	32,94	23.257,30	24
Talpa occidentalis	Mammals	32,94	23.257,30	24

COMBINATION	1C			
REPAIR TECHNIQUE	CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS.			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Tetrax tetrax	Birds	3.952,57	6.694,43	6
Thalasseus sandvicensis	Birds	592,89	6.694,43	6
Tichodroma muraria	Birds	1.976,28	6.694,43	6
Timon lepidus	Reptiles	197,63	7.349,05	6
Tinca tinca	Inland fish	19,76	7.349,05	6
Tringa ochropus	Birds	592,89	6.694,43	6
Triturus marmoratus	Amphibians	65,88	7.349,05	6
Troglodytes troglodytes	Birds	197,63	6.694,43	6
Turdus merula	Birds	26,35	6.694,43	6
Turdus philomelos	Birds	32,94	6.694,43	6
Turdus torquatus	Birds	592,89	6.694,43	6
Turdus viscivorus	Birds	32,94	6.694,43	6
Tyto alba	Birds	1.185,77	6.694,43	6
Upupa epops	Birds	3.952,57	6.694,43	6
Uria aalge	Birds	592,89	6.694,43	6
Vanellus vanellus	Birds	65,88	6.694,43	6
Vipera aspis	Reptiles	65,88	7.349,05	6
Vipera seoanei	Reptiles	65,88	7.349,05	6
Vulpes vulpes	Mammals	26,35	23.257,30	24
Zamenis longissimus	Reptiles	197,63	7.349,05	6
Zootoca vivipara	Reptiles	65,88	7.349,05	6
Other Critically Endangered Amphibians	Amphibians	395,26	7.349,05	6
Other Endangered Amphibians	Amphibians	395,26	7.349,05	6
Other Vulnerable Amphibians	Amphibians	241,55	7.349,05	6
Other non-threatened Amphibians	Amphibians	228,37	7.349,05	6
Other Critically Endangered Birds	Birds	34.198,85	6.694,43	6
Other endangered Birds	Birds	24.973,21	6.694,43	6
Other Vulnerable Birds	Birds	11.575,07	6.694,43	6
Other non-threatened Birds	Birds	2.184,66	6.694,43	6
Other Critically Endangered Mammals	Mammals	159.861,20	23.257,30	24
Other endangered mammals	Mammals	5.270,09	23.257,30	24
Other Vulnerable Mammals	Mammals	1.394,03	23.257,30	24
Other non-threatened mammals	Mammals	1.394,03	23.257,30	24
Other critically endangered Inland fish	Inland fish	251,06	7.349,05	6
Other Inland fish endangered	Inland fish	251,06	7.349,05	6
Other vulnerable Inland fish	Inland fish	251,06	7.349,05	6
Other Inland fish not threatened	Inland fish	15,81	7.349,05	6
Other critically endangered reptiles	Reptiles	9.241,11	7.349,05	6

COMBINATION REPAIR TECHNIQUE		1C CAPTURE OF INVASIVE ALIEN ANIMALS BY MONITORING AND POPULATION CONTROL TEAMS AND RELEASE OF CAPTIVE-BRED INDIVIDUALS.		
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Other endangered reptiles	Reptiles	9.241,11	7.349,05	6
Other vulnerable reptiles	Reptiles	395,26	7.349,05	6
Other non-threatened reptiles	Reptiles	191,35	7.349,05	6

F. DAMAGE TO ANIMAL SPECIES: COMBINATION 1D (DEATH DAMAGE DUE TO VIRUSES AND BACTERIA)

TABLE A.I-8. VIRUS AND BACTERIAL DEATH DAMAGE REPAIR TECHNIQUES FOR ANIMAL SPECIES (COMBINATION 1D). SOURCE: OWN ELABORATION.

COMBINATION REPAIR TECHNIQUE		1D CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC VACCIE (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Accipiter gentilis	Birds	3.952,57	1,00	3.953,57	6
Accipiter nisus	Birds	1.976,28	1,00	1.977,28	6
Acrocephalus arundinaceus	Birds	2.635,05	1,00	2.636,05	6
Acrocephalus paludicola	Birds	197,63	1,00	198,63	6
Acrocephalus schoenobaenus	Birds	5.270,09	1,00	5.271,09	6
Acrocephalus scirpaceus	Birds	2.635,05	1,00	2.636,05	6
Actitis hypoleucos	Birds	2.635,05	1,00	2.636,05	6
Aegithalos caudatus	Birds	197,63	1,00	198,63	6
Aegypius monachus	Birds	106.574,13	1,00	106.575,13	6
Alauda arvensis	Birds	197,63	1,00	198,63	6
Alcedo atthis	Birds	592,89	1,00	593,89	6
Alectoris barbara	Birds	54,09	1,00	55,09	6
Alectoris rufa	Birds	98,81	1,00	99,81	6
Alosa alosa	Inland fish	395,26	1,00	396,26	6
Alytes obstetricans	Amphibians	65,88	1,00	66,88	6
Anas acuta	Birds	131,75	1,00	132,75	6
Anas clypeata	Birds	131,75	1,00	132,75	6
Anas crecca	Birds	98,81	1,00	99,81	6
Anas platyrhynchos	Birds	98,81	1,00	99,81	6
Anas querquedula	Birds	263,50	1,00	264,50	6
Anas strepera	Birds	131,75	1,00	132,75	6
Anguilla anguilla	Inland fish	26,35	1,00	27,35	6
Anguis fragilis	Reptiles	65,88	1,00	66,88	6
Anser anser	Birds	395,26	1,00	396,26	6

COMBINATION REPAIR TECHNIQUE		1D CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC VACCIE (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Anthus campestris	Birds	197,63	1,00	198,63	6
Anthus pratensis	Birds	197,63	1,00	198,63	6
Anthus spinoletta	Birds	197,63	1,00	198,63	6
Anthus trivialis	Birds	197,63	1,00	198,63	6
Apodemus flavicollis	Mammals	32,94	1,00	33,94	24
Apodemus sylvaticus	Mammals	32,94	1,00	33,94	24
Apus apus	Birds	592,89	1,00	593,89	6
Apus melba	Birds	592,89	1,00	593,89	6
Aquila adalberti	Birds	159.861,20	1,00	159.862,20	6
Aquila chrysaetos	Birds	106.574,13	1,00	106.575,13	6
Ardea cinerea	Birds	5.328,70	1,00	5.329,70	6
Ardea purpurea	Birds	5.330,17	1,00	5.331,17	6
Ardeola ralloides	Birds	6.587,61	1,00	6.588,61	6
Arvicola sapidus	Mammals	131,75	1,00	132,75	24
Arvicola terrestris	Mammals	131,75	1,00	132,75	24
Asio flammeus	Birds	2.635,05	1,00	2.636,05	6
Asio otus	Birds	1.185,77	1,00	1.186,77	6
Athene noctua	Birds	1.185,77	1,00	1.186,77	6
Aythya ferina	Birds	131,75	1,00	132,75	6
Aythya fuligula	Birds	197,63	1,00	198,63	6
Barbastella barbastellus	Mammals	5.270,09	1,00	5.271,09	24
Barbus haasi	Inland fish	131,75	1,00	132,75	6
Botaurus stellaris	Birds	6.587,61	1,00	6.588,61	6
Bubo bubo	Birds	10.657,41	1,00	10.658,41	6
Bufo calamita	Amphibians	395,26	1,00	396,26	6
Burhinus oedicnemus	Birds	592,89	1,00	593,89	6
Buteo buteo	Birds	1.976,28	1,00	1.977,28	6
Calandrella brachydactyla	Birds	197,63	1,00	198,63	6
Calandrella rufescens	Birds	197,63	1,00	198,63	6
Callipepla californica	Birds	21,32	1,00	22,32	6
Calonectris diomedea	Birds	1.185,77	1,00	1.186,77	6
Calotriton asper	Amphibians	658,76	1,00	659,76	6
Canis lupus	Mammals	21.314,83	1,00	21.315,83	24
Capra pyrenaica	Mammals	21.314,83	1,00	21.315,83	24
Capreolus capreolus	Mammals	2.664,35	1,00	2.665,35	24
Caprimulgus europaeus	Birds	592,89	1,00	593,89	6
Carassius auratus	Inland fish	6,59	1,00	7,59	6
Carduelis cannabina	Birds	39,53	1,00	40,53	6
Carduelis carduelis	Birds	39,53	1,00	40,53	6
Carduelis chloris	Birds	39,53	1,00	40,53	6
Carduelis spinus	Birds	65,88	1,00	66,88	6

COMBINATION REPAIR TECHNIQUE		1D CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC VACCIE (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Caretta caretta	Reptiles	395,26	1,00	396,26	6
Certhia brachydactyla	Birds	197,63	1,00	198,63	6
Certhia familiaris	Birds	2.635,05	1,00	2.636,05	6
Cervus elaphus	Mammals	2.664,35	1,00	2.665,35	24
Cettia cetti	Birds	197,63	1,00	198,63	6
Chalcides minutus	Reptiles	395,26	1,00	396,26	6
Chalcides striatus	Reptiles	131,75	1,00	132,75	6
Charadrius alexandrinus	Birds	2.635,05	1,00	2.636,05	6
Charadrius dubius	Birds	3.952,57	1,00	3.953,57	6
Charadrius morinellus	Birds	592,89	1,00	593,89	6
Chelon labrosus	Inland fish	13,18	1,00	14,18	6
Chelonia mydas	Reptiles	658,76	1,00	659,76	6
Chionomys nivalis	Mammals	263,50	1,00	264,50	24
Chlamydotis undulata	Birds	21.314,83	1,00	21.315,83	6
Chlidonias hybrida	Birds	592,89	1,00	593,89	6
Chlidonias niger	Birds	5.270,09	1,00	5.271,09	6
Ciconia ciconia	Birds	10.657,41	1,00	10.658,41	6
Ciconia nigra	Birds	159.861,20	1,00	159.862,20	6
Cinclus cinclus	Birds	592,89	1,00	593,89	6
Circaetus gallicus	Birds	3.952,57	1,00	3.953,57	6
Circus aeruginosus	Birds	3.952,57	1,00	3.953,57	6
Circus cyaneus	Birds	1.976,28	1,00	1.977,28	6
Circus pygargus	Birds	3.952,57	1,00	3.953,57	6
Cisticola juncidis	Birds	197,63	1,00	198,63	6
Cobitis calderoni	Inland fish	395,26	1,00	396,26	6
Coccothraustes coccothraustes	Birds	1.185,77	1,00	1.186,77	6
Columba bollii	Birds	21,32	1,00	22,32	6
Columba domestica	Birds	21,32	1,00	22,32	6
Columba guinea	Birds	21,32	1,00	22,32	6
Columba junoniae	Birds	21,32	1,00	22,32	6
Columba livia/domestica	Birds	52,70	1,00	53,70	6
Columba oenas	Birds	52,70	1,00	53,70	6
Columba palumbus	Birds	52,70	1,00	53,70	6
Coracias garrulus	Birds	592,89	1,00	593,89	6
Coronella austriaca	Reptiles	197,63	1,00	198,63	6
Coronella girondica	Reptiles	131,75	1,00	132,75	6
Corvus corax	Birds	263,50	1,00	264,50	6
Corvus corone	Birds	6,59	1,00	7,59	6
Corvus monedula	Birds	263,50	1,00	264,50	6
Coturnix coturnix	Birds	98,81	1,00	99,81	6
Crocidura russula	Mammals	32,94	1,00	33,94	24

COMBINATION REPAIR TECHNIQUE		1D CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC VACCIE (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Crocidura suaveolens	Mammals	32,94	1,00	33,94	24
Cuculus canorus	Birds	592,89	1,00	593,89	6
Cyanopica cyana	Birds	197,63	1,00	198,63	6
Cygnus olor	Birds	2.635,05	1,00	2.636,05	6
Dama dama	Mammals	2.664,35	1,00	2.665,35	24
Delichon urbicum	Birds	197,63	1,00	198,63	6
Dendrocopos leucotos	Birds	592,89	1,00	593,89	6
Dendrocopos major	Birds	592,89	1,00	593,89	6
Dendrocopos medius	Birds	3.952,57	1,00	3.953,57	6
Dendrocopos minor	Birds	592,89	1,00	593,89	6
Dermochelys coriacea	Reptiles	658,76	1,00	659,76	6
Discoglossus galganoi	Amphibians	131,75	1,00	132,75	6
Dryocopus martius	Birds	2.635,05	1,00	2.636,05	6
Egretta garzetta	Birds	1.976,28	1,00	1.977,28	6
Eliomys quercinus	Mammals	197,63	1,00	198,63	24
Emberiza calandra	Birds	65,88	1,00	66,88	6
Emberiza cia	Birds	197,63	1,00	198,63	6
Emberiza cirlus	Birds	197,63	1,00	198,63	6
Emberiza citrinella	Birds	197,63	1,00	198,63	6
Emberiza hortulana	Birds	197,63	1,00	198,63	6
Emberiza schoeniclus	Birds	2.635,05	1,00	2.636,05	6
Emys orbicularis	Reptiles	395,26	1,00	396,26	6
Eptesicus serotinus	Mammals	131,75	1,00	132,75	24
Eretmochelys imbricata	Reptiles	658,76	1,00	659,76	6
Erinaceus europaeus	Mammals	197,63	1,00	198,63	24
Erithacus rubecula	Birds	197,63	1,00	198,63	6
Falco columbarius	Birds	3.952,57	1,00	3.953,57	6
Falco eleonorae	Birds	53.287,06	1,00	53.288,06	6
Falco naumanni	Birds	1.976,28	1,00	1.977,28	6
Falco pelegrinoides	Birds	53.287,06	1,00	53.288,06	6
Falco peregrinus	Birds	53.287,06	1,00	53.288,06	6
Falco subbuteo	Birds	3.952,57	1,00	3.953,57	6
Falco tinnunculus	Birds	1.976,28	1,00	1.977,28	6
Felis silvestris	Mammals	3.952,57	1,00	3.953,57	24
Ficedula hypoleuca	Birds	2.635,05	1,00	2.636,05	6
Fringilla coelebs	Birds	197,63	1,00	198,63	6
Fulica atra	Birds	65,88	1,00	66,88	6
Galemys pyrenaicus	Mammals	5.270,09	1,00	5.271,09	24
Galerida cristata	Birds	197,63	1,00	198,63	6
Galerida theklae	Birds	197,63	1,00	198,63	6
Gallinago gallinago	Birds	98,81	1,00	99,81	6

COMBINATION REPAIR TECHNIQUE		1D CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC VACCIE (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Gallinula chloropus	Birds	65,88	1,00	66,88	6
Gallotia gomerana	Reptiles	35.515,17	1,00	35.516,17	6
Garrulus glandarius	Birds	79,05	1,00	80,05	6
Gasterosteus aculeatus	Inland fish	131,75	1,00	132,75	6
Genetta genetta	Mammals	197,63	1,00	198,63	24
Glis glis	Mammals	658,76	1,00	659,76	24
Gypaetus barbatus	Birds	159.861,20	1,00	159.862,20	6
Gyps fulvus	Birds	53.287,06	1,00	53.288,06	6
Haematopus ostralegus	Birds	592,89	1,00	593,89	6
Hieraaetus fasciatus	Birds	53.287,06	1,00	53.288,06	6
Hieraaetus pennatus	Birds	3.952,57	1,00	3.953,57	6
Hierophis viridiflavus	Reptiles	395,26	1,00	396,26	6
Himantopus himantopus	Birds	592,89	1,00	593,89	6
Hippolais polyglotta	Birds	197,63	1,00	198,63	6
Hirundo rustica	Birds	197,63	1,00	198,63	6
Hydrobates pelagicus	Birds	2.635,05	1,00	2.636,05	6
Hyla arborea	Amphibians	263,50	1,00	264,50	6
Hyla meridionalis	Amphibians	658,76	1,00	659,76	6
Hypsugo savii	Mammals	131,75	1,00	132,75	24
Ixobrychus minutus	Birds	3.952,57	1,00	3.953,57	6
Jynx torquilla	Birds	592,89	1,00	593,89	6
Lacerta bilineata	Reptiles	197,63	1,00	198,63	6
Lacerta schreiberi	Reptiles	197,63	1,00	198,63	6
Lamprotornis caudatus	Birds	5,32	1,00	6,32	6
Lamprotornis chalybaeus	Birds	6,79	1,00	7,79	6
Lanius collurio	Birds	197,63	1,00	198,63	6
Lanius excubitor	Birds	197,63	1,00	198,63	6
Lanius senator	Birds	3.952,57	1,00	3.953,57	6
Larus argentatus	Birds	26,35	1,00	27,35	6
Larus audouinii	Birds	1.976,28	1,00	1.977,28	6
Larus fuscus	Birds	592,89	1,00	593,89	6
Larus genei	Birds	592,89	1,00	593,89	6
Larus melanocephalus	Birds	592,89	1,00	593,89	6
Larus michahellis	Birds	26,35	1,00	27,35	6
Larus ridibundus	Birds	26,35	1,00	27,35	6
Lepus castroviejoi	Mammals	395,26	1,00	396,26	24
Lepus europaeus	Mammals	395,26	1,00	396,26	24
Lepus granatensis	Mammals	395,26	1,00	396,26	24
Lepus schlumbergeri	Mammals	395,26	1,00	396,26	24
Limosa limosa	Birds	592,89	1,00	593,89	6
Lissotriton helveticus	Amphibians	131,75	1,00	132,75	6

COMBINATION REPAIR TECHNIQUE		1D CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC VACCIE (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Locustella luscinioides	Birds	5.270,09	1,00	5.271,09	6
Locustella naevia	Birds	197,63	1,00	198,63	6
Loxia curvirostra	Birds	1.185,77	1,00	1.186,77	6
Lullula arborea	Birds	197,63	1,00	198,63	6
Luscinia megarhynchos	Birds	197,63	1,00	198,63	6
Luscinia svecica	Birds	197,63	1,00	198,63	6
Lutra lutra	Mammals	10.657,41	1,00	10.658,41	24
Lynx pardinus	Mammals	159.861,20	1,00	159.862,20	24
Malpolon monspessulanus	Reptiles	197,63	1,00	198,63	6
Martes foina	Mammals	197,63	1,00	198,63	24
Martes martes	Mammals	527,01	1,00	528,01	24
Mauremys leprosa	Reptiles	395,26	1,00	396,26	6
Melanocorypha calandra	Birds	197,63	1,00	198,63	6
Meles meles	Mammals	197,63	1,00	198,63	24
Merops apiaster	Birds	592,89	1,00	593,89	6
Mesotriton alpestris	Amphibians	395,26	1,00	396,26	6
Micromys minutus	Mammals	32,94	1,00	33,94	24
Microtus agrestis	Mammals	32,94	1,00	33,94	24
Microtus arvalis	Mammals	32,94	1,00	33,94	24
Microtus duodecimcostatus	Mammals	32,94	1,00	33,94	24
Microtus gerbei	Mammals	32,94	1,00	33,94	24
Microtus lusitanicus	Mammals	32,94	1,00	33,94	24
Milvus migrans	Birds	1.976,28	1,00	1.977,28	6
Milvus milvus	Birds	5.270,09	1,00	5.271,09	6
Miniopterus schreibersii	Mammals	527,01	1,00	528,01	24
Monticola saxatilis	Birds	592,89	1,00	593,89	6
Monticola solitarius	Birds	592,89	1,00	593,89	6
Montifringilla nivalis	Birds	197,63	1,00	198,63	6
Motacilla alba	Birds	197,63	1,00	198,63	6
Motacilla cinerea	Birds	197,63	1,00	198,63	6
Motacilla flava	Birds	197,63	1,00	198,63	6
Mus musculus	Mammals	32,94	1,00	33,94	24
Mus spretus	Mammals	32,94	1,00	33,94	24
Muscicapa striata	Birds	197,63	1,00	198,63	6
Mustela erminea	Mammals	5.270,09	1,00	5.271,09	24
Mustela lutreola	Mammals	5.270,09	1,00	5.271,09	24
Mustela nivalis	Mammals	131,75	1,00	132,75	24
Mustela putorius	Mammals	527,01	1,00	528,01	24
Myodes glareolus	Mammals	32,94	1,00	33,94	24
Myotis alcathoe	Mammals	658,76	1,00	659,76	24
Myotis bechsteinii	Mammals	658,76	1,00	659,76	24

COMBINATION REPAIR TECHNIQUE		1D CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC VACCIE (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Myotis blythii	Mammals	527,01	1,00	528,01	24
Myotis daubentonii	Mammals	131,75	1,00	132,75	24
Myotis emarginatus	Mammals	527,01	1,00	528,01	24
Myotis myotis	Mammals	658,76	1,00	659,76	24
Myotis mystacinus	Mammals	658,76	1,00	659,76	24
Myotis nattereri	Mammals	131,75	1,00	132,75	24
Natrix maura	Reptiles	131,75	1,00	132,75	6
Natrix natrix	Reptiles	131,75	1,00	132,75	6
Neomys anomalus	Mammals	32,94	1,00	33,94	24
Neomys fodiens	Mammals	32,94	1,00	33,94	24
Neophron percnopterus	Birds	53.287,06	1,00	53.288,06	6
Netta rufina	Birds	197,63	1,00	198,63	6
Numenius arquata	Birds	592,89	1,00	593,89	6
Nyctalus lasiopterus	Mammals	527,01	1,00	528,01	24
Nyctalus leisleri	Mammals	131,75	1,00	132,75	24
Nyctalus noctula	Mammals	527,01	1,00	528,01	24
Nycticorax nycticorax	Birds	3.952,57	1,00	3.953,57	6
Oenanthe hispanica	Birds	197,63	1,00	198,63	6
Oenanthe leucura	Birds	197,63	1,00	198,63	6
Oenanthe oenanthe	Birds	197,63	1,00	198,63	6
Oriolus oriolus	Birds	592,89	1,00	593,89	6
Oryctolagus cuniculus	Mammals	65,88	1,00	66,88	24
Otis tarda	Birds	21.314,83	1,00	21.315,83	6
Otus scops	Birds	1.185,77	1,00	1.186,77	6
Ovis aries	Mammals	2.664,35	1,00	2.665,35	24
Pandion haliaetus	Birds	106.574,13	1,00	106.575,13	6
Panurus biarmicus	Birds	197,63	1,00	198,63	6
Parachondrostoma miegii	Inland fish	19,76	1,00	20,76	6
Parus ater	Birds	197,63	1,00	198,63	6
Parus cristatus	Birds	197,63	1,00	198,63	6
Parus major	Birds	197,63	1,00	198,63	6
Parus palustris	Birds	197,63	1,00	198,63	6
Passer domesticus	Birds	32,94	1,00	33,94	6
Passer montanus	Birds	197,63	1,00	198,63	6
Pelobates cultripes	Amphibians	197,63	1,00	198,63	6
Pelodytes punctatus	Amphibians	65,88	1,00	66,88	6
Pelophylax perezi	Amphibians	39,53	1,00	40,53	6
Perdix perdix	Birds	54,09	1,00	55,09	6
Pernis apivorus	Birds	2.635,05	1,00	2.636,05	6
Petromyzon marinus	Inland fish	395,26	1,00	396,26	6
Petronia petronia	Birds	197,63	1,00	198,63	6

COMBINATION REPAIR TECHNIQUE	1D CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS				
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC VACCIE (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Phalacrocorax aristotelis	Birds	3.952,57	1,00	3.953,57	6
Phalacrocorax carbo	Birds	1.185,77	1,00	1.186,77	6
Phasianus colchicus	Birds	98,81	1,00	99,81	6
Phoenicopterus roseus	Birds	5.270,09	1,00	5.271,09	6
Phoenicurus ochruros	Birds	197,63	1,00	198,63	6
Phoenicurus phoenicurus	Birds	3.952,57	1,00	3.953,57	6
Phoxinus bigerri	Inland fish	19,76	1,00	20,76	6
Phylloscopus bonelli	Birds	197,63	1,00	198,63	6
Phylloscopus sibilatrix	Birds	197,63	1,00	198,63	6
Phylloscopus trochilus	Birds	2.635,05	1,00	2.636,05	6
Pica pica	Birds	6,59	1,00	7,59	6
Picus viridis	Birds	592,89	1,00	593,89	6
Pipistrellus kuhlii	Mammals	131,75	1,00	132,75	24
Pipistrellus nathusii	Mammals	131,75	1,00	132,75	24
Pipistrellus pipistrellus	Mammals	131,75	1,00	132,75	24
Pipistrellus pygmaeus	Mammals	131,75	1,00	132,75	24
Platalea leucorodia	Birds	5.270,09	1,00	5.271,09	6
Platichthys flesus	Inland fish	19,76	1,00	20,76	6
Plecotus auritus	Mammals	131,75	1,00	132,75	24
Plecotus austriacus	Mammals	131,75	1,00	132,75	24
Podarcis hispanica	Reptiles	65,88	1,00	66,88	6
Podarcis muralis	Reptiles	65,88	1,00	66,88	6
Podiceps cristatus	Birds	592,89	1,00	593,89	6
Podiceps nigricollis	Birds	592,89	1,00	593,89	6
Porzana parva	Birds	197,63	1,00	198,63	6
Porzana porzana	Birds	197,63	1,00	198,63	6
Porzana pusilla	Birds	197,63	1,00	198,63	6
Prunella collaris	Birds	197,63	1,00	198,63	6
Prunella modularis	Birds	197,63	1,00	198,63	6
Psammodromus algirus	Reptiles	197,63	1,00	198,63	6
Ptyonoprogne rupestris	Birds	197,63	1,00	198,63	6
Puffinus puffinus	Birds	1.185,77	1,00	1.186,77	6
Pyrrhocorax graculus	Birds	592,89	1,00	593,89	6
Pyrrhocorax pyrrhocorax	Birds	592,89	1,00	593,89	6
Pyrrhula pyrrhula	Birds	197,63	1,00	198,63	6
Rallus aquaticus	Birds	2.635,05	1,00	2.636,05	6
Rana dalmatina	Amphibians	395,26	1,00	396,26	6
Rana iberica	Amphibians	263,50	1,00	264,50	6
Rana temporaria	Amphibians	65,88	1,00	66,88	6
Recurvirostra avosetta	Birds	592,89	1,00	593,89	6
Regulus ignicapilla	Birds	197,63	1,00	198,63	6

COMBINATION REPAIR TECHNIQUE		1D CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC VACCIE (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Regulus regulus	Birds	197,63	1,00	198,63	6
Remiz pendulinus	Birds	197,63	1,00	198,63	6
Rhinechis scalaris	Reptiles	263,50	1,00	264,50	6
Rhinolophus euryale	Mammals	658,76	1,00	659,76	24
Rhinolophus ferrumequinum	Mammals	527,01	1,00	528,01	24
Rhinolophus hipposideros	Mammals	131,75	1,00	132,75	24
Riparia riparia	Birds	3.952,57	1,00	3.953,57	6
Rissa tridactyla	Birds	592,89	1,00	593,89	6
Salamandra salamandra	Amphibians	65,88	1,00	66,88	6
Salaria fluviatilis	Inland fish	395,26	1,00	396,26	6
Salmo salar	Inland fish	105,40	1,00	106,40	6
Salmo trutta	Inland fish	105,40	1,00	106,40	6
Saxicola rubetra	Birds	197,63	1,00	198,63	6
Sciurus vulgaris	Mammals	197,63	1,00	198,63	24
Scolopax rusticola	Birds	131,75	1,00	132,75	6
Serinus citrinella	Birds	197,63	1,00	198,63	6
Serinus serinus	Birds	39,53	1,00	40,53	6
Sitta europaea	Birds	197,63	1,00	198,63	6
Sorex coronatus	Mammals	32,94	1,00	33,94	24
Sorex minutus	Mammals	32,94	1,00	33,94	24
Squalius pyrenaicus	Inland fish	395,26	1,00	396,26	6
Sterna albifrons	Birds	592,89	1,00	593,89	6
Sterna hirundo	Birds	592,89	1,00	593,89	6
Sterna nilotica	Birds	2.635,05	1,00	2.636,05	6
Streptopelia decaocto	Birds	26,35	1,00	27,35	6
Streptopelia turtur	Birds	98,81	1,00	99,81	6
Strix aluco	Birds	1.185,77	1,00	1.186,77	6
Sturnus unicolor	Birds	26,35	1,00	27,35	6
Sturnus vulgaris	Birds	32,94	1,00	33,94	6
Suncus etruscus	Mammals	32,94	1,00	33,94	24
Sus scrofa	Mammals	532,86	1,00	533,86	24
Sylvia atricapilla	Birds	197,63	1,00	198,63	6
Sylvia borin	Birds	197,63	1,00	198,63	6
Sylvia cantillans	Birds	197,63	1,00	198,63	6
Sylvia communis	Birds	197,63	1,00	198,63	6
Sylvia conspicillata	Birds	197,63	1,00	198,63	6
Sylvia hortensis	Birds	197,63	1,00	198,63	6
Sylvia undata	Birds	197,63	1,00	198,63	6
Tachybaptus ruficollis	Birds	2.635,05	1,00	2.636,05	6
Tadarida teniotis	Mammals	131,75	1,00	132,75	24
Tadorna ferruginea	Birds	3.952,57	1,00	3.953,57	6

COMBINATION	1D				
REPAIR TECHNIQUE	CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS				
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC VACCIE (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Tadorna tadorna	Birds	3.952,57	1,00	3.953,57	6
Talpa europaea	Mammals	32,94	1,00	33,94	24
Talpa occidentalis	Mammals	32,94	1,00	33,94	24
Tetrax tetrax	Birds	3.952,57	1,00	3.953,57	6
Thalasseus sandvicensis	Birds	592,89	1,00	593,89	6
Tichodroma muraria	Birds	1.976,28	1,00	1.977,28	6
Timon lepidus	Reptiles	197,63	1,00	198,63	6
Tinca tinca	Inland fish	19,76	1,00	20,76	6
Tringa ochropus	Birds	592,89	1,00	593,89	6
Triturus marmoratus	Amphibians	65,88	1,00	66,88	6
Troglodytes troglodytes	Birds	197,63	1,00	198,63	6
Turdus merula	Birds	26,35	1,00	27,35	6
Turdus philomelos	Birds	32,94	1,00	33,94	6
Turdus torquatus	Birds	592,89	1,00	593,89	6
Turdus viscivorus	Birds	32,94	1,00	33,94	6
Tyto alba	Birds	1.185,77	1,00	1.186,77	6
Upupa epops	Birds	3.952,57	1,00	3.953,57	6
Uria aalge	Birds	592,89	1,00	593,89	6
Vanellus vanellus	Birds	65,88	1,00	66,88	6
Vipera aspis	Reptiles	65,88	1,00	66,88	6
Vipera seoanei	Reptiles	65,88	1,00	66,88	6
Vulpes vulpes	Mammals	26,35	1,00	27,35	24
Zamenis longissimus	Reptiles	197,63	1,00	198,63	6
Zootoca vivipara	Reptiles	65,88	1,00	66,88	6
Other Critically Endangered Amphibians	Amphibians	395,26	1,00	396,26	6
Other Endangered Amphibians	Amphibians	395,26	1,00	396,26	6
Other Vulnerable Amphibians	Amphibians	241,55	1,00	242,55	6
Other non-threatened Amphibians	Amphibians	228,37	1,00	229,37	6
Other Critically Endangered Birds	Birds	34.198,85	1,00	34.199,85	6
Other endangered Birds	Birds	24.973,21	1,00	24.974,22	6
Other Vulnerable Birds	Birds	11.575,07	1,00	11.576,07	6
Other non-threatened Birds	Birds	2.184,66	1,00	2.185,66	6
Other Critically Endangered Mammals	Mammals	159.861,20	1,00	159.862,20	24
Other endangered mammals	Mammals	5.270,09	1,00	5.271,09	24
Other Vulnerable Mammals	Mammals	1.394,03	1,00	1.395,03	24
Other non-threatened mammals	Mammals	1.394,03	1,00	1.395,03	24
Other critically endangered Inland fish	Inland fish	251,06	1,00	252,06	6
Other Inland fish endangered	Inland fish	251,06	1,00	252,06	6

COMBINATION REPAIR TECHNIQUE		1D CAPTIVE BREEDING AND RELEASE OF VACCINATED REPLACEMENT INDIVIDUALS			
SPECIES	TYPE OF SPECIES	PEC REPOSITION (€2019/UD; UNIT COST)	PEC VACCIE (€2019/UD; UNIT COST)	PEC CAPTURE (€2019/UD; NIT COST)	RECOVERY TIME (MONTHS)
Other vulnerable Inland fish	Inland fish	251,06	1,00	252,06	6
Other non-endangered Inland fish	Inland fish	15,81	1,00	16,81	6
Other critically endangered reptiles	Reptiles	9.241,11	1,00	9.242,11	6
Other endangered reptiles	Reptiles	9.241,11	1,00	9.242,11	6
Other vulnerable reptiles	Reptiles	395,26	1,00	396,26	6
Other non-threatened reptiles	Reptiles	191,35	1,00	192,35	6

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